International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 05 Issue: 04 | Apr-2018 www.irjet.net p-ISSN: 2395-0072

Attribute Based Adaptive Evaluation System

Shubham[1], Sujay Giri[1], Supreeth N[1], Sunil Kulkarni[1] and Suhas S[2]

[1]Student, Dept. of CSE, NIE, Karnataka, India
[2]Asst. Professor, Dept. of CSE, NIE, Karnataka, India

Abstract - *This paper proposes to improvise the candidate's evaluation system for better and precise outcomes and contribute towards a robust Information and Communication Technology (ICT). Questions composed are to be analyzed using text mining to ascertain what attributes the particular question tests and the responses will be recorded using fuzzy logic approach generating outcomes in terms of a set of attributes quantified in terms of levels. Hence, this system will not only evaluate the candidate more precisely but also to the best of his ability.*

***Key Words*: Text Analytics, Fuzzy Logic, Evaluation System, Attributes, Multiple Intelligence, Information and Communication Technology (ICT)**

1. INTRODUCTION

With the existence of numerous evaluation system to conceive human attributes so to fulfill the requirements as set by the institution conducting the evaluation has there been all along. Such as psychometric tests, IQ tests, memory tests etc. Each of these evaluation techniques are rigid and do not offer flexibility in terms of evaluating human attributes in a full-fledged manner. It is important to be noted here, the above tests contains question with a single dimensional approach to examine only one of the human attribute such as either mathematical ability, perception power, reasoning or many other as such. Essential here is to understand that the problem is in the way questions are undertaken to test the attributes. A single question could be processed in a certain way to estimate what attributes and at what level it intends to evaluate with consequent responses to yield the final outcome.

There is a need for attribute-fair measures that value the distinct modalities of thinking and learning that uniquely define each attribute. Ultimately, it would certainly be desirable to have an algorithm for the selection of intelligence, such that any trained researcher could determine whether a candidate's attribute met the appropriate criteria. Thus, making the evaluation system approach towards a more wholesome scientific assessment.

2. RELATED WORKS

There are multitudes of attributes so to aptly determine any individual's capability. With many theories, scale points , concepts already in implementation or stages of implementation here are few evaluation systems presented as below:

i. g- factor (psychometrics) : The basis of major evaluation systems in the world such as those of standardized tests in USA which takes verbal, logical and mathematical attributes as the criteria to determine a candidate's potential.

ii. Wechsler Adult Intelligence Scale: IQ tests use this scale to evaluate candidates on the grounds of verbal, memory, perception and processing speed[1].

iii. Theory of multiple intelligence: Distinguishes intelligence into eight different modalities such as verbal-linguistic, interpersonal, intra-personal etc. to provide an extensibility in an attempt to examine a candidate's potential to fullest [2].

To be noted here is, while i) and ii) have been well developed and implemented, iii) has yet to take a full shape with a scarce of studies and projects being undertaken such as the following.

In a study, multiple intelligence (MI) theory was used as the framework to design and structure teaching–learning strategies for first-year undergraduate students in an organic chemistry course. The MI profile data were a compilation of each student's highest ranking intelligences [3]

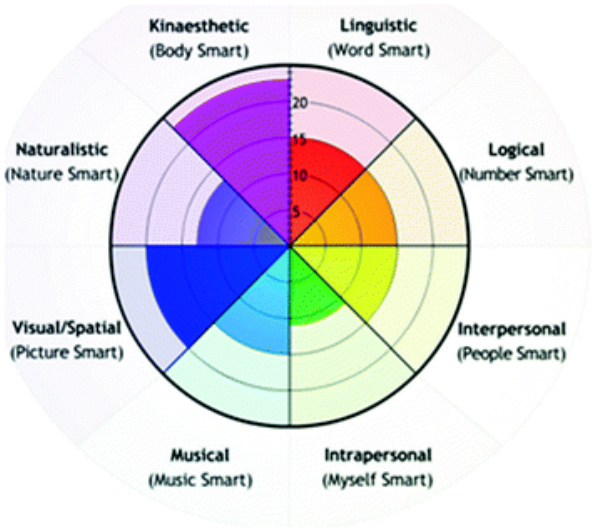

Fig 1. Example of a result of a multiple intelligence (MI) profile of student

The fig 1 displays the eight types of attributes under-testing for an individual student in an organic chemistry class.

Similar evaluation system can be developed on a broader scale for candidates across all fields to assess their abilities on all scales to motivate institutions to build better criterion in order to make a rightful selection.

3. METHODOLOGIES

As mentioned previously about the theory of multiple intelligence, eight attributes can be considered as the standards to determine a candidate's potential. Hereby, four out of those eight attributes with an additional attribute, emotional intelligence (EQ) shall be undertaken to design an evaluation system which namely are:

a)verbal-linguistic : Attributes shown by individuals able with words, language and memorizing words.

b)logical-mathematical : Attributes shown by individuals able in reasoning, numeric problems and critical thinking.

c)interpersonal : Attributes shown by individuals able in communication skills such as public discussion, debate etc.

d)intra-personal : Attributes shown by individuals with a strong broad self reflective sense and motives.

e)emotional intelligence : Attributes shown by individuals able in analyzing situations and deciding outcomes[4]

Designing a multiple choice question format using text analytics for processing the question via lexical analysis which applies such a mechanism to convert text body into tokens and consequently identify them with a meaning [5] .Attached with this to improvise the accuracy is semantic analysis which could be integrated to relate syntactic structures, from the levels of phrases, clauses, sentences and paragraphs as they come along as a part of the question[6]. Ideally here the questions to be processed are in English language therefore no need of any translator mechanism.

Also it is needed to determine the text complexity using Flesch–Kincaid grade level [7] of each of these questions which would in return help in assigning levels to the attributes related to the question according to the obtained complexity utilizing fuzzy logic approach[8] . Here complexity has been taken as a measure for understandability depending on which the candidate's attributes can be assessed. The levels and its related meaning are depicted as follows:

a)Level 0 : Low ; Complexity Score (<0.0)

b)Level 1 : Basic ; Complexity Score (0.0 to 25.9)

c)Level 2 : Intermediate ; Complexity Score (26.0 to 50.9)

d)Level 3 : Difficult ; Complexity Score (51.0 to 75.9)

e)Level 4 : Complex ; Complexity Score (76.0 to 99.9)

Responses by candidate shall be processed according to an algorithm following iteration response theory[9] to curtail activities such as guesswork or plagiarism and to keep the authenticity of the outcome intact.

4. IMPLEMENTATION

The evaluation system shall be bifurcated which namely along with its respective operation is as follows:

i) Question Composition & Analysis

When the composer inputs question text into the text analytics model designed using Meaning Cloud[10] which processes text using lexical analysis and semantic analysis and facilitates to categorize the question in accordance to the set attributes provided. Next step naturally shall be to estimate the complexity of the text implementing Lexile[11] and assign a level accordingly to the attribute related to that particular question. Responses, presumably four multiple choices, to the particular question are to be defined and manually allocated with levels ranging from calculated level (highest level) to the level 0 (lowest level) by any trained or eligible researcher composing the questions.

In the sample followed the above technique has been implemented to obtain desirable outcomes:

Question Composed: An adult has a body temperature of 44.4 degree Celsius, mention the normal temperature and calculate the percentage increase from the normal body temperature.

Attribute Assigned: Logical-Mathematical

Level Assigned: Level 3

Levels Assigned to Responses:

a) 37, 20% (Level 3)

b) 39,13% (Level 1)

c) 37,30% (Level 2)

d) 39,33% (Level 0)

This is the question composed and consequently analyzed for the candidate to respond to.

ii) Response Recording & Analysis

Through an adaptive module the candidate selects responses for each of the questions which cumulates into a final outcome showcasing the level of candidate's potential for each of the attributes.

In the sample below the outcome is determined :

Response Recorded : c) 37, 30 %

This response is incorrect rather a) 37,20% is correct yet the evaluation system shall determine the candidate's potential aptly and yield the outcome as :

The candidate has Logical-Mathematical attribute at Level 2.

The above outcome after being examined over a range of questions across all five attributes shall present a complete assessment of the candidate's attribute.

CONCLUSION

This paper has made a step towards implementing effective tools of text analytics and fuzzy logic to modify and upgrade the current existing evaluation system for all purposes using theory of multiple intelligences bringing forth a more comprehensive assessment of human attributes. Numerous institutions has been facing the acute shortage of right selection of candidature for their businesses and other purposes. This evaluation system while being upgraded with technology and time might as well offer the most apt solution.

REFERENCES

[1] Matarazzo, Joseph D. (1972). Wechsler's Measurement and Appraisal of Adult Intelligence (5th and enlarged ed.). Baltimore (MD): Williams & Witkins.

[2] Gardner, H. (1983). Frames of mind: The theory of multiple intelligences. New York: Basic Books Inc.

[3] Lai HY., Yap SL. (2016) Application of Multiple Intelligence Theory in the Assessment for Learning. In: Tang S., Logonnathan L. (eds) Assessment for Learning Within and Beyond the Classroom. Springer, Singapore

[4] Coleman, Andrew (2008). A Dictionary of Psychology (3 ed.). Oxford University Press

[5] Farhanaaz and V. Sanju, "An exploration on lexical analysis," 2016 International Conference on Electrical, Electronics, and Optimization Techniques (ICEEOT), Chennai, 2016, pp. 253-258.

[6] Goddard, Cliff (2013). Semantic Analysis: An Introduction (2nd ed.). New York: Oxford University Press. p. 17.

[7] Kincaid JP, Fishburne RP Jr, Rogers RL, Chissom BS (February 1975). "Derivation of new readability formulas (Automated Readability Index, Fog Count and Flesch Reading Ease Formula) for Navy enlisted personnel" Research Branch Report 8-75, Millington, TN: Naval Technical Training, U. S. Naval Air Station, Memphis, TN.

[8] D. Wu, C. Zhou, M. Chen and J. Xu, "Evaluation Model and System of ICT in Education Based on Gray Fuzzy Method," 2017 International Symposium on Educational Technology (ISET), Hong Kong, 2017, pp. 85-89.

[9] De Ayala, R. J. (2009), The Theory and Practice of Item Response Theory, New York: Guilford Press.

[10] www.meaningcloud.com

[11] www.lexile.com