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C-4, Janakpuri, New Delhi-110058
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Contents

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Compression Function

Shashi Kant Pandey[1], Vijay Dahiya[2], Harish Singh[3]

Abstract: Keeping the data with it long lasting validity is one of the primary requirements in computer science. The storage size of data and the speed of access plays interesting role in this procedure. There are various storage schemes available in literature. Development of a scheme is always an attractive field of research for commuter scientist. The length of the code plays an important role in designing of the scheme. In this article we discuss a well-known scheme namely Huffman coding scheme and its algorithm with an example. A brief history and current trends of compression functions are also discussed.

Keywords: compression functions; coding theory; tree.

1. INTRODUCTION

The efficient transmission of data through online mode is very interesting task for network analyst and computer scientist. Here the meaning of efficiency of transmission mode is in two aspects, the accuracy of the received data and the time duration between sender and receiver. Through data compression it can achieve in some of aspects of these requirements. To fast transfer of data at its destination, it is necessary to either increase the data rate of the transmission media or simply send less data. But, we never require less data or a data with full of error at the receivers end. So always it is mandatory that either we received error free data or the whole data without any loss of information. Suppose we have to send a file through mail then first we compress it (using win zip), which reduces the size of the data and receiver get the original file without any loss of information. Win zip helps us in reduction of the size but the problem during transmission is still available. This can solve by the speed of transmission of the data (using high speed bandwidth). It is interesting that optical fiber transfer the data at the rate of speed of light in the glass. Nowadays, fiber optics is used to increase the transmission rate of the data. Using fiber optics communication, researchers at Bell labs have achieved over 100 Petabits per second kilometer speed [6]. Research in the direction of fiber optics is going on and NTT japan had demonstrated one of the fastest single fiber cables in 2012 [7]. Search of compression functions is another branch of work in the optimal data transmission. Claude Shannon was the person whose work on information theory is a breakthrough for this science [8]. Later he and his colleague Feno, developed a famous coding scheme named as Shanon-Fano coding.

In 1951, David Huffman a student of Fano, produce an algorithm which is an optimal coding scheme and it is known as Huffman coding scheme. This scheme is based on properties of tree in Graph theory. In a tree there is one and only one path between any two vertices, Huffman used this concept and produce this optimal scheme. One of the techniques to use it for storage in more optimal way is to compress the files. By taking advantage of redundancy or patterns, it may be able to "abbreviate" the contents in such a way to take up less space yet maintain the ability to reconstruct a full version of the original when needed. Such compression could be useful when trying to cram more information on a disk or to shorten the time needed to copy or send a file over a network. There are some known compression algorithms, which give compression formats, such as JPEG, MPEG, or MP3, are specifically designed to handle a particular type of data file. Some of the compression algorithms (e.g. JPEG, MPEG) are lossy-decompressing. In this compression scheme, the compressed result doesn't recreate a perfect copy of the original. It has the algorithm which compresses by just summarizing the data. In process of reconstruction the summary losses some information and fail to reconstruct the original data. Sound and video data may be acceptable for lossy encoding schemes because in this case a huge amount of data is available. In case of some missing pixels, retrieving does not affect the original information. But for text data these lossy encoding schemes are not appropriate. In case of text data, whole information is distributed uniquely and in retrieving of the original text it is necessary to get each at most text correctly. Huffman scheme is an efficient scheme in this scene. It reduces the text loss in the retrieving process because it not works on the lossy method of compression. In this article we brief this technique with its mathematical background. Section 2 contains the requirement of concepts from graph theory. Further we elaborate the Huffman scheme with an example.

2. GRAPHS AND TREE

Graphs theory has remarkable analogy to solve a lot of mathematical problems. From the beginning to till date this area attracts the research community to explore the theoretical understating about graphs. In this section we present the essential theoretical details of graphs.

[1,2,3]Department of Business Administration, Maharaja Surajmal Institute, GGSIP University, Delhi-110058
[1]shashikantpandey@msi-ggsip.org; [2]vijaydahiya@msi-ggsip.org; [3]harishsingh@msi-ggsip.org

Definition 2.1 [Graph] A graph G is representation of the relation between two sets called vertices and edges. If E and V be the set of edges and vertices respectively then we denote the graph as $G = (V, E)$.

Now to understand the concept of tree in graph theory following definitions are essential here. For the sake of convenience we assumed that there are n number of vertices $\{v_i : 1 \leq j \leq n\}$ and m number of edges $\{e_i : 1 \leq i \leq m\}$ in a graph denoted as $G = (V, E)$.

Definition 2.2 [Path] Sequence of continuous vertices in a graph is called path. For example $v_1, v_2, \ldots, v_k$ is a path of length of k.

Definition 2.3 [Connected Graph] A graph G is connected graph, if there is a path between any two vertices v_i and v_j of that graph for all $1 \leq i, j \leq$ n.

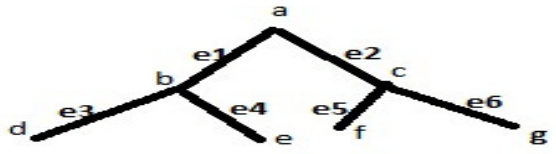
Definition 2.4[Walk] A walk in a graph is a path or a sequence of vertices with no repetition. A walk is closed if its start and end vertices is same.

Definition 2.5[Cycle] A closed walk is called a cycle in a graph. A graph which has no any cycle then it is called acyclic.

Based on the previous well known definitions in graph theory now we present a formal definition of tree in graph theory. Especially it is related to the unavailability of cycle in a graph and in the following definition we present this.

Definition 2.6[Tree] A connected acyclic graph is a tree. In a tree we always get a path from any two vertices and it is unique for any two vertices.

Here we present a graphical presentation of an example of tree of seven vertices $\{a, b, c, d, e, f, g\}$ and six edges $\{e1, e2, e3, e4, e5, e6\}$ is,



3. PRIMITIVES OF CODING THEORY

Design of all compression functions are based on some techniques of a mathematical function which is one way. From starting to till date the designing of compression functions are an interesting are of research in cryptography and coding theory. Various security algorithms and cryptographic signature schemes are based on some efficient compression functions. Keccak is the latest design of a compression function. This is based on the technique of sponge function [9]. Here we present some theoretical aspects for the design for a compression function.

A. Perfect secrecy:

Achievement of perfect secrecy is always required in design of any cryptosystem. In practical scenario perfect secrecy means that Oscar can obtain no information about plaintext by observing the cipher text. This terminology can be described in terms of probability distribution also. It is defined as in following definition.

Definition 3.1 A cryptosystem has perfect secrecy if $Pr[x \mid y] = Pr[x]$ for all $x \in P, y \in C$. That is, the a posteriori probability that the plaintext is *x*, given that the cipher text y is observed, is identical to the a priori probability that the plaintext is *x*

B. Entropy:

The idea of entropy is introduced by Shannon at first time in his famous paper named "A Mathematical Theory of communication" in 1948 [8]. Entropy can be thought of as a mathematical measure of information or uncertainty, and is computed as a function of probability distribution.

Suppose we have probability distribution of some events. The amount of information we gain from occurrence of these particular events under given probability distribution or we say, at what extent the uncertainty about the outcomes of events which are not yet occurred. So from definition it is clear that entropy is a function of probability distribution. If X is a random variable then entropy of X is denoted by H(X).

Definition 3.2 Suppose $\boldsymbol{X}$ is a discrete random variable which takes on values from set X Then the entropy of the random variable $\boldsymbol{X}$ is defined to be the quantity

$$H(\boldsymbol{X}) = -\sum_{x \in X} pr[x] log_2 pr[x]$$

In the next section we show an example of compression function namely Huffman coding scheme.

4. HUFFMAN CODING SCHEME EXAMPLE AND ALGORITHM

This scheme is based on the probability distribution of the plaintext. Using the technique of graph theory and probability distribution, this scheme assigns a unique code to each of the plaintext. Following is the algorithm for the Huffman coding scheme.

A. Algorithm:

Let given probability distribution is $P = \{p_i : 1 \leq i \leq n\}$

Step1: Short the $p_i's$ in decreasing order such that $p_1 \leq p_2 \leq \cdots \leq p_n$ and assume they are vertices of tree. These vertices are called as leaf of this tree and we start the extension of that tree from its leaf to its root.

Step2: Choose two minimum of $\{p_i : 1 \leq i \leq n\}$, these are p_1 & p_2

Step3: Find new vertices with entry are sum of $\{p_1 \& p_2\}$ let it is q_1 & makes edge between$p_1 to\ q_1$ & $p_2\ to\ q_1$. In this way we can extend this tree.

Step 4: Make new set of probability distribution with removing two selected p_i and include the new vertices q_i in P.

Step 5: Do step2& step3 till the vertices end or when we rich at the root of the tree.

Step 6: For encoding start labeling the tree starting from root as left edge with 0 and right edge with 1.

Step 7: Choose path from the root to the pendent vertices to encode the character whose probability distribution is given. And in this way we can provide a unique code to every information very efficiently.

B. Example:

Huffman coding uses 'variable length coding' which means that symbols in the data which we want to encode are converted to a binary symbol based on how often that symbol is used.

Let the probability distribution of five information or characters are as follows:

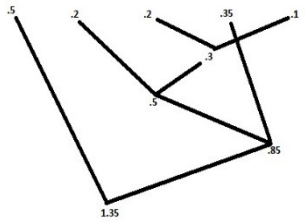
$$P = \{.5, .2, .2, .35, .1\}$$

First step: short P in descending order

$$P(x) = \{.5, .2, .2, .35, .1\}$$

Second step: Take smallest two of them and starting to build edge between both of them and sum of both probabilities. Again recursively do this process till all probability does not assign. Choose again minimum of them and add them for next vertices of the tree, we can see the minimum of them is .2 & .2 so next vertices is attached with them and its entry is .2+.2=.4

Recursive process of these steps gives a tree.



Give level to all edges of this tree which are code or alphabets. After leveling all the edges of this tree we get the required optimal code for this probability distribution of information.

Give level of this tree with 0 or 1 in the way such that all left edge are leveled with 0 and all right edges corresponding to each vertices are leveled with 1,we get the unique code for each characters. To produce code words for a character x follow the path from root of this tree to pendent vertices which is the probability corresponding to particular *x*. We get code words for each one as follows:

Cod words:	00	001	0101	11	1101
P(*x*):	.5	.2	.2	.35	.1

Since from each pair pendent vertices and root we have one and only one path so we get a unique code words for any " x"

Now we see that expected length of each code world is

l(*x*):	2	3	4	2	4
P(*x*):	.5	.2	.2	.35	.1
P(*x*)*l(*x*)	1.0	.6	.8	.7	.4

L =expected length of this code = $\sum$P(*x*)*l(*x*) = 3.5 bits and we know that in binary value system the entropy of this P is $H_2(P)$= 2.5016 bits. Therefore we can see that $H \leq L \leq H+1$

So it satisfies source coding inequality and we can say that this scheme work like that the most probable information or character are represented by less bits and less probable character or information are represented by more bits so this algorithm can optimize the expected length and produce an optimal code.

Authors and Affiliations

1. Assistant Professor in Maharaja Surajmal Institute, C-4, janakpuri, Delhi 110058

2. Associate Professor in Maharaja Surajmal Institute, C-4, Janakpuri, Delhi-110068

3. Professor in Maharaja Surajmal Institute, C-4, Janakpuri, Delhi-110068

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The Influence of Leadership on National Culture

(Comparison of Different Leadership Traits)

Rajeshwari Malik*

Abstract: Leadership and followership are very essential factors for national development and achievement of organizational goal. Leadership and followership is a major universal challenge to all nation States; while some countries have overcome the primitive or dictatorial stage to propel their economy and social welfare of her people to a comfortable level; other emerging developing economy are still reeling to grow above the challenges of impotent leadership and followership syndrome. This paper discusses Leadership from the macro level. It looks into the concept of leadership, Types, qualities, functions and problems of leadership from the India perspective and the relationship between Leadership and followership. The paper is aimed at enlightening political leaders and their followers of their responsibilities, and promoting good governance in India. This paper recommend that, leadership and followership relationship should always be harmonized as to enable the society or group to achieve her vision and set goal. Leadership and followership should adopt a new paradigm shift were values, and leadership traits, integrity and other discussed qualities herein will serve as the basis for consideration or conceding Leadership. Consensus selection of leaders should be avoided; Leaders should be elected through democratic and transparent process.

Keywords: Leadership, Followership, National Culture, Development, Economic growth

1. INTRODUCTION

Leadership is a sacred responsibility. It is for those who possess the spirit of sacrifice and selflessness. It is the ability of the individual to successfully direct the activities of the group to the attainment of organizational or national goals (Agwaranze, 1997). Leadership, according to Fayemi (2008) is "the ability to take an initiative, to motivate, to influence, to direct and control the thoughts, the opinions and the actions of the follows in any given society towards the achievement of purposeful desired ends". In China, we see that Mao's rule was closely associated with poor economic growth, averaging 1.7 percent per year. After his death, growth averaged 5.9 percent per year. The Cultural Revolution and the forced collectivization of agriculture were among many national policies that likely limited growth during Mao's rule, while Deng, who came to power in 1978, is often regarded as having moved China towards more market-oriented policies. While the dramatic change in growth after Mao's death may suggest leader effects, this is one example and it could be a coincidence. Jones and Olken (2005) analyze 57 cases of 6 natural and accidental deaths in the world sample and test, on average, whether growth changes in an unusual fashion when leaders die. Do leadership decides the destiny of a nation?

Also, does leadership shape the culture of a nation? Through this paper, the author tries to explore the relationship between leadership and national culture.

2. CONCEPTUAL FRAMEWORK

Leadership is defined in various ways. We shall examine some of the definitions and apply them to this study. Bryman (1992) in Ngwube (2010) defined Leadership as *a process of social influence whereby a Leader steers members of a group towards a goal*. Leadership here involves influence. It is concerned with how the Leader affects followers and the leader is the focal point. Fafowora et al (1995) also see leadership as implying *a purposeful direction of the affairs of the Led*. Leadership is all about influence here too. Northouse (2010) defined leadership as *a process whereby an individual influences a group of individuals to achieve a common goal.*

Tannenbaum and Thom-Otuya (2007) defined Leadership as *interpersonal influence exercised in situation and directed through communication process, toward the attainment of goals.* Utomi (2004) defined Leadership as the art of mobilizing in a least cost manner to achieve a clear goal. Stogdill, Irikana and Orisa (2007) defined Leadership as the process of influencing the activities of an organized group towards goal setting and goal achievement. R.J House and Thom Otuya (2007), described leadership as the ability of an individual to influence, motivate, and enable others to contribute toward the effectiveness and success of the organization of which they are members. According to Newman (1997) leadership is the special and unique ability to influence people to move towards goals that are beneficial and meet the group's best interests. In this paper, leadership will be seen as one who is in a position of integrity or trust, direct and conduct the affairs of a group or group of persons, influencing their behavior and decisions towards complying to the achievement of some desired goals. Leadership therefore involves the element or skills of: vision, motivation, integrity,

**Maharaja Surajmal Institute; rajmalik2007@gmail.com*

initiative, courage and successfully mobilizing an organization or group of persons towards a goal.

President Corazon Aquino of Philippines (Thom-Otuya, 2007) qualified leadership with its alphabet related acronym. They are:

L – Leadership is love of and loyalty to God, Country and People.

E – It is enthusiasm energetic effort to help and serve others.
A – It is action, accomplishment.

D – It is dedication, discipline, dignity, decency, devotion to duty, decisiveness for the general welfare.

E – It is excellence, exemplary work for others to follow and emulate.

R – It is reliability, responsibility; respect for the law arid the right of others, reconciliation for peace and unity.

S – It is sincerity, service, self-sacrifice, social justice to make life better for mankind.

H – It is humility, honesty, honor, helpfulness, hardwork for accomplishment and fulfillment.

I – It is integrity, interest, initiative, and idealism.

P – Finally leadership is patience, perseverance, beyond partisanship, religion or creed; it works for peace, progress and prosperity of mankind.

Types of Leadership: There are various classification (or types) of Leadership. The common classifications/ types of Leadership according to majority of authors are:

1. *Autocratic* (boss centered) Leadership: in this type of Leadership the leader makes decisions on his own without consulting others. This type of leadership is also called 'dictatorial". In this context, the leader assumes monopoly of knowledge. He is personal in his praises and criticisms of individuals but remains aloof from the group. The leader decrees what will be done and the followers have no choice but to accept it. All the military regimes in India are good examples of a dictatorial leadership.

2. *Democratic* (subordinate centered) Leadership: is one in which the leader invites the participation of subordinates or followers in decisions that affect them. This type of leader is characterized by his concern for the achievement of set goals with the group. He is sensitive and understands the need of the individual, groups within the organization and helps them to fulfill their needs as well as the functions of the group.

3. *Laissez-Faire* (free-reign) Leadership: is a leader that leaves many of the decisions up to the subordinates or followers to make. He gives his subordinates a "free reign" over their activities; has little or no attempt to evacuate or regulate the members of the group of their progress towards achieving their goals and objectives. In most cases, the laissez-faire leaders can be said to be enjoying leadership of position and not that of functions.

Followership can be described as adherence to a leader. But in this exposition, followership is the virtue of supporting leaders and helping them to lead well. For followers to help their leaders do well, they have a responsibility to actively participate in the achievement of a nation's goal. Jehn and Bezrukova (2003) contended that followership is a people oriented behavior, and this behavior builds relationships between leaders and followers, providing an environment that promotes all organizational members to focus on a common goal. Both authors suggested that good followers may be a catalyst for change in an organization as followership "inspires others to follow toward a common goal; creates enthusiasm and desire to excel; fully engages others, build confidence; moves the organization ahead as one entity rather than separate parts" Jehn and Bezrukova (2013).

3. REVIEW OF LITERATURE

Qualities of Good Followership: Irikana and Orisa (2007) described the qualities of good followership as total obedience to the laws of the land or constituted authorities. He said it requires loyalty or allegiance to the leadership, eschew indiscipline in any form or shapes, and explore channels of grievance resolution along with commitment to goals and aspiration of the country. Werlin (2012) contended that good followership relationships must build on motivation rather than control, and that instilling values into followers is essentially to develop a culture of trust and good relationship. He asserted that, the balance of power between leader and follower; however, must be maintained in order to provide a culture of openness that promotes self engagement.

National Development is defined by Lawal and Oluwatoyin (2011) as the overall development or a collective socio-economic, political as well as religious advancement of a country or nation. However in this paper, it will be describe as the ability of a country or countries to improve the social welfare of the people, by providing social amenities like quality education, potable water, transportation, infrastructure, medical care, etc.

According to Irikana and Orisa (2007) some basic qualities expected of a good leader are: (1) Intelligence (2) Self Control (3) Sociability (4) Integrity (5) Honesty (6) Patriotism (7) Courage (8) Foresight (9) Oratory ability (10) Alertness and (11) Empathy. A leader that possesses these qualities must enjoy, obedience, support and positive followership of his people, and will be attuned to high compliance in the

achievement of his set goals, and effective in dispensation of justice and public welfare.

***Functions of Leadership*:** Leadership functions are very numerous and articulated differently by various author, but all pointing to the ability of a Leader to mobilize his people to achieve a set goal. These functions of Leaders are:

Taking initiative: constitutes the most fundamental function of Leadership. A leader must be creative and logical enough in other to take action for every situation that confronts him. Initiators of action in an organization or states become history's most important Leaders. Taking initiative in detecting and remediating problems distinguishes leaders in many modern organizations and nation-states.

Evaluating Followers Needs, Aspiration, and Capabilities: for Leadership to command high followership there must be deliberate attempt by leadership to motivate their followers. Every person need hope to survive, and motivation has to do with the leader understanding the needs of his follower. Understanding the needs of your followers has to do with another leadership skill of patiently listening to your followers. It equally involves knowledge of their capabilities, including energy, endurance and commitment. Irikana and Orisa(2007) noted that, a purposeful and insightful leader creates new ideas, project discussion, etc and positively and invariably lead others in the group t o develop or carry out the tasks.

***Fostering and maintaining Communication*:** It is one of the leading functions of a leader. Leaders initiate instrumental relationships when they assign people to work in teams and task forces or appoint ministers, commissioners, advisers, etc. It is the task of a leader to prevent fragmentation and foster cooperation and team work amongst his subordinates and followers; this can be done through effective communication. Effective communication reduces doubt and suspicion among groups; sustain followers' interest and participation in group action or policy adoption and implementation.

***Representing Members' Aspirations and Values*:** one of the consistent noted function of leadership has been the expression and symbolization of their followers' aspiration and values. In developed societies, leadership role is assigned to people believed to reflect the values and aspirations of members. Some author will refer to this as implementation of group philosophy. To achieve this (Irikana & Orisa), rules and regulations are stated and implemented. This is to guide against conflict of interest among the group, and for the general good to prevail at all times.

Providing Resources: command of resources both material and non material promotes the exercise of leadership and compels the loyalty of followership. The entrepreneur who provides capital to Start-up Company attains influence over its operators. Strategic plans formulated by executives also constitute resources, providing direction to the Management team that work under them. In war, strategy itself becomes a crucial resource. In politics, followership expects one reward or the other from their leaders. Leaders process or facilitate the passage of a budget so that, they have both material and non material resources to provide for their followers. Followers also become more loyal to leadership as soon as budget has been passed so that, they can be involved in the material gain of implementing the budget.

There are nine roles important at senior strategic levels because they help leaders understand what to do to be strategic. These challenges include factors such as their increased span of influence, loss of tactical control, broader consequences of failure, the business scope they are addressing, their own visibility, and a greater variety in stakeholders they need to satisfy. Following are the nine key strategic leadership roles and brief definitions of each.

NAVIGATOR—Clearly and quickly works through the complexity of key issues, problems and opportunities to affect actions (e.g., leverage opportunities and resolve issues).

STRATEGIST—Develops a long-range course of action or set of goals to align with the organization's vision.

ENTREPRENEUR—Identifies and exploits opportunities for new products, services, and markets.

MOBILIZER—Proactively builds and aligns stakeholders, capabilities, and resources for getting things done quickly and achieving complex objectives.

TALENT ADVOCATE—Attracts, develops, and retains talent to ensure that people with the right skills and motivations to meet business needs are in the right place at the right time.

CAPTIVATOR—Builds passion and commitment toward a common goal.

GLOBAL THINKER—Integrates information from all sources to develop a well-informed, diverse perspective that can be used to optimize organizational performance.

CHANGE DRIVER—Creates an environment that embraces change; makes change happen—even if the change is radical— and helps others to accept new ideas.

ENTERPRISE GUARDIAN—Ensures shareholder value through courageous decision-making that supports enterprise—or unit-wide interests.

Strategic leaders are not typically engaged in all nine roles "all the time," they will often be involved in situations related to more than one role at any given time. The relative importance placed on each role is dependent upon the business situation in which the leader is engaged. Thus, in one situation a strategic leader may initially be focused on developing a long range

course of action or set of goals to align with the organization's vision. The focus might then subsequently shift to building passion and commitment toward those goals among the people who need to take ownership of the strategy or vision. The nine roles have general applicability across all senior leadership positions, and are not unique to any particular job; however, the particular focus on any given role at a point in time will be determined by the business issues being addressed at that time. Ideally, an executive team would collectively represent capabilities across the full spectrum of these roles.

Several factors will determine a leader's success or failure in meeting these challenges, such as his or her underlying skills or leadership competencies, knowledge, experience etc. Just because leaders have been highly successful in operational/functional roles doesn't ensure their success as senior strategic leaders. Yet organizations routinely rely on these very people to move into these critical roles. The result—senior strategic leaders who are unprepared to effectively deal with the situations and challenges they must face. Through the powerful content and hands-on leadership simulation of Strategic Leadership Experience, participants will learn how to think and act more strategically—to strategize ways to grow the business, gain acceptance of their strategies, and execute them to achieve desired business results.

4. NATIONAL CULTURE

Cultural problems have not become so apparent and delicate, for the world, today only. They have drawn the interest of many researchers for many years, bringing about the realization of many important studies, in size and scope, as well as in a representative capacity and actuality of (their) results. But, even though many researchers accept the influence of culture in organizational values and attitudes they very rarely go as far as to empirically confirm these relations Hofstede (1980; 1991) has identified four major dimensions of national culture: uncertainty avoidance, individualism/collectivism, masculinity/ femininity, and power distance. Uncertainty avoidance is a lack of tolerance for ambiguity. Individualism versus collectivism refers to a need for getting ahead versus a need to belong. The masculinity/femininity dimension is Hofstede's code for a preference for domination versus cooperation in superior/ subordinate relationships. Power distance describes a preference for, or tolerance of, inequality.

Hofstede (1991) and Hickson and Pugh (1995) have linked these cultural dimensions to organizational behavior. They found that high power distance is associated with strong authority and steep hierarchies, and that uncertainty avoidance is associated with formalization. Hofstede's (1980) framework has been criticized on both empirical and theoretical grounds (e.g., one time, single company data; dimensions derived from factor analysis). Nevertheless, on balance, Hofstede's framework has been largely validated (e.g., Sondergaard, 1994) and provides a reasonable representation of national cultural attributes (see also Hickson, 1996). In addition, it seems obvious that board structure is also influenced by differences in countries' economic, political and legal systems (e.g., Roe, 1993). This study, however, was restricted to cultural differences as a first step. Country-level economic development was also included as a control in the models. Kroeber, Kluckholn, Untereiner, & Meyer (1952) identified over 160 definitions of the term culture, selecting one of the widely cited definitions, offered by B. Tylor, "that complex whole which includes knowledge, belief, art, morals, law, custom, and any other capabilities and habits acquired by man as a member of society."

Later on Kluckholn & Kelly (1945) have referred to cultures as "all the historically created designs for living, explicit and implicit, rational, irrational, and non-rational, which exist at any given time as potential guides for the behavior of men." While Herskovits spoke of culture as being "the man-made part of the environment" and Downs (1971) defined culture as being "a mental map which guides us in our relations to our surroundings and to other people." If the nation would be personified with the organism of a human being, then people would be its cells, while groups of individuals would constitute the different organs of the body that interact continuously with one-another for the organism to live. Viewed from this perspective "Culture is an integral composed of partly autonomous, partly coordinated institutions. It is integrated with a series of principles such as the community of blood through procreation; the specialization in activities; and last but not least, the use of power in political organization.

Each culture owes its completeness and self-sufficiency to the fact that it satisfies the whole range of basic, instrumental and integrative needs." (Malinowski, 1969, p. 40) "Thus culture is our roots and the foundation of our family, community and society." (Banutu-Gomez, 2002, p. 30) Culture is everything which identifies and differentiates a group of people living together at the same place (as geographical location), speaking the same language, and passing through the same historical developments. "Culture is not a 'thing' which can be experienced directly through the senses, just as 'needs', 'social systems', 'evil' and 'peace' are not European Scientific Journal April 2013 edition vol.9, No.11 ISSN: 1857 – 7881 (Print) e - ISSN 1857- 7431 163 directly tangible or visible. They are ideas constructed within a society. 'Culture' does not exist in a simple and easily defined form for a specifiable number of people in a bounded area." (Hoecklin, 1995, p. 24) In an intriguing way culture appears as comprehensive as much as dismissive. Exploring in it you see how simple things turn into complicated and complicated things turn into simple ones. According to Chhokar, Brodbeck, & House, (2007) culture and leadership even though the most written about

topics, are still the least understood ones in the social sciences. The authors consider them very challenging, as well as very important for satisfying human existence. Culture is a social construct that we do not inherit genetically but socially from our predecessors, pass it to our children, and in this way we teach culture in society. rationale that connect behavior to outcomes. People need a secure sense that they understand how the world works in order to behave confidently and consistently." This finds approval also from The Manjako ethnic group in The Gambia, Guinea-Bissau and Senegal, who defines culture as our world of yesterday, our world of today and our world of tomorrow which creates and nurture cooperation, development and sustainability among our people in our society.

5. CONCLUSION

We can conclude that, Leadership is a process, not a property of a person. he process involves a particular form of influence called motivating. The nature of the incentives, extrinsic or intrinsic, is not part of the definition. The consequence of the influence is collaboration in pursuit of a common goal. The "great things" are in the minds of both leader and followers and are not necessarily viewed as desirable by all other parties.

Leadership was assumed to be a general personal trait independent of the context in which the leadership was performed. We refer to this as a heroic conception of leadership. Heroic models originated in the great man theory of history proposed by 18th-century rationalists such as Carlyle, Nietzsche, and Galton. Major events in world history were assumed to be the result of great men whose genius and vision changed the world in which they lived. Among psychologists, William James (1880) stressed that the mutations of society were due to great men who led society in the directions they believed to be important. The development of psychological testing in the early part of the 20th century provided the potential for testing the trait concept. If leadership is a general personal trait, it should be measurable, and people with a high level of this trait could be placed in positions requiring their talents. If the heroic model proved to be correct, society could enormously benefit through improved leader selection.

Finally, we can conclude that leadership plays a key role in development of a nation. Majority of the papers analyzed had identified three distinct roles that situational variables play in the leadership process and its effectiveness in shaping the national culture.

1. **Organizational effectiveness** (often taken to be an indication of its leadership) is affected by situational factors not under leader control like the actions of competitors, enactment of new legislation, new technologies, interest rates, and currency fluctuations (to name just a few variables). All of these factors can have large effects on organizational effectiveness, making it difficult to discern leadership effects. It is these direct effects of situation that are one of the principal bases for what we have termed the pure-situational theory and have led some to conclude that leadership is entirely illusory.

2. **Situations shape how leaders behave**. Leaders, are affected by their environment as well as by fairly stable characteristics that predispose them to certain kinds of behavior. Unfortunately, the field of leadership has identified more closely with the field of individual differences and has largely ignored the way the behavior of leaders is influenced by the situations they encounter. The heroic model, with its search for a general trait of leadership, as well as the investigations of leader behavior at Ohio State University and the University of Michigan assumed a degree of invariance across situations that is seldom, if ever, observed.

3. Situations influence the **consequences of leader behavior.** Popular books on management are filled with maxims such as push decision power down, delegate; enlarge jobs, place your trust in people, the customer must come first, and so on. Each of these maxims is situation free. The advice is unfettered with information about the kinds of situations in which the recommended actions are effective and those in which they are ineffective. Clearly, normative theories require situational qualifiers. Actions must be tailored to fit the demands of each situation.

A leadership style that is effective in one situation may prove completely ineffective in a different situation. Tannenbaum and Schmidt (1958) stimulated thinking about the possibility of developing a contingency model of leadership by suggesting a wide range of situational factors that should be considered by managers in adopting a leadership style. Hersey and Blanchard (1982) carried the process one step further by proposing a taxonomy of four styles ranging from telling to delegating and a framework for matching each to the situation. However, their one situational variable—the maturity of followers— essentially ignored other important features of the context within which the interaction took place. The normative models of Vroom, Yetton, and Jago represent more ambitious attempts to model the interaction between leadership style, situation, and effectiveness outcomes. In their research, the situational variables used in predicting the consequences of a leader's choices are the same as those used in explaining the choices that a leader actually makes. The advantage of using the same situational variables in both normative and descriptive analyses is the ease with which the effectiveness of a leader's choices can be determined. One can compare a

leader's choices in each situation with the choice recommended by the normative model. In this way, the overall effectiveness of a leader's choice can be determined as well as the source of his or her ineffectiveness. Participation in decision making is but one of many dimensions of leader behavior that can be studied in the manner that we have used here.

Viewing leadership in purely dispositional or purely situational terms is to miss a major portion of the phenomenon. Earlier in this article, we defined leadership as a process of motivating others to work together collaboratively to accomplish great things. The task confronting contingency theorists is to understand the key behaviors and contextual variables involved in this process. Looking at behavior in specific classes of situations rather than averaging across situations is more consistent with contemporary research on personality and more conducive to valid generalizations about effective leadership.

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Prediction of Gross Domestic Product for South Asian Countries

Kavita Pabreja*

Abstract: ***Gross Domestic Product (GDP) is one of the most significant indicators to understand the economical status of an economy. Economic analysis provides an insight into the essentials of an economy. It is a systematic process for determining the optimum use of scarce resources and selecting the best alternative to achieve the economic goal. The economic health of a country depends upon many factors viz. human resources, natural resources, capita formation, technological development and social and political factors. The objective of this study is to find out correlation among health, climate, and education related indicators of developing South-Asian countries, select the reduced subset of indicators and then forecast GDP. The datasets have been collected from officially documented international sources.***

Keywords: ***Gross Domestic Product, Health, Education, Development, Correlation, Artificial Neural Network.***

1. INTRODUCTION

The economic development of every nation is closely related to the increase in the utilization and burning of fossil fuels, coal, oil, and natural gas by factories and electric power plants, motor vehicles, and family units. The consequential carbon dioxide (CO_2) emissions have turned into the largest source of greenhouse gases that do not allow the infrared radiation from the earth to leave the atmosphere and build the risk of global warming [1]. It has been recommended that every country must put in efforts to reduce these harmful CO_2 emissions for the sake of its citizens.

These emissions affect the agriculture directly that causes adverse effects on the economy of a country. As suggested by Smith [2], a little enhancement in average temperature worldwide (approximate change of 2°C, calculated with reference to year 1990 temperature readings) would cause in net negative impacts on GDP of various developing countries and net positive market impacts on GDP of several developed economies. As a result, this would rise gaps in the income inequality among countries across the globe.

Health of people of a country plays a vital role in its growth and development. The importance of Adult Survival Rate on growth rates for poor countries has been discussed by [3]. The authors discussed that other parameters of health such as disease occurrence rates and cognitive functioning are imperative for sustaining a balanced provision of trained manpower which is a significant component for growth of economy. In another study, the authors have examined the role of health to economic growth [4] and concluded that good health affects the economic growth of a nation in a constructive and numerically significant way.

Education is one of the foremost mechanisms for decreasing poverty and inequality and lays a basis for continual economic growth. The effect of education on GDP has been studied by [5]. The authors argued that the skills available in the labour force and the value of those skills are important determinants of economic performance of any country. There is requirement of workers with higher levels of education in order to handle complex services and production systems [6]. The data of over six five year periods for 65 countries has been utilized by [7] and applying Bayesian models, the authors recommended that with the improvement in education, the economic growth of a country improves.

In the past, various Soft Computing techniques have been utilized by many researchers for forecasting GDP of a country. Neural networks have been applied for forecasting of macro-economical variables and an evaluation of different linear and non-linear models has been done [8]. The authors have found that multivariate linear models are better. Different variants of neural networks have been used for anticipating the future of Egypt's cereal and it was concluded that ANN performed better than ARIMA [9]. GDP of Britain has been forecasted by authors using ANN and they have compared two different training algorithms [10]. The forecasting ability of ANN to anticipate financial output increase based on financial variables has been found to be better than linear models, as discussed in [11]. The GDP of Malaysia has been forecasted based on various economical indicators [12]. The authors have also compared econometric approaches with ANN and have demonstrated that ANN has better performance. A combination of ANN and ARIMA has been also been experimented and in comparison with ANN or ARIMA, this hybrid model has produced more convincing results [13].

**Maharaja Surajmal Institute (affiliated to Guru Gobind Singh Indraprastha University), New Delhi, India*
kavita_pabreja@rediffmail.com

Most of these studies are based on either statistical relationship between different indicators or application of soft computing techniques using economical indicators as input variables. This paper differs from all of these studies as it is based not only on economical indicators but also on Education statistics and Health. Also this piece of research is for five south-asian countries *viz.* India, Bhutan, Bangladesh, Sri Lanka and Pakistan. In this paper, we have analysed the most current and precise global development datasets accessible at The World Bank's official website and using strong correlations as the basis of selection of a small subset of features, we have forecasted the GDP of south-asian countries. The paper is arranged as follows: - section 2 discusses Data and Methodology including data collection, countries under study, indicators used for the analysis and feature reduction. Section 3 discusses the concept of Artificial Neural Network used for forecasting GDP, Results and discussions are explained in section 4 followed by conclusions as section 5.

2. DATA AND METHODOLOGY

Datasets employed for the study have been downloaded from The World Bank website. Various steps followed *viz.* selection of countries, different indicators responsible for economic growth and development, pre-processing of datasets and finally reduction of datasets, have been explained in following sub-sections.

A. Data Collection

There is huge data available for download for 249 countries, for 1343 attributes for 55years for the time period 1960 till date [6]. The countries as per their development status have been categorized by The World Bank in four groups: High Income group, Upper Middle Income group, Lower Middle Income group and Low Income group.

B. Countries under study

This study is based on the developing countries of South Asian region. The countries under study are India, Bhutan, Bangladesh, Pakistan and Sri Lanka.

C. Indicators under study

In this paper, data related to three important determinants of GDP have been selected. The records corresponding to attributes describing the World Development Indicators viz. Education statistics, Health, and environmental statistics have been collected for the time period 1998-2013 [6]. The list of attributes under consideration, under each of these two groups has been explained below.

World Development Indicators

World Development Indicators (WDI) is the key World Bank repository of development data, assembled from officially distinguished global resources. It includes the latest and precise global development data, at national, regional and global level. The indicators considered under the study are as follows: Agriculture, value added (% of GDP); CO_2 emissions (metric tons per capita); Domestic credit provided by financial sector (% of GDP); Electric power expenditure (kWh per capita); Energy utilization (kg of oil equivalent per capita); Exports of goods and services (% of GDP); External liability stocks, total (DOD, current US$); Foreign direct investment, net inflows (BoP, current US$); GDP (current US$); GDP growth (annual %); GNI per capita, Atlas method (current US$); GNI, Atlas method (current US$); Gross capital formation (% of GDP); Imports of goods and services (% of GDP); Inflation, GDP deflator (annual %); Internet users (per 100 people); Life expectancy at birth, total (years); Merchandise trade (% of GDP); Mobile cellular subscriptions (per 100 people); Mortality rate, under-5 (per 1,000 live births); Population density (people per sq. km of land area); Population growth (annual %); Population, total; Surface area (sq. km); Total debt service (% of exports of goods, services and primary income); Urban population growth (annual %).

Education statistics

The World Bank EdStats Query holds approximately 2,500 internationally comparable education indicators for contact purpose, evolution, conclusion, literacy, educators, population, and money spent by countries. The indicators elaborate the education sequence from pre-primary to tertiary education. The inquiry placed on huge repository of datasets provides data from international learning assessments, equity data from domestic analysis, and protuberance data till year 2050. The attributes selected for this study are as follows: Government expenditure on teaching and learning as % of GDP (%); Gross registration ratio, primary, female (%); Gross registration ratio, primary, gender equality index; Net registration rate, pre-primary, female (%); Net registration rate, primary, female (%); Out-of-school children of primary school age, both sexes (number); Percentage of all students in tertiary education registered in ISCED 6 and 7, both sexes (%); Primary achievement rate, both sexes (%); Ratio of girls to boys in primary and secondary education (%); School registration, primary (% gross); School registration, secondary (% gross).

Health, Nutrition and population statistics

Data about Key health, nutrition and population statistics gathered from a variety of international sources has been utilized for the study. The indicators used are as follows: Adolescent fertility rate (births per 1,000 women ages 15-19); Health expenditure per capita (current US$); Health expenditure, total (% of GDP); Health expenditure, total (current US$); Immunization, DPT, measles, polio; Improved cleanliness facilities (% of population with access); Improved cleanliness facilities, urban (% of urban population with

access); Improved water resource (% of population with access); Improved water resource, urban (% of urban population with access); occurrence of tuberculosis (per 100,000 people); Out-of-pocket health spending (% of private expenditure on health); Out-of-pocket health spending (% of total spending on health); occurrence of anemia amid children (% of children under 5); occurrence of anemia amid non-pregnant women (% of women ages 15-49); occurrence of anemia amid pregnant women (%); occurrence of tuberculosis (per 100,000 population); Tuberculosis case recognition rate (all forms); Tuberculosis death rate (per 100,000 people).

D. Data Pre-processing and feature reduction

Data for the analysis is approximately 90% complete. The missing values have been filled up with estimated values using linear regression model.

Pearson's correlation coefficient has been calculated to find out the statistical relationships between two or more variables of health, climate change, education and other development related indicators so as to perform feature reduction. In positively correlated variables, increase or decrease in the value of one variable, causes the value of other variable also to increase or decrease accordingly. In negatively correlated variables, the value of one variable decreases as the value of the other increases and vice-versa. Out of the 57 attributes, there are many that are strongly correlated and there are certain findings that are quite unexpected and are discussed in Results and Discussions section. Further only following eight attributes as given in Table I, have been selected based on correlation coefficient values, for anticipation of GDP corresponding to South Asian countries, using Artificial Neural Networks.

TABLE I: LIST OF 8 SELECTED INDICATORS FOR FORECASTING GDP (CURRENT US$)

Time	**Pupil-teacher ratio in primary education (headcount basis)**
CO2 emissions (metric tons per capita)	Pupil-teacher ratio in secondary education (headcount basis)
Government expenditure on education as % of GDP (%)	Health expenditure, total (% of GDP)
Percentage of students in secondary vocational education who are female (%)	GDP growth (annual %)

3. ABOUT ARTIFICIAL NEURAL NETWORK

An Artificial Neural Network is a numerical representation designed with motivation from the composition of biological neural networks. A neural network comprises of an interrelated collection of artificial neurons, and the neurons process information using a connectionist method to calculation [14,15].

In this paper, ANN has been implemented using Matlab 7.0 software (matrix laboratory). A two layer MLP Back Propagation network with default settings has been applied for the training and testing of artificial neural network. In hidden layer of the back propagation network, Tangent-sigmoid transfer function is employed. A pure linear transfer function is utilized in the output layer. The Back propagation learning algorithms *viz.* trainlm has been used for prediction of percentage of GDP. The input dataset comprises of attributes selected based on correlation coefficient, mentioned in Table I. The output data corresponds to GDP of the country under consideration. A snapshot of dataset is illustrated in table II. Columns 1 to 8 of this table are used as input and column 9 corresponds to target. The range of inputs and outputs have been adjusted and hence lies in the range [-1,1]. A pre-defined function premnmx() provided by Matlab has been used for the purpose.

TABLE II: SAMPLE OF DATASET FOR ANTICIPATION OF GDP

country	Time	CO2 emissions (metric tons per capita)	Government expenditure on education as % of GDP (%)	Percentage of students in secondary vocational education who	Pupil-teacher ratio in primary education (head count basis)	Pupil-teacher ratio in secondary education (head count basis)	Health expenditure, total (% of GDP)	GDP growth (annual %)
Bangladesh	1998	0.19	2.10	23.42	43.50	36.31	2.25	5.18
Bangladesh	1999	0.20	2.13	23.83	44.00	37.41	2.29	4.67
Bangladesh	2002	0.25	2.02	25.59	45.50	34.37	2.59	3.83
Bhutan	2005	0.61	7.08	33.65	31.05	28.11	5.28	7.12
Bhutan	2006	0.59	6.00	32.96	29.18	21.88	5.27	6.85
Bhutan	2007	0.58	5.00	33.96	29.50	22.70	5.88	17.93
India	2005	1.23	3.13	20.08	39.30	30.90	4.28	9.28
India	2006	1.29	3.09	22.54	38.60	29.30	4.25	9.26
India	2007	1.37	3.12	25.00	37.90	27.90	4.23	8.61
Pakistan	2011	0.94	2.22	41.64	39.83	21.30	3.01	2.75
Pakistan	2012	0.93	2.14	42.76	41.35	21.04	2.76	3.51
Pakistan	2013	0.92	2.49	42.99	42.55	20.17	2.70	4.37
Sri Lanka	1998	0.42	3.05	35.00	27.10	16.86	3.71	4.70
Sri Lanka	1999	0.47	2.90	35.80	26.80	16.89	3.65	4.30
Sri Lanka	2000	0.55	2.81	36.30	26.50	16.92	3.77	6.00

TABLE III DETAILS OF VALUES OF R CORRESPONDING TO DIFFERENT DATASETS UNDER CONSIDERATION

S.No.	Datasets	Correlation Coefficient R
1	Training	0.99986
2	Validation	0.99196
3	Testing	0.99402
4	All	0.99694

4. RESULTS AND DISCUSSIONS

There are 57 variables under various categories and we have calculated correlation coefficient amongst them. The variables having positive correlation of more than 0.9 have been selected. Since a modification in the value of one variable will be able to forecast the change in the similar way in the second variable, we have selected a subset of variables with 8 features to be used for forecasting GDP in case of South-Asian countries. There are certain correlations that are implied but there are certain findings which are quite innovative, infrequent and interesting.

It has been found that there exists very strong correlation coefficient of more than 0.9 between External debt stocks, Health expenditure and Foreign direct investment, net inflows. The Health Expenditure is strongly correlated with CO_2 emissions, Electric Power consumption and Energy use.

Hence after selecting the important features based on correlation coefficient, we have trained the ANN with the mentioned datasets, so as to forecast GDP. The performance measurement in terms of Mean Square Error between actual and forecasted GDP stands at 0.0377 at 14 epochs, which is quite convincing, shown in Fig. 1.

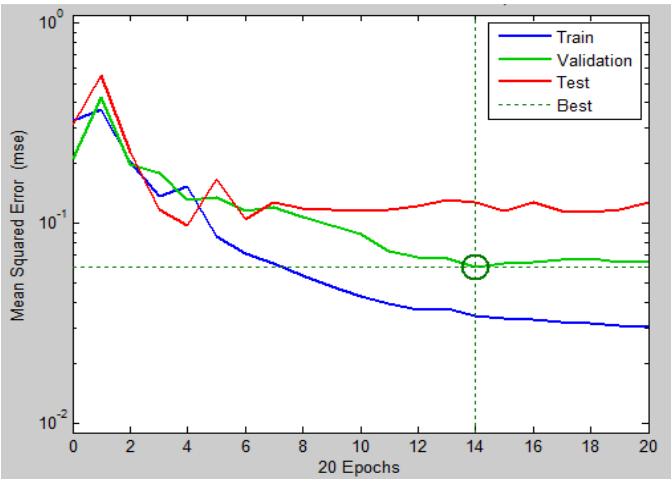

Fig. 1. Result of training, testing and Validating ANN for South-Asian countries data using learning function trainlm.

The correlation coefficient (R) representing the measure of linear relationship between actual GDP and the predicted GDP has been found as mentioned in table III. A very strong correlation coefficient has been reported that advocates of the fact that the ANN with trainlm back propagation learning algorithm, transfer function namely tangent-sigmoid applied in hidden layer of the back propagation network and pure linear transfer function utilized in the output layer is able to predict the GDP correctly.

5. CONCLUSION

Important correlations between various World Development Indicators have been found and discussed. It is concluded that ANN has capability to provide conclusive results and is very appropriate for anticipating Gross Domestic Product. Using the input parameters describing Education, Health, Climate change indicators, the ANN has been trained to forecast the GDP for five countries of South Asia. This research has noticeably demonstrated that application of Soft Computing techniques can facilitate in providing advanced details for forecast of GDP.

This paper differs from all of the earlier studies explained in Introduction section, as it is based not only on economical indicators but also on Education statistics and Health, also the anticipation of GDP is not done just for a single country but for five countries of South Asian segment of economies. In this paper, selection of a small subset of features has been done on the basis of strong correlations between more than 50 indicators. Also, a few unusual correlations have been observed that have already been discussed in Results section.

The study is further to be extended for finding correlations between different development indicators for remaining categories of economies.

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Human Resource Accounting

Anita Sharma Samnol*

Abstract: ***Human resource accounting is basically the accounting of human resources of the company. As the human resources are the important resources of the company without which it cannot survive, hence it should be properly accounted for. In the present era, the companies have to work hard to face the stiff competition and to become the pace setter of the market. This will become possible only when the companies capitalize its investments in the human resources. There are various approaches to quantify the value of human resources. This paper is based on secondary data and focuses on the meaning, need, importance, methods, present position, and criticisms of human resource accounting.***

Keywords: Human resource, Capitalizing, Employees, Assets, Accounting

1. INTRODUCTION

Human resource accounting is basically the accounting of human resources of the company. As the human resources are the important resources of the company without which it cannot survive, hence it should be properly accounted for. In the present era, the companies have to work hard to face the stiff competition and to become the pace setter of the market. This will become possible only when the companies capitalize its investments in the human resources. There are various approaches to quantify the value of human resources. The importance of Human resource accounting is recognized by many organizations in India but till date it has not been compulsory by Companies Act.

Objectives of the Study

The objectives of the study are as follows

- To understand the meaning of Human resource accounting
- To discuss the necessities for capitalization of Human Resource Expenditure
- To discuss various methods of Human resource accounting.
- To know the present status of HRA
- To discuss criticisms of HRA

2. RESEARCH METHODOLOGY

The present research is secondary data base. The data for the study is collected through internet and other published sources.

Meaning of Human Resource Accounting

According to American accounting association committee, Human Resource Accounting is the process of identifying and measuring data about human resource and identifying and measuring data about human resource and communicating this information to interested parties.

Flamholtz refers HRA as the process, which involves measuring the cost incurred by business firms and other organizations to recruit, select, hire, train and develop human asset.

Literature Review

Batra (1996) conducted a study for the period 1991-92 in BHEL, SAIL and CCI and suggested that HR valuation and audit helps for improving efficiencies of their human resources.

Dhade (2005) in his study concluded that for the future growth of the company, it should properly focus on its intangible assets like human resources.

Ratti (2012) had determined the human resource efficiency quotient by calculating the value of human resources of fifteen companies. His study concluded that the value of human resources is not dependent upon the number of persons employed.

A study conducted by **Cherian and Farouq (2013)** revealed that implementation of HRA was difficult for the organization but on the other hand it disclosures on human assets acted as evidence for wealth creation and helped in calculating the human resources capital, worth of management development and enhances the value of management accounting.

Kumar (2014) had made a comparative study regarding disclosure and reporting of HRA in some selected Private and

**Maharaja Surajmal Institute (affiliated to Guru Gobind Singh Indraprastha University), New Delhi, India*
kavita_pabreja@rediffmail.com

public sector banks. In the study it was found that public sector discloses more quality information regarding HRA in comparison to private banks. The study also emphasized that HRA help the company Infosys for identifying the right person for right job. It was suggested that the government should take appropriate measures for measurement and reporting of human resource assets.

Sharma and Lama (2014) had conducted a study on the growth and development of HRA in some Indian companies. They found that Indian companies are conscious about the reporting and befits of HRA and also suggested in their study that the Regulatory Bodies for Accounting Standards in both the National and International level have to focus on the measurement and reporting aspect of HRA and enforce sound standards for it.

Bullen and Eyler concluded that HRA gained positive effect overseas assignment on personal development. It was suggested to follow the international trends emerging in intangible reporting, capitalized human resource information, so that HRA can become more prevalent.

Necessities for Capitalization of Human Resource Expenditure

The success of an organization is very much dependent on the assets that it owns. Now among all the assets, Human resources are such an important asset without which the targets set by the company can't be achieved. This can be considered as the basic reason as to why the companies are spending a huge amount of capital on the advertising, interview selection and recruitment of their employees.

There are certain other reasons also for spending capital on their employees which can be enumerated as following

(i) Each organization wishes to have the best brains with it:

Every organization wishes to work with intellectuals, those who are fit for the vacant position. This is the reason for spending a huge amount in the recruitment process. This one time huge spending will help the organization to choose the best brain out of many. The capability of an individual determines his future productivity and fruitfulness towards the organization. It also helps the organization in determining the nature of training required to be given to him.

(ii) For achieving the pre-determined objectives of the organization:

To achieve the predetermined objectives in terms of productivity and profitability for ensuring maximization of shareholders wealth, the organizations have to make the best combination of its available resources i.e. men, money, machines and materials. The most important asset that is men is to be selected effectively so that the efficient personnel can come to the organization for achieving its objectives by delivering his best performance.

(iii) To fulfill Stakeholders' Expectations:

Efficient and productive personnel are the milestone of success of an organization. They increase the goodwill of the company, helps in bringing investments and also maintaining its high reputation. All this provides help in upgrading the shareholders wealth. These also work as a factor for making high investments in the human resources.

(iv)To gain Competitive Advantage:

To attract the recognition of the people the companies have to work with uniqueness rather than with uniformity. To stand first in this stiff competition the organizations need such personnel who bring something extra which must be different from others. All this require selection and recruitment of the best among the available human resources and also motivate them in this direction.

(v) To Act as Pace Setter and Market Leader:

Market leaders such as Microsoft, NIIT, Samsung, LG, Coca-Cola, etc gain competitive advantage and become the pace setter in the market through their best human resources. These organizations select the quality personnel by making huge investments in hiring them.

Need of Human Resource Accounting

The development of an organization is dependent on its human resources. No other physical asset can move or develop by itself without the help of the human resources. This is the basic reason for their accounting. Human Resource Accounting plays an important role in an organization by providing the Cost value information about the time of acquisition, development, allocation and maintenance of HR. The human asset can be effectively controlled through the use of HRA as it provides the relevant information about that whether the value of its human assets are appreciating or depreciating and the management can take appropriate steps to motivate its employees by providing the training and development measures.

Likert (1971) explained that Human Resource Accounting is a tool which serves several purposes in an organization. To attain cost-effectiveness HRA provides cost/value information for taking management decisions about acquiring, allocating, developing, and maintaining human resource. It provides an effective tool to the management to scrutinize effectively the use of human resources.

A research conducted by Mainona (1995) concluded that investors' decision making is significantly affected by the appropriate reporting of human resources by the organizations.

The need for human resource accounting on India is also emphasized by Jasrotia (2004). According to him, the economy have shifted from manufacturing to service industry, the success of which is dependent to a large extent on the knowledge and intellectual capabilities of the personnel working in it. So, Human resource accounting should be made compulsory for every organization by the Indian Government in the same manner as it has been done in Denmark from the year 2005 onwards.

Leading management scholar, Flamholtz (1979) explains the human resource accounting model as "psycho-technical systems" (PTS) approach to organizational measurement. This approach emphasized that the human resource are very important for the fulfillment of short term as well as the long term objectives of the organization to increase productivity and expansion.

Importance of Human Resources

- Human Resource is an asset which has the ability of value creation like any other physical and financial asset. One of the worth mentioning point about the human resources is that it not only create value but also appreciate over time. The value of other physical assets depreciates over time but no such depreciation occurs in case of human resources.
- It is the contribution of human resources to make effective use of financial and physical assets which contributes to increase market value of shares of the company.
- The efficiency of two companies having same capital employed can be compared only on the basis of the value of its human resources.
- Success of a company is very much dependent on its human resources. So, in order to retain them and not to face the difficulty created after they leave the organization, it must take proper steps to motivate them in order to gain their loyalty towards the company.

Methods of Human Resource Valuation followed by companies in India

Human resources have started gaining due importance with the change of time Various human resource accounting models have been developed to quantify the talent, skills and knowledge of employees or workforce. Some of the models for human resource valuation are as follows

- **Historical Cost Method**

This method was developed by William C.Pyle (and assisted by R. Lee Brummet & Eric G. Flamholtz) and is adopted in 1969 by R.G.Barry Corporation, a leisure footwear company.

Under this method, the historical cost is considered to be the cost incurred on hiring, selecting, training and developing employees. A proportion of this cost is written off to the income or the benefits which the employee provides through his service to the company. I f the human asset leaves the company prematurely then the whole of the amount not written off is charged to the income of the year in which the human asset left. On the other hand if he serves the company for a period more than what was expected of them proper revisions is done accordingly. This method is very easy to calculate and apply but it sufferers from certain limitations such as it doesn't take into account the aggregate value of the potential services of the employee and it is also very difficult to calculate the time period for which the capitalized expenditure to be amortized etc.

- **Replacement Cost Model**

This model was developed by Rensis Likert, and Eric G. Flamholtz on the basis of concept of replacement cost. According to this model the value of employee is estimated as the cost of replacement with a new employee of equivalent ability and efficiency. Flamholtz divided the replacement cost in two parts i.e. individual replacement cost and positional replacement cost. Individual replacement cost includes the cost of recruiting and selecting the new employee; providing him training and development to make him as much capable as the employee who is leaving.

Positional replacement cost meant the loss of production caused to the company due to the replacement of the leaving employee, the set of jobs which was expected to be performed by the employee of the present position and the cost of recruiting and developing the employee to make him so much capable as will justify the present position as that of the leaving employee.

This method is considered as more realistic as compared to historical cost method as it is taking the current value of the human asset. But its limitation is that it is very difficult to find two persons of same caliber and to compare the caliber of the new entrant with the leaving one is very subjective.

- **Opportunity Cost Model**

This method was first advocated by **Hc Kiman and Jones** .Under this method the cost of a human asset is equal to the benefit which he can provide if been put to some alternative work.
Opportunity cost is the maximum alternative earning that is

earning if the productive capacity or asset is put to some alternative use. It is very difficult to calculate the value of Human resource by this method because alternative use of HR within the organization is restricted and at the same time the use may not be identifiable in the real industrial environment.

- **Standard Cost Method**

This method was coined by David Watson. According to this method the value of human resource is equal to the total of the standard costs incurred in recruiting, hiring, training and development per grade of service.

- **Stochastic Rewards Model**

This model was developed by Eric G. Flamholtz. This model considers both the factors that are the probability of promotion of an employee and also the rewards generated by him during his period of service.

Flamholtz has measured the expected realizable value of an individual as

$$E(RV) = \sum_{i=1}^{n} y \left[\left[\sum_{i=1}^{n} \left(R_t * \frac{P(R_t)}{(1+r)^t} \right) \right] \right]$$

Where
E (RV) =expected realizable value
Rt =Value derived by an organization in each possible sate
P (Rt) =Probability that the organization will have Rt
t= time
n= state of exit
r= discount rate
i = 1, 2, 3.....

- **S.K. Chakraborty Model**

Chakraborty model divided the human assets in two groups i.e. managerial group and non managerial group. To calculate the value of human asset the average turnover of group of employees is multiplied with average salary drawn by them and discounted by the expected average turnover period.

- **Lev and Schwartz compensation model**

Lev and Schwartz developed this model in 1971 for valuing human resources. Most of the Public sector companies like BHEL, SAIL etc. are using this method for valuation of their human resources. This model takes the future earnings of an employee till retirement as the basis of this model.

According to the model the value of a human resource is equal to his remaining future earnings. In other words, it is equal to the estimated salary payable over remaining estimated working life.

$$Vr = \sum_{T-T}^{T} \frac{I(t)}{(1+R)^{(t-T)}}$$

Where
Vr= value of an individual or r years old
I (t) = the individual's annual earnings up to retirements age
T= retirement age
r= discount rate specific to the person
t= active year of service

The model categorized whole work force in the various homogenous groups on the basis of their age groups and income levels. Then the present value of different groups is ascertained by discounting the average earnings of different groups by using the above formula. By using the formula calculated average earnings for different classes and age groups and present value of HR. This model also suffers from certain limitations such as it doesn't consider the early leaving of organization by an employee, effect of seniority and change of role.

Present Status of Human Resources Accounting in India

Human Resource accounting has not been made compulsory in India by any legislation till now. Even the New Companies Act 2013 does not made any provision regarding compulsory disclosure of Human resources in the Annual report of the company. Some of the companies are introducing and following the concept of Human resource accounting.

In India Human Resource Accounting was first introduced by Public Sector Companies. Bharat Heavy Electricals Limited was the first company to adopt the concept of valuation of Human resources. But the concept of human resource accounting does not gain much importance at that time.

Infosys Technologies was the first software company who had valued its human resources in India. The company valued its human resources at Rs. 1.86 billion by using Lev and Schwartz Model. In spite of many advantages of HR Accounting, it has not been developed and encouraged in different industries. Presently around twenty-eight companies are doing the practice of Human Resource Accounting .The name of those companies are ,Steel Authority of India Ltd. (SAIL),Hindustan Machine Tools Ltd. (HMTL).,Oil & Natural Gas Corporation Ltd. (ONGC),National Thermal Power Corporation Ltd. (NTPC),Hindustan Shipyard Ltd. (HSL),Oil India Ltd. (OIL),Minerals and Metals Trading Corporation of India Ltd. (MMTC),Cement Corporation of India Ltd. (CCI),Engineers India Ltd. (EIL),Electrical India Ltd. (ELIL),Project and Equipment Corporation of India (PEC),Metallurgical and Engineering Consultants Of India

(MECON) Canbank Financial Services Ltd.(CFSL), Southern Petrochemical Industries Corporation Ltd. (SPIC), Cochin Refineries Ltd.(CRL), Madras Refineries Ltd. (MRL), Associated Cement Companies Ltd.(ACC), Tata Engineering & Locomotive Co. Ltd. (TELCO), Infosys Technologies Ltd.(ITL) ,Bharat Heavy Electricals Limited (BHEL),Global Tele Limited (GTL), Hindustan Petroleum Limited (HPL), Hindustan Zinc Limited, Indian Drugs and pharmaceuticals Limited (IDPL), Indian Oil Corporation (IOC), Rolta India Limited, Satyam Computers Limited (SATYAM) and U.P State Cement Corporation Limited (UPCCI)

Criticisms of Human Resource Accounting

- Dehumanizing Human Resources- One of the major limitation of Human resource accounting is that if the report is not prepared with accuracy or if the results of the report are not used properly then it will lead to demonizing of human resources.
- No Uniform Standards- Financial performance of two organizations can be compared as there is uniformity in the preparation and presentation of the accounts .This is due to the fact because they follow the uniform standards laid. But in case of Human resource accounting there is no uniform standards due to which the results of one organization can not be compared with other.
- Mobility of Human resources- The valuation of human resources is done on the basis that they will remain in the organization for a long time. But this is unrealistic as the human mobility is very high.

3. CONCLUSION

Human Resources are an asset which has the ability of value creation like any other physical and financial asset. There are various methods which can be followed for computation of human resources. Many organizations have already adopted the process of accounting for human resources others are also expecting.

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Web Content Filtering using Machine Learning Approach

Neetu Narwal*

Abstract: ***We see Internet pages as a group of incoherent information presented together as single unit rather than a single cohesive block of information. Most of e-Newspaper websites consist of 30-40% of news related information and rest are the advertisements, link to external websites, copyright information etc. User finds it arduous to focus on news content, and many at times it becomes disturbing. There are many search-oriented applications such as topic specific search application, filtering of actual textual content from surrounding page clutter. In this paper we proposed a novel approach that extracts real content from new web pages in an unsupervised fashion. Our method utilizes the web page segmentation technique to partition the web page into incoherent visual blocks. Artificial neural network is used as classifier to discriminate the visual block based on their features. The main content blocks are filtered from the web page and user is presented with clean news web page. Empirical evaluation of our system shows that ANN classifier gives 96.03% accuracy for web content identification that results in accurately filtering of the web page content.***

Keywords: Artificial Neural Network, Web Page Segmentation, Visual Blocks, Cosine Similarity.

1. INTRODUCTION

Web news page can be viewed as a non-coherent group of unrelated news items along with huge amount of noise like advertisement, links to related news, copyright claimant etc. Figure 1 shows a sample of Web news page. In this page, the actual content of news covers almost 30-40% of the complete page and the noise occupies nearly half of the page. Efficiently extracting high-quality content from Web news page is crucial for many Web applications such as information retrieval, automatic text categorization, topic tracking, machine translation, abstract summary, helping end users to access the Web easily over constrained devices like PDAs, mobile phones. The extracted content can become the basic data for the further analysis. Various researchers have focused on Content extraction from e-Newspaper websites. [1][2][3][4][5] [6][7].

In this paper we present an approach that extract the main content from the news web pages. We mainly deal with Indian newspaper websites written in English. Since, our results will be used by other real life application hence the accuracy of information identification is important. The identification of the actual content of news in the Web page is a relatively easier for human by making use of his intellect and seeing the visual clues. However it is really difficult for the machine to automatically identify the real content.

There have been many approaches existed to extract content from Web page [8]. These approaches can be divided into three categories based on the techniques used:

1) A wrapper can be generated by wrapper induction system for web content extraction [8]. However the wrapper generated for one web site can't be used for other, hence it becomes website specific. This is a major limitation of wrapper.

2) Some approaches use web mining techniques, such as classification and clustering, to extract content from Web news page such as [1][2]. The accuracy of these systems is better. However most of these techniques rely on human intervention and the complexity of the underlying algorithms is high, so this class of approaches has limited ability for scalable extraction.

3) Some approaches extract content from Web page based on statistics such as [3][4]. These approaches can usually perform the extraction in an unsupervised fashion. However most of them rely on some weights or thresholds that are usually determined by some empirical experiments.

We used the third approach where the web contents are identified based on their visual and spatial features. We used the techniques of learning by example, where Artificial Neural Network classifier is trained on the dataset to identify the main content and noise content of the web page.

The rest of this paper is organized as follows: The next section outlines related work; In section III, we will provide the details of our system; In section IV, our experiments and results will be discussed; Section V concludes with some final remarks and directions for future work.

Asso. Prof., Maharaja Surajmal Institute; neetunarwal@gmail.com

Fig. 1. Web page of The Times of India web site showing presence of advertisements, external links, internal links with main content uploaded on 4th June 2016.

2. RELATED WORK

Web page can be viewed as collection of non-overlapping blocks and can be easily identified as main content, advertisement, navigation panel, copyright information etc. Earlier researches on web content categorization showed that the block analysis can be used in information retrieval tasks such as searching, classification and clustering. Researchers have worked in the area of Web content extraction using web mining techniques basic three approaches have been studied.

A. Wrapper induction

Chang et. al. [13] presented a detailed survey on the major Web data extraction approaches and compares them in three

Dimensions: the task domain, the automation degree, and the techniques used. Some of the well known wrappers developed by researches using supervised method are: WIEN [14], STALKER and SoftMealy [15]; semi-supervised method are: IEPAD [16] and OLERA [17]; and unsupervised method are Dela [18], Road Runner [19], and EXALG [20].

B. Using Web mining techniques

Many researchers have used web mining techniques for content extraction. Ziegler et. al.[1] presented an approach to extract real content from Web news pages using a particle swarm optimizer (PSO). Gibson et. al. [2], presented another approach for identifying content from a Web page using a sequence labeling technique. The content of a Web page is identified by using a Conditional Random Field sequence labeling model. Reis et. al.[5] in their work used traditional hierarchical clustering techniques to extract the desired news from the Web news sites. Mc Keown et. al. [6] presented an article on content extraction using machine learning program Ripper.

C. Based on Statistics

Content extraction can also be performed based on statistics.

Lin et. al. [7] proposed an approach to partition a Web page into several content blocks according to HTML tables, and discovered informative content blocks using statistics based on the occurrence of the features (terms) in the set of pages. Gupta et. al. [4], used DOM tree to navigate the page recursively for content extraction. They applied a series of filtering techniques to remove and adjust specific nodes and leave only the content. The filters are based on statistics on some features of nodes such as link-to-text ratio. Prasad et. al. [3] developed a heuristic technique CoreEx for extracting the main article from Web news pages. CoreEx traverse the DOM tree of the page and scores every node based on the amount of text, the number of links it contains and additional heuristics.

3. NEWS WEB PAGE FILTERING SYSTEM

The first phase, we takes web page as input and parse the tree structure using top-down approach by using the functions and methods of Document Object Model (DOM) API (Application Programming Interface). DOM API used to traverse, modify and delete the tree structure of the web page elements even at run time. In the top down approach the traversal begins from the root node of the web page then child nodes are recursively traversed until it reaches a level where the node size is below the maximum threshold size of the node (25% of the screen space). However, if the size of splitting node reaches below the minimum threshold size (5% of the screen space) then it is merged with its sibling nodes to form a leaf node. The leaf nodes obtained after segmentation of the web page are the non-overlapping blocks [12].

In the *Second phase* of the features are obtained after analyzing the web page blocks [21]. These features are segregated into five different categories and analyzed their significance for web page block identification. The categories are:

1. *Spatial features* – it is related to the positioning information of the visual block with reference to the web page.
2. *Formatting features* – it represents the formatting style applied on the visual block.
3. *Content features & Hyperlink features* - Content features are related to information in terms of text, image, hyperlink and table contained inside the block.
4. *Embedded features* - Web page usually includes few external objects that are embedded in the web content. These embedded objects may belong to the same domain or another domain.

In the *Block identification phase* the features extracted from second phase is used for classification. We used learning by example approach where the dataset is manually pre labeled with class and trained to build a model. Each block is represented in pair (x, y), where x is set of features of the block and y is the class.

In this work we used feed forward Neural Network (ANN) to train our model. Artificial Neural Networks (ANN) is one of the best machine-learning algorithms for solving problems that can't be solved using conventional algorithm. When the new input is provided to the ANN model, it produces an output similar to the closest matching training input pattern [12]. In neural network model architecture, each node at input layers receives input values, perform processing and send it to the next layer.

The key feature of neural networks is that it learns the input/output relationship through training. The response of the neural network is reviewed and the configuration is refined until the analysis of the training data reaches a satisfactory level. In the current system neural network receives 21 inputs and gives 2 outputs with two intermediate layers.

In the last phase, the content marked as main contents are filtered from the list of visual blocks. These blocks are rearranged accordingly to fit the browser window. The news web page user is presented a clean news web page.

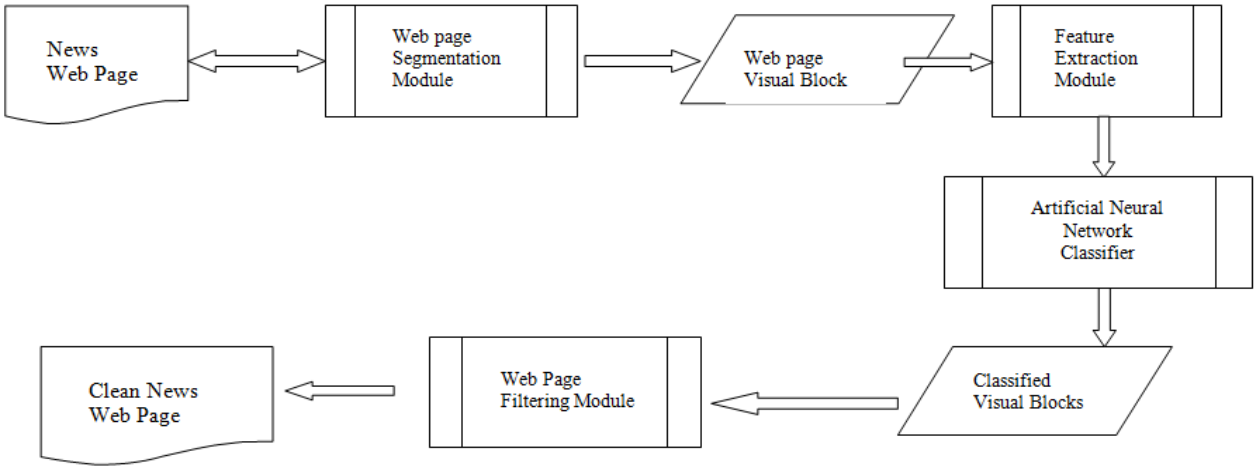

Fig. 2. Methodology used in the study

4. EXPERIMENT

Experiment is conducted on the dataset prepared with 350 news web pages from 40 different web sites comprising of five different categories i.e., science, academics, fiction, sports and news, giving total 800 visual blocks. These blocks are then manually labeled as pure main content, pure noise content and mix of noise and main content.

We implemented the model using feed forward Artificial Neural Network classifier. We evaluated the results using different evaluation measures such as Accuracy, Precision, Recall, F-Measure.

To derive the identification of each block, we have used the approach of learning by example, where the dataset is manually pre labeled with class and trained to build a model. Each block is represented as (x, y), where x is set of similarity measure of each block and y is the class. In this paper we have used Artificial Neural Network (ANN) techniques to train the model.

To test the classifier predictive capability evaluation measure is computed using confusion matrix as shown in Table I. The confusion matrix is the table of size m by m where m is the total number of class in the dataset, where each row depicts the actual outcome or class given by the classifier and each column depict predicted outcome or class. True Positive (TP) and True Negative (TN) are indicators of correctness of the classifier. Whereas, True Negative (TN) and False Positive (FP) are indicators of error or mislabeled tuples [11].

TABLE 1. Confusion Matrix

		Predicted Class		**Total**
		Yes	No	First
Actual Class	Yes	TP	FN	P
	No	FP	TN	N
	Total	P'	N'	P+N

The accuracy of classifier is the percentage of test tuples that are correctly classified by the classifier.

$$Accuracy = \frac{(TP+TN)}{(P+N)} \quad (1)$$

Precision is a measure of exactness means percentage of tuples labeled as positive.

$$Precision = \frac{(TP)}{(TP+FP)} \quad (2)$$

Recall is a measure of completeness means percentage of positive tuples labeled as positive.

$$Recall = \frac{(TP)}{(TP+FN)} \quad (3)$$

F-measure is a combination of precision and recall.

$$F - Measure = \frac{(2\ x\ Precision\ x\ Recall)}{(Precision + Recall)} \quad (4)$$

We have used feed forward neural network, where the input layer has three neurons and output layer has two neurons. The sigmoid activation function is used to train the model and performance is evaluated after performing five-fold cross validation. Table II shows the efficiency of the classifier depicted in terms of evaluation measures.

TABLE 2: Accuracy Measure of Classifier

Feature set	Accuracy	Precision	Recall	F-Measure
Feed Forward Neural Network	0.9603	0.8832	0.9295	0.9056

The result depicts that tool provide considerable results in terms of classification of block type and hence can be used for informative content filtering for providing news web page user a clean pure news content.

5. APPLICATION OF BLOCK FILTERING SYSTEM

The block filtering system plays a significant role in various web applications. The output of the model can be utilized for web content personalization, content segregation, search engine crawlers, viewing the web page on small screen device etc.

Block identification can be utilized for topic specific search where user is interested in finding the useful content related to any topic from different web site. The main content from different web sites can be clubbed and displayed to the user.

Another useful application of block identification is displaying selective content of web site on small screen devices. Due to limited screen space, main content and internal links information is sufficient to be displayed to the user.

6. CONCLUSION

In this paper we presented the news web page content filtering system that extracts main news content from the web page. We also developed a tool for this. We tested the tool through experiment using the data sets. From the experimental results we conclude that the tool provides high precision in classification of informative and non-informative content of the web page and hence is suited for segregating and informative content filtering.

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Using Multimedia for Project based Learning

Monika Davar*

Abstract: ***In Recent times, schools can no longer rely on traditional educational methods. These methods must be supplemented with innovative educational experiences and multimedia. This paper focuses on use of multimedia for project based learning in science. Project based learning using multimedia is an innovative method of teaching in which students conduct a project using multimedia and which results in a multimedia product i.e. technology-based presentations, such as a computerized slide show, a Web site, or a video. Teaching of science involves clarification of abstract concepts and calls for visualization of microscopic organisms, structure of an atom, cell, astronomical bodies, creation of universe etc. These challenges are met effectively by using graphics, animation and simulation on computer.ICT facilitates accurate representation of abstract scientific concepts and processes. ICT helps students to gather, organize and display information in a systematic and innovative manner. The paper discusses the key features of Project based learning using multimedia and illustrates its use for teaching science. Research findings related to this innovative approach are also discussed.***

Keywords: ***Project based learning, multimedia, instructional approach, teaching science, supporting researches***

1. INNOVATIVE METHODOLOGIES IN EDUCATION

Using innovative methodologies and integrate multimedia in the teaching learning process is the need of the 21st Century. In recent times schools are expected to provide opportunity to students not just to complete school successfully but also empower them to be successful in the 21st century. For a student to be competitive in the global market, we can no longer rely on traditional educational methods. These methods must be supplemented with innovative educational experiences and multimedia. Information and communication technology provides opportunities for students to engage in active participation, exploration and research and apply their knowledge in appropriate situations.

This paper focuses on use of multimedia for project based learning in science. Project-based learning is an educational method which has been in use since a long time. The use of multimedia is a recent form of communication with a lot of potential. The combination of project-based learning and multimedia leads to an innovative teaching strategy i.e. "project-based multimedia learning." Project based learning using multimedia is an innovative method of teaching in which students conduct a project using multimedia and which results in a multimedia product i.e. technology-based presentations, such as a computerized slide show, a Web site, or a video.

Project based learning is a comprehensive instructional approach which engages students in sustained cooperative investigation. It involves students in problem solving investigations and other meaningful tasks, allows students to construct their own knowledge and culminates in a realistic product. The teacher acts as a motivator and facilitator in the construction of knowledge and guides the students in the right direction. The main features of project based learning are:

- It provides freedom to students to plan and carry out problem solving investigations and other meaningful activities.
- It is based on cooperation and collaboration among students as they engage in sustained cooperative investigations.
- Project based learning encourages active learning
- It involes identification of the problem, collection of data, designing and conducting experiments, analyzing the data, drawing conclusions and reporting it.
- It culminates in a realistic product such as a report or a presentation.
- It inculcates scientific attitude and provides training in scientific method
- It brings students close to **reality** as they work on real life problems in natural settings.
- The project undertaken is **purposeful** for the students and leads to learning.
- Projects emphasize on **activities**, exploration and investigation
- Project is of **utility** or use to the students in dealing with real life situations.
- Project work involves **correlation** of knowledge obtained from different subjects.

**Assistant Professor, Maharaja Surajmal Institute, Janakpuri, Delhi, India; monikadavar@msi-ggsip.org*

- Projects involve **group work** and collaboration among team members.
- Projects **create** interest in the students for the topic.
- A good project is neither too easy nor too complex yet **challenging** enough to retain the interest of the students.
- A project is **based on needs and abilities** of the students.
- A good project is **practically feasible** and takes into account the resources available.
- A project **widens the mental horizons** of students.

In project based learning, teacher provides a situation which presents a problem and students are motivated to work upon it. Students discuss the problem and plan out the activities to solve the problem. Students work in groups, investigate and conduct activities and finally submit a project report or give a presentation.

2. SIGNIFICANCE OF INTEGRATING MULTIMEDIA IN PROJECT BASED LEARNING

Multimedia means the integration of media objects such as text, graphics, video, animation, and sound to represent and convey information.

Computer brings up-to-date and instant information to the students. ICT helps students to gather, organize and display information in a systematic and innovative manner.

Technology allows visualization and simulation of abstract concepts and dangerous experiments in science which cannot be performed in reality. For instance, nuclear reactions such as nuclear fission and nuclear fusion can be simulated on computer. Such reactions cannot be demonstrated in classroom situation. Teaching of science involves clarification of abstract concepts and calls for visualization of microscopic organisms, structure of an atom, cell, astronomical bodies, creation of universe etc. These challenges are met effectively by using graphics, animation and simulation on computer.ICT facilitates accurate representation of abstract scientific concepts and processes.

The computer can also serve as effective communication tool between individuals in a group. Networked projects can be undertaken where students work with others, conduct their research and analysis online and then construct multimedia presentations collectively as a group.

Real time data collections provide a touch of reality and authenticity to what is being learnt. Students can use ICT not only to analyze data and interpret the findings but also to present their project work in the form of multimedia presentation.

3. FEATURES OF PROJECT BASED LEARNING USING MULTIMEDIA

In addition to the features listed above, this method also has the following dimensions**:**

- Learning objectives are based on knowledge and skills to be attained by students (as per curriculum) using multimedia
- Use of multimedia-Students not only use multimedia products created by others but also create it themselves. Video clips, pictures, recordings and other media objects serve as raw material for their presentations, videos, websites or any other multimedia product
- Students make decisions regarding the form and nature of investigations to be carried out, the use of multimedia during the course of the project and the final multimedia product. Teacher provides guidance and acts as a facilitator.
- Assessment strategies to assess students learning will be based on judging their collaborative and investigatory activities, scientific concepts applied and the quality of their multimedia products submitted.
- Related to real life- Activities are so designed as to be related to real life.
- It takes longer time duration to complete (compared to regular classroom teaching)

4. ACTION PLAN FOR PROJECT BASED LEARNING USING MULTIMEDIA

- Outline the objectives of the project and milestones to be achieved
- Introduce the project to the students
- Provide computer and other resources
- Form student groups
- Preliminary research and planning
- Investigatory activities using multimedia
- Presentation of the project using multimedia
- Evaluation by the teacherI

5. PROJECT BASED LEARNING USING MULTIMEDIA: AN ILLUSTRATION

Following is an illustration of how technology can be used to support project based learning. For instance, for the topic ‘Pollution’ teacher can begin with showing some slides of polluted environment Students are asked to identify the

problem on the basis of similarity between the various slides. Some students may be able to identify that 'The environment is unclean or polluted.' Teacher can then motivate the students to take up the problem of 'Pollution' as a project.

Students of the class are divided into groups. These groups collect information on pollution from internet. Then the groups investigate the problem at specific locations with high levels of air pollution, water pollution, land pollution and noise pollution. The groups use ICT to record and analyze their observations. All the groups after completing their study present their work in the form of a multimedia presentation.

For instance, the students working on water pollution are asked to collaborate with another group of students in another state to compare the level of pollution in another river. Here the role of technology assumes significance as students in Delhi interact with students in Chennai who conduct a similar project on Periyar River. These distant learners collaborate via ICT to share information, analyze data and work together to present their findings.

Similarly other groups conduct investigations with their focus on land pollution, air pollution and noise pollution. Thus all the groups use ICT in the following manner:

- To collect latest data on Pollution
- To select and organize relevant data
- To interact with distant learners working on the same project
- To analyze data obtained from different locations investigated
- To make comparative analysis of findings and represent them graphically
- To prepare a multimedia presentation using visuals and animation

The above given illustration can serve as a model for teachers and teacher educators to use ICT to support project based learning.

6. WHAT RESEARCHERS SAY

Research studies have shown that

- Students taught through project method retained content for a longer time, had better problem solving abilities and collaborative skills and helps students to perform well compared to students taught through traditional method of teaching (Strobel and Barnveld, 2009, Walker and Leary,2009).
- Condliffe et al. (2016) have also reported that the design principles most commonly used in PBL coordinate well with the goals of preparing students for deeper learning, higher-level thinking skills, and intra/interpersonal skills
- Newmann and Wehlage in 1995 reported that project based learning can also provide an effective model for whole-school reform.
- Project based learning is especially beneficial when supported by technology. As per Brown & Campione, (1996), technology makes the knowledge construction process explicit, thereby helping learners to become aware of that process.
- Krajcik et al., (1994) research clearly highlights that using technology in project-based science makes the environment more authentic to students, because the computer, provides access to data and information, expands interaction and collaboration with others via networks, promotes laboratory investigation, and emulates tools experts use to produce artifacts."

To conclude, it is justified to say that technology usage in classrooms is not merely the usage of gadgetry; rather it is a systematic approach which can lead to a revolution in the teaching learning process. Despite its innumerable benefits, teachers are still wary of adopting innovative technology based methods. The challenge is to leave behind the teacher dominated traditional methods and gradually adopt such child-centred innovative methods to empower students to be successful in the 21st century.

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