ONLINE OPINION MINING SYSTEM TO PREDICT THE QUALITY OF STATE UNIFORM SYSTEM OF SCHOOL EDUCATION

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ABSTRACT
The children of today will gear up to become the adult citizens of our country tomorrow. The growth and future of our country highly depends upon the quality of the present school education system. The school education system must focus on the development of mental aspects, social aspects, physical aspects, and overall aspects as they step into their adulthood. This paper analyzes the public opinion on *samacheer kalvi* (Uniform System of School Education) to predict the strength and weakness of our state school education system. The proposed work evaluates the quality of the system USSE (Uniform System of School Education) using a novel NLP-based rules for the tasks of subjective and opinion categorization at the feature level. To synthesize the quality of the proposed work various quality parameters involved and its opinions have gathered from faculties of higher education department, school education department, students from different streams and the public through an online system. Results show that the proposed algorithm able to perform better than Liu's model in *samacheer kalvi* domain, improving both accuracy and recall for the task of subjective and opinion categorization. The experimental results prove that a redesign in the syllabus of Tamil Nadu USSE is highly recommended.
Keywords: Opinion Mining, Sentiment Analysis, Samacheer Kalvi, Uniform School Education System.

INTRODUCTION

The Tamil Nadu Government headed by the chief minister K.Karunanithi took initiative in the year 2010 to provide common school education to all the children of our state by integrating various school education systems. The system was named as *samacheer kalvi* in mother (Tamil) language. Regarding the amendment of the system, a committee was formed by the government to frame the new curriculum and syllabus for providing the Uniform System of School Education in our state, Tamil Nadu. The various subject's experts from the state board and metric board were involved in framing the course material and syllabus for the students. The committee recommended the system called s*amacheer kalvi* with the following merits:

- The syllabus was designed as per National Curriculum Framework 2005 and matches the standards of NCERT books
- The system provided quality education to all children without any inequity based on their economy, community or educational background
- Child Centered
- The merits of other boards namely CBSE and Metrics are adopted into *samacheer kalvi* to diminish the variation among the students.

The system was implemented by the school education department of Tamil Nadu under the Act 2010 Uniform System of School Education for I-VI classes for the academic year 2010 and subsequently, in 2011 the system was extended up to 10th standard. The new system called s*amacheer kalvi* integrates the various stream of school education. There are over 12 million children studying in different categories of school boards which include:

- 45,000 State Board Schools
- 11,000 Matriculation Schools
- 25 Oriental Schools and
- 50 Anglo-Indian Schools

The common syllabus, textbook and scheme of examinations are regularized for USSE by the school education department when the system was implemented in TN. The aim of new system is diminishing the variations

between the Matriculation, CBSE and the Government school students. The motivation for a USES was obtained from the Ex. Chief Minister of Tamil Nadu, K. Kamaraj who was the first to initiate a common dress code in schools to diminish the differences among the students.

The state government headed by the chief minister of Tamil Nadu K. Karunanidhi ruled out in the public election conducted in the year 2011. After the change of Government, *Selvi* J. Jayalalitha, the chief minister of TN has dropped *samacheer kalvi* for the academic year 2011-2012 due to some political issues. Again, a new committee was formed by the ADMK (*All India Anna Dravida Munnetra Kalakam*) government in 2011, headed by the Chief Secretary, Debendranath Sarangi. The committee identified the following defects in the s*amacheer kalvi* syllabus and they decided not to recommend the system to the government. The demerits of the system identified include:

- The standard of Text Book is low.
- The recommendation of National Curriculum and Framework (NCF) and NCERT was not followed while preparing the syllabus and text book.
- No scope for children in rural and urban areas
- Joy of learning is poor
- The syllabus was overburdening the children
- No life skills/Survey Skills
- Analytical thinking is poor
- Poor Age appropriate learning
- The *samacheer* syllabus did not encourage thinking process of students
- No standard was adopted since the syllabus has been framed in a hurry
- The teachers were not trained to teach *samacheer* syllabus

Regarding this controversies, the former government appealed in the high court of TN, the court ordered the state to proclaim the system into immediate effect. The state government appealed to Supreme Court to stay the order of high court but the apex court refused the petition and insisted state Government to distribute the s*amacheer kalvi* books to students on or before 02/08/2011 (Thomas & Liffy, 2010). After the thorough investigation, the honorable court dismissed the state government petition on 09/08/2011 to drop USES in TN and directed the state government to implement the system on or before 19/08/2011(The Hindu, 2011). Though the honorable Supreme Court view is clear in its judgment, the dispute between two governments made public more confused about their children school education. This contradictory view on Uniform System of School Education motivates this study. In the proposed work, opinions are gathered from faculties in higher education department, school education department, students from various colleges and publics across the state to know the real scenario of the system.

CHALLENGES OF STATE (TAMILNADU) SCHOOL EDUCATION SYSTEM

In this universal educational system era, school education has become more confused due to different board of school education system in our country. As the world is becoming more and more spirited, it is essential for each one to manage with it to endure. On one hand, to stay alive in such a spirited competitive world, it is essential to have a complete thought about competitors' position in the education sector**.** The main challenge for state education is that the government of India is not preparing a common question paper for conducting NEET (National Entrance Exam Test) exam for MBBS (Bachelor of Medicine and Bachelor of Surgery) admission. Since each state in India follows their own curriculum and syllabus pattern of school education system, to gain sustainable competitiveness is unbalanced and confused educational surroundings, school education requires adapting to their settings and mounting cleverness that assists government to make a vital constructive judgment to strengthen the common syllabus pattern of the school education.

PROBLEM DEFINITION

The government of India is conducting NEET exam to select the candidates for MBBS admission. The NEET conducted by the central government of India is based on CBSE (Central Board of School Education) syllabus pattern. But, in our state (Tamil Nadu) only a few schools are following CBSE syllabus pattern. The peoples from rural areas are totally ignored due to the admission cost of the CBSE. It is most horrible to report that the students who are economically poor could not get admission in CBSE, India, though the students are talented. Due to this Non-uniformity, the students from our state could not score more marks in the examination conducted by NEET for MBBS admission, 2017. So it is highly important to examine the quality of state board syllabus whether it meets CBSE standard or not. Though the system provided uniformity in s*amacheer kalvi*, the standard is, way below the rest of the country's education policies. Also, in this modern world, it is essential to strengthen the syllabus pattern of school education to equip it to international standards for the entire nation, India. The proposed works addresses these problems.

RELATED WORK

Board of School Education System

Our system is intended to help the government to understand the overall appreciation of web users by easily finding and extracting relevant subjective information available from the web. To strengthen the proposed work, opinions have been gathered from teaching professional, public and students from the different educational stream. The various merits and demerits related to common education systems and opinion mining techniques have been discussed in this survey.

C.Mahalingam (2010), proposed a comparative statement of STATE BOARD, CBSE, MATRIC for mathematics and physics syllabus of 10th standard. He reported that TN launched the *samacheer kalvi* to replace Matric, Anglo Indian and Oriental Boards for standard 1-6. However, there were several viewpoints across teachers, writers, and the public that the new scheme is not of good quality as compared to global standards. To find the actual scenario, a comparison study of CBSE, Matric, and State board has been done for the core subjects such as physics and mathematics to look at the differences of the course content among the three boards. It has been found that our tenth standard syllabus was too high for the age group compared to the CBSE syllabus. Some points of the study brought out include:

- Tamil Nadu syllabus brings the best of the four syllabus
- This is just right for the age group of the students
- Candidates across the state will study the same syllabus
- It encourages students to focus on sports, literary and arts related skills
- It's on par with global standards

According to his analysis the above study witnessed that the state board syllabus had all qualities equal to Metric and CBSE systems.

R.Srinivasan (2012) proposed an article stating that transforming school education through a single board for the 10th class and the University exam for the 12th class, will facilitate a serious and comprehensive reform starting from clearly stating the objectives of school education, to curriculum design, instituting infrastructural facilities, ensuring teacher quality and redefining process of learning and evaluation that tests the learning outcome in the broader framework of public education that is contextualized and forms the basis for life-long learning process.
A workshop on 'Language and Education' in madhyapradesh (2011) recognized the grave danger which our entire mother tongue in India are facing today. The language is most important mode of communication which helps to express our thoughts, cultural history and knowledge deliberately. Therefore, it is necessary to protect and develop the different language skills of Indian people. Multilinguality is a new way of education. It refers to "first-language-first" education that is schooling which begins in mother tongue and transitions to another additional language.

A. Sadagopal and G. Haragopal (2009) have appealed to the Government by stating the need in change of education system through "All India Forum for Right to Education". They have been urging the government to replace the framework with the 'Common School System based on Neighborhood Schools' in consonance with the basic spirit and to providing a Fundamental Right to free and compulsory education of equitable quality to all children until the age of eighteen years. The suggestions recommended in the conference include:

- Incorporating a constitutional guarantee for providing adequate funding for the entire school system
- Include a provision to completely ban all forms of privatization and commercialization of education
- Hold public hearings in all district headquarters of the country in a democratic and transparent manner in the process of drafting a new Bill. But, the state government rejected the recommendation forwarded by the conference committee.

P.B Suresh Babu (2013) advocate, Chennai high court proposed an article and interesting findings were observed. He reported that there was creation of an inclusive free-school system in the United States, though schooling was not compulsory, not free of charge-British colonies. Blacks and Indians, in general, received no formal schooling in these institutions. The funded schooling and charity schooling is the base of monitorial school model. They provided totally free schools through property taxes. The political party called the Whig Party's role is to construct institution building, economic development, and free public schools. The schools for racial minorities across the nation generally had poorer resources. The common school system therefore by its evolution would mean a system of education run by the state with the common syllabus, free of cost, and uniformity in the standard for people of all classes, race, and religion in a country within the neighborhood of the child.

The common school ideas of the system were:

- Publicly funded schools open to all children irrespective of caste, creed, community, religion, economic condition or social status
- Where access to good education will depend not on wealth or class
- Adequate standards in all schools and at least a reasonable proportion of quality institutions
- No tuition fee is charged
- It meets the expectations of average parents so that they would not ordinarily feel the need to send their children to fee-charging schools outside the system.

The above survey reports witnessed the importance of common education system in Tamil Nadu, India. Though we have uniformity in our school system, the coaching and training provided to the government school student is poor. So, the standardization has to be achieved to make the students to score more marks in the competitive exam conducted by the state and central government of India.

Opinion Mining and Sentiment Analysis

The knowledge discovery algorithm in combination with Natural Language Processing is helpful for a knowledge worker to extract interesting findings from the web. Liu (2007) classified opinion system into two types; one is aspect based and another one non-aspect based scheme. The first approach is useful to analyze the text into knowledge that can be used for the decision making process. There are many approaches proposed by different authors, like (Archak, Ghose, & Ipeirotis, 2007; Decker & Trusov, 2010; Ku, Liang, & Chen, 2006; Pang and Lee (2004); Qiu, Liu, Bu and Chen, (2010); Lu, Zhai, & Sundaresan, 2009; Popescu & Etzioni, 2005; Titov & McDonald, 2008; Zhao & Li, 2009; Zhuang et al., 2006). Though we have referred many different approaches and methods for aspect based opinion mining, the proposed approach is most deterministic for feature based mining system.

In our work, we have framed a novel mining system which can be applied over multiple domains. Other similar techniques by Kim, Ganesan, Sondhi, and Zhai (2011); Jo and Oh, (2011), Pang and Lee (2008); and Marrese-Taylor, Rodriguez, Velasquez, Ghosh, and Banerjee (2013); Jin Hay and Srihari (2009) Xu, Cheng, Tan, Liu, & Shen, (2013), are based on Latent Dirichlet Allocation (LDA), which is similar to the article by Titov & McDonald, (2008). These approaches are based on document modeling by merging more topics into a single model. Further similar articles proposed by Duerias-Fenandez, Velsquez, and L.Huillier (2014) used unique methods to discover hidden pattern from web. The article published by Cruz et al., 2013, had a different views and perspectives that concentrated on domain analysis for discovering patterns.

The concept level sentiment analysis approaches focus on a semantic analysis of text through the use of semantic networks or web ontologies. These approaches allow the aggregation of conceptual and affective information associated with natural language opinions sentences (Cambria, 2013; Havasi, Cambria, Schuller, Liu, & Wang, 2013a, Havasi, Cambria, Schuller, Liu, & Wang, 2013b). The use of ontology technique to represent semantics associated with natural language text is much better than bags-of-words concepts. The recent approaches of this kind mainly leverage on existing affective knowledge. This helps understanding the semantics behind bag-of-concepts, such as WordNet. Indeed, (Cambria, Poria, Gelbukh, & Kwok, 2014) presents an API for ontology based sentiment analysis. This approach provides semantics and sentics associated with 15,000 natural language concepts. The ontology based approach also includes complex tasks such as domain adaptation; multi model analysis and opinion classification based on linguistic, audio, and visual features.

In this context, the proposed work is based only on linguistic features. Our approach does not use any external source of knowledge. The entire above mentioned article implemented various techniques to analyze different issues in opinion mining. The proposed work concentrates only on the state education system; to solve a very specific issue. The proposed technique is different from all the above approaches since it is aspect based and analyzes opinions at the sentence level. However, the method is not proposed as an application but rather as a service. To the best of our knowledge, this is the new work carried out for predicting the strength and weakness of the s*amacheer kalvi*, a uniform system of school education in Tamil Nadu, India.

MATERIALS AND METHODS

The novel linguistic algorithms have been proposed to extract subjective information and detect relevant polarity value of all the aspect identified in this domain. Based on the sentiment score, a summary is generated, from which the strength and weakness of state board syllabus pattern is evaluated at aspect level. In extension to this analysis, opinion mining systems have been constructed to strengthen the proposed work by collecting opinions

from teaching professional's, students and public. We use 'R' tool to analyze the user opinions for finding the real scenario of the s*amacheer kalvi* through various parameters level.

OPINION MINING IN WEB

The proposed work is to mine s*amacheer kalvi* reviews from the web to assist the government to assess the quality of school education system at various aspect levels. Determining the relative quality is one of the main benefits in our system. The top six aspects are identified based on the merit of relative importance, from user expressed review sentences. The idea of this work is to apply Liu ideas in order to perform aspect based sentiment analysis for the s*amacheer kalvi* domain. The existing author had this kind of analysis for electronic product reviews where people have expressed their opinions directly on any one feature. So, we develop a model for aspect-based opinion mining that especially considers features of the uniform system of school education domain. To extract the implicit features a well know method Lancaster in Lancaster (1966) have been reused. Our extension, based on the work of Marrese-Taylor, Velasquez, Bravo-Marquez, and Matsuo (2013), takes Liu's methods as a basis. The proposed novel approach has been applied into the s*amacheer kalvi* domain.

ASPECTS SENTENCE EXTRACTION

As Liu said in his work, the aspects are not directly appearing in text but they exist with some manner of feature expressions. The existing model is unclear how aspects that appear more than once in a document are managed. The process of extracting relevant expression is a complex task than finding the specific aspect, since the review expression in the document is large. The proposed system related to children school education system is having several review expressions than the product review sentences. The another issue found in Bing model is resolved by the new method that is define a sentence as an ordered set of tokens, including words and punctuation. The aspect that appears in three different places must be counted thrice. The word distance between two elements of sentence S can be calculated based on the difference of the positions of the two tokens in sentence S.

$$WD(t_a, t_b) = |\text{position } t_a - \text{position } t_b| \; t_a, t_b \in S \quad (1)$$

The minimal distance between 2 elements in S is 1. The maximum distance corresponds to |S| + 1. Another main task in this work is to find opinion orientation at feature level, the Bing idea in Hu and Liu (2004b) is used to extract important or frequent features.

FINDING OPINION ORIENTATION

The work set of heuristic rule from Ding et al. (2008) is used to predict the orientation of the opinion sentences. The approach is novel and it is used to calculate the optimistic and pessimistic words in each sentence and assign a sentiment score.

FINDING WORD ORIENTATION

The purpose of algorithm 1 is to find the relative orientation of each word in sentences. The step by step process explains the set of linguistic rules to perform the given task.

Algorithm 1 Word Orientation Rule

1. **If** word is in opinion_words then
2: mark (word)
3: orientation Apply Opinion Word Rule (marked_word)
4: **else**
5: **if** word is in neutral_words then
6: mark (word)
7: orientation ← 0
8: **end if**
9: **end if**
10: **if** word is near a too_word then
11: orientation ← Apply Too Rules (orientation)
12: **end if**
13: **if** word is near a negation_word then
14: orientation ← Apply Negation Rules (orientation)
15: **end if**
16: return orientation

Word rules: The score 1 is representing the optimistic orientation while -1 is often called as pessimistic orientation. The noun and adjectives in sentences with no opinion word may have an intrinsic score which is called as a neutral word.

Negation rules: There are rules applied to extract the right meaning of the expressions when negation word encountered in the sentences. They are, Negation Negative! Positive, Negation Positive! Negative and Negation Neutral! Negative. Negation words and phrases include: ‘‘no’’, ‘‘not’’, ‘‘never’’, ‘‘n’t’’, ‘‘dont’’, ‘‘cant’’, ‘‘didnt’’, ‘‘wouldnt’’, ‘‘havent’’, ‘‘shouldnt’’.

FINDING FEATURE ORIENTATION

The algorithm 2 explains how to combine the orientation of all sentences to calculate the total score on particular aspects. The below algorithm describes the process in step by step manner.

Algorithm 2 Opinion orientation

```
1:  if but_word is in sentence then
2:     orientation Opinion Orientation (aspect, marked_words, but_clause)
3:     if orientation – 0 then
4:        return orientation
5:     else
6:  orientation ← Opinion Orientation (aspect, marked_words, not but_clause)
7:        if orientation # 0 then
8:           return -1 * orientation
9:        else
10:          return 0
11:       end if
12:    end if
13: else
14:    for all aspect_position in aspect do
15:      for all aspect_word in aspect_position do
16:        for all word in marked_words do
17:           sub orientation += Word Orientation (word) / WD (aspect_word.word)
18:        end for
19:        orientation += suborientation
20:     end for
21:     final_orientation += orientation
22:  end for
23:  if final_orientation > 0 then
24:     return 1
25:  else
26:     if final_orientation < 0 then
27:        return - 1
28:     else
29:        return 0
30:     end if
31:     end if
32:   end if
```

Feature summarization rule: Let S be a sentence that grasps the group of feature expressions A= {a_1…..a_m}, each one of them emerging only one time in S. Also, let AW_i be the collection of words that include feature a_i, where AW_i = {aw_{i1}, awi_2, . . .aw_{in}}. Each aw_{ij} will be called aspect word and it will correspond to an aspect expression a_i. If scores for each opinion word and neutral word in s are known, score for each aw_{ij} in s is given by the following aggregation function:

$$Score\ (aw_{ij}, s) = \sum_{ow_j \in S} \frac{score(ow_j)}{WD(ow_j, aw_{ij})} \qquad (2)$$

Where ow_j is an sentiment expression or neutral expression in s, WD (ow_j, aw_{ij}) is the expression distance between the feature word aw_{ij} and the sentiment expression ow_j in s. Line 17 implements this formula in Algorithm 2. And, it is observed that in *samacheer kalvi* reviews some feature expressions are in fact composed by more than one word. For example, in the sentence ‘‘*samacheer kalvi* has uniformity but standard is low ’’ an aspect expression that should be extracted by Liu’s algorithms is standard low. Bing idea is failed to determine more aspects in the same sentences. So, the formula should not be used for each aspect expression. In the proposed work a rule is applied to each word in each expression.

Aspect aggregation rule: For each compound feature expression a_i in s, its orientation will be computed in view of the scores of all the words that create it, $aw_{ij} \in aw_i$, according to the following equation, which is applied in line 19 of Algorithm 2.

$$Score\ (ai, s) = \sum_{aw_{ij} \in AW_i} score\,(aw_{ij}, s) \quad (3)$$

Position aggregation rule: We have also seen that in *samacheer kalvi* reviews aspect expressions could appear more than once in a sentence. Assuming that ai emerges t times in s and eloquent the score of each aspect phrases emergence a_i^k, k {1, 2 . . . , t}, we propose that the final score of ai, or fscore (ai, s), should be computed by just adding the values of the scores of all the ai appearances in s, according to the following equation.

$$fscore\ (ai, s) = \sum_{k=1}^{t} score(a_i^k, s) \quad (4)$$

The formula appears in line 21 of Algorithm 2. Note that when a_i only appears one time in s; fscore (ai, s) = score (ai, s). Finally, lines 23–31 show how the orientation is calculated according to the fscore of each aspect expression. If fscore (ai, s) is optimistic, the sentiment is considered optimistic on ai (lines 23 and 24) and if it is pessimistic, the sentiment is considered pessimistic on ai (lines 26 and 27). If none of these cases occur, the sentence is considered neutral (line 29).

SUMMARIZATION

According to Liu's methodologies, aspects are ranked based on the occurrences of aspects but, in the proposed work the task is carried out based on the sentiment score calculated by the algorithm 2. The sentiment analysis technique is most helpful in this domain to predict the polarity value of system meanwhile the requirement of the number of occurrences is not needed. Let P_i and N_i be the number of positive and negative opinions on feature ai, i $\in$ {1. . . n}. Then, $PScore_i$ and $NScore_i$ will be the min-max normalizes values of P_i and N_i, correspondingly. With this, we calculate the standard deviation of these scores using:

$$AVscore_i = \frac{PScore_i + NScore_i}{2} \quad (5)$$

$$STDScore_i = \sqrt{\frac{(PScore_i - AvScore_i)^2 + (NScore_i - AvScore_i)^2}{2}} \quad (6)$$

We distinguish our novel rule for each feature expression a_i, called relative importance, as the minimum-maximum normalized value of its $STDScore_i$. We recommend that feature-based synopsis should include visualization tool that shows the actual values of $PScore_i$; $NScore_i$ and relative importance for each feature expression.

ONLINE OPINION MINING SYSTEM

The online opinion mining system is designed to assess the quality of *samacheerkavi* school education system. Due to limited availability of public opinion in the web, online system has been designed to gather opinion from a different board of school teachers to evaluate the quality of the system performance. Moreover, reviews were also collected from medical college professor's to ensure whether the state education system is meeting the standards of NEET exam conducted by the central board of school education(CBSE), Government of India. The faculty views from higher education department, school education department, student, and public opinions have been taken into consideration to ensure the real scenario of the *samacheerkavi* system.

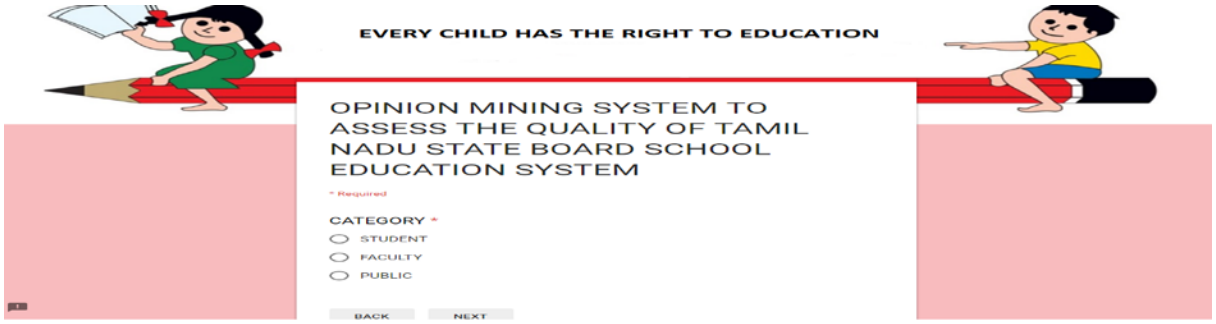

Figure 1 Online Opinion Mining System

Figure 1 represents the online opinion mining system involved collecting user opinion from various disciplines to assess a quality of the proposed system. There are three categories in which users are allowed to log in and submit their reviews. For each question, users must choose one option to complete the survey. The users are also permitted to express their own views in the text box available in the opinion mining system. To ensure the quality of reviews users have strictly adhered to login into the system through their personal Gmail account. There are some compulsory fields in which user detail must be given to proceed evaluating the online survey. The details for students category are student name, gender, and board of the school; faculty name, field (college or school), gender, designation, institution name, place of living (urban or rural) in faculty category, and name, gender, occupation for the public category are mandatory. The message "successfully submitted" is displayed when the user has answered all the questions in the template.

The total number of students participated in the system are 524, out of which 448 students were from the state board and 76 were students from CBSE. The total faculty strength is 156 among which 116 faculties were from higher education department and 40 faculties were from the school education department have participated in the system. As far as public category is concerned the total strength participated in the online opinion mining system is small that is70, out of which 41 are male and 29 are female. Totally, 750 reviews were gathered from a different stream of people to predict the quality of common school education system of TN.

CATEGORY	NAME	GENDER	EMAIL ID	BOARD	Qns 1	Qns 2	Qns 3	Qns 4	Qns 5	Qns 6	Qns 7	Qns 8	Qns 9	Qns 10
					Does the syst	Does it impro	Is the system	Does it help s	Does the syst	Does the syst	Do students f	Does the syst	Does it provi	Is the studen
STUDENT	Kanjana	FEMALE	kanjana.s.2014.it@rajalakshmi.edu.in	STATE BOARD	Negative	Neutral	Negative	Neutral	Negative	Positive	Negative	Negative	Neutral	Negative
STUDENT	Sriram A	MALE	srirukesh31@gmail.com	STATE BOARD	Negative	Negative	Neutral	Negative	Negative	Negative	Neutral	Neutral	Positive	Negative
STUDENT	Rangarajan R S	MALE	rangarajan1997@gmail.com	CBSE	Negative	Negative	Positive	Negative	Negative	Positive	Negative	Positive	Positive	Negative
STUDENT	Santhanalakshmi S	FEMALE	santhanalakshmi.s.2014.it@rajalakshmi.edu.in	STATE BOARD	Negative	Negative	Negative	Negative	Negative	Negative	Neutral	Negative	Positive	Negative
STUDENT	Sai prashanth.R	MALE	saiprashanth132@gmail.com	STATE BOARD	Positive	Positive	Neutral	Neutral	Negative	Negative	Negative	Neutral	Neutral	Negative
STUDENT	sivaranjani	FEMALE	sivaranjanisrikanth@gmail.com	STATE BOARD	Neutral	Neutral	Positive	Negative	Negative	Negative	Neutral	Negative	Neutral	Negative
STUDENT	RANGASHRI.V	FEMALE	rangashriv@gmail.com	STATE BOARD	Negative	Negative	Neutral	Negative	Positive	Negative	Negative	Negative	Positive	Negative
STUDENT	SINDHUJA M.	FEMALE	sindhumk30@gmail.com	STATE BOARD	Neutral	Negative	Neutral	Negative	Negative	Negative	Negative	Negative	Negative	Negative
STUDENT	SHIVA PRAKASH.S	MALE	s.shivaprakash29@gmail.com	STATE BOARD	Neutral	Negative	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
STUDENT	SRIHARI V	MALE	venk.srihari@gmail.com	CBSE	Neutral	Positive	Negative	Positive	Neutral	Positive	Neutral	Positive	Positive	Neutral
STUDENT	SHRUTHI SUNDAR	FEMALE	shruthisundar.2014.it@rajalakshmi.edu.in	CBSE	Positive	Positive	Negative	Positive	Neutral	Neutral	Neutral	Positive	Positive	Positive
STUDENT	Smruthi P.V	FEMALE	smruthi997@gmail.com	STATE BOARD	Negative	Negative	Negative	Negative	Neutral	Negative	Neutral	Neutral	Negative	Negative
STUDENT	Ravi Subramanian N	MALE	ravisubramanian.n.2014.it@rajalakshmi.edu.in	STATE BOARD	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Positive	Neutral
STUDENT	Shivani.s.c.	FEMALE	Shivani.sc.2014.it@rajalakshmi.edu.in	STATE BOARD	Negative	Negative	Positive	Negative	Negative	Positive	Negative	Neutral	Negative	Negative
STUDENT	Shivani G	FEMALE	shivani.g.2014.it@rajalakshmi.edu.in	STATE BOARD	Negative	Negative	Positive	Negative	Negative	Neutral	Negative	Negative	Negative	Negative
STUDENT	srinivasan k	MALE	cheenuaus@gmail.com	STATE BOARD	Negative	Negative	Negative	Negative	Negative	Positive	Neutral	Positive	Neutral	Neutral
STUDENT	sreeharienee.p.r	FEMALE	sreeharienee@gmail.com	STATE BOARD	Negative	Negative	Negative	Negative	Neutral	Neutral	Positive	Negative	Negative	Negative
STUDENT	RAJNEEKANTHA.D	FEMALE	rajneekantharajneekantha@gmail.com	STATE BOARD	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative
STUDENT	SANKARAN R	MALE	sankaran.r.2014.it@rajalakshmi.edu.in	STATE BOARD	Neutral	Positive	Negative	Neutral	Positive	Positive	Positive	Positive	Positive	Neutral
STUDENT	NATHIYA R	FEMALE	nathiyarajum@gmail.com	STATE BOARD	Positive	Positive	Positive	Positive	Positive	Positive	Neutral	Positive	Positive	Neutral
STUDENT	mythly	FEMALE	mythly.14gmail.com	CBSE	Positive	Positive	Positive	Positive	Neutral	Positive	Neutral	Positive	Neutral	Positive
STUDENT	PREETHI S	FEMALE	preethi.s.2014.it@rajalakshmi.edu.in	STATE BOARD	Positive	Negative	Positive	Negative	Negative	Negative	Negative	Negative	Positive	Neutral
STUDENT	A PREMALATHA	FEMALE	premalatha3096@gmail.com	STATE BOARD	Positive	Neutral	Negative	Negative	Neutral	Negative	Positive	Positive	Positive	Positive
STUDENT	B kiruthiga	FEMALE	kiruthiga1297@gmail.com	STATE BOARD	Positive	Neutral	Negative	Neutral	Negative	Negative	Positive	Positive	Neutral	Positive

Figure 2 Represents sample review template for online opinion system

The above snapshot in figure 2 represents the online opinion gathered from student's category. To assess the system, sentiment scores are computed by assigning the value 5 to Positive, 2.5 to Neutral and 1 to Negative polarities. The total review score for all questions is categorized into positive, negative and neutral. The sentiment score is calculated for each category of the user. The polarity value for student category are, 2453 positive score, 4397 negative score, and 2038 neutral score. The polarity values for faculty category contains 553 positive score, 1316 negative score, and 783 neutral score. For public category, the sentiment score for positive polarity is 377, negative polarity is 555, and the neutral polarity value is 258. The above results recommended the change in the existing scheme of the Tamil Nadu School Education System.

RESULTS & DISCUSSION

There was no specific website or common forum available for *samacheer kalvi* domain. So, the reviews are extracted from *twitter* and open web. The user reviews in web are limited due to lack of awareness of the system compared to product opinions available in the web. The figure 3 represents the reviews extracted from the web. The total reviews sets collected from web are 285 and total sentences are 1260. We use an algorithm from Kiss and Strunk (2006) to tokenize each review sentences.

Table 1 Data set

Corpus	*Samacheer Kalvi*
Reviews	285
Total sentences	1260
Opinion sentences	965
Percentage	77%

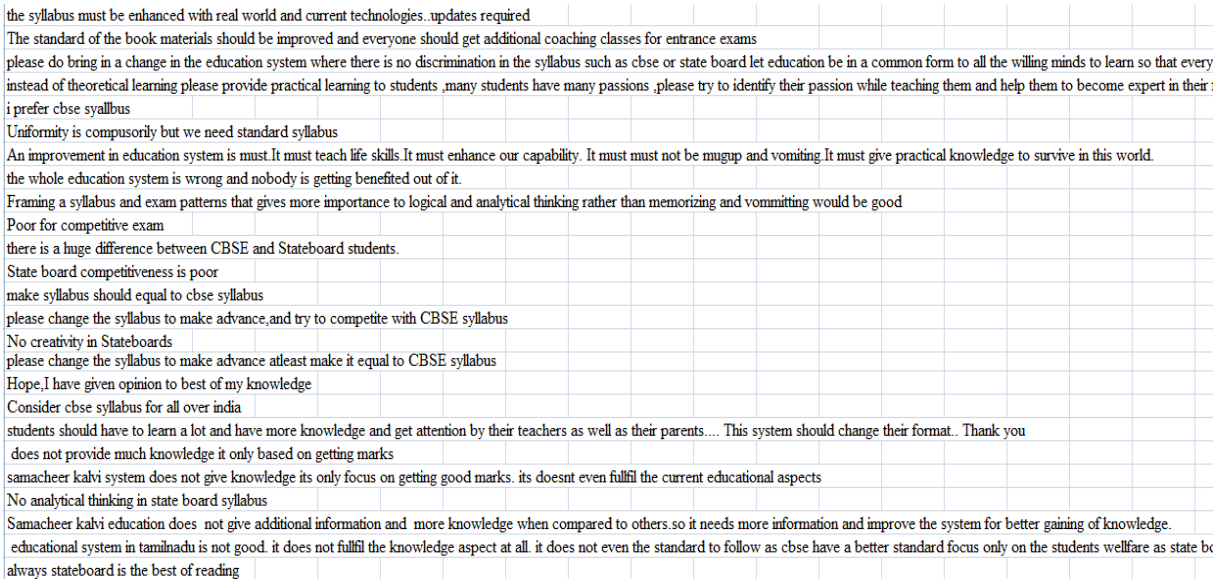
the syllabus must be enhanced with real world and current technologies..updates required
The standard of the book materials should be improved and everyone should get additional coaching classes for entrance exams
please do bring in a change in the education system where there is no discrimination in the syllabus such as cbse or state board let education be in a common form to all the willing minds to learn so that every
instead of theoretical learning please provide practical learning to students ,many students have many passions ,please try to identify their passion while teaching them and help them to become expert in their
i prefer cbse syallbus
Uniformity is compusorily but we need standard syllabus
An improvement in education system is must.It must teach life skills.It must enhance our capability. It must must not be mugup and vomiting.It must give practical knowledge to survive in this world.
the whole education system is wrong and nobody is getting benefited out of it.
Framing a syllabus and exam patterns that gives more importance to logical and analytical thinking rather than memorizing and vommitting would be good
Poor for competitive exam
there is a huge difference between CBSE and Stateboard students.
State board competitiveness is poor
make syllabus should equal to cbse syllabus
please change the syllabus to make advance,and try to competite with CBSE syllabus
No creativity in Stateboards
please change the syllabus to make advance atleast make it equal to CBSE syllabus
Hope,I have given opinion to best of my knowledge
Consider cbse syllabus for all over india
students should have to learn a lot and have more knowledge and get attention by their teachers as well as their parents.... This system should change their format.. Thank you
does not provide much knowledge it only based on getting marks
samacheer kalvi system does not give knowledge its only focus on getting good marks. its doesnt even fullfil the current educational aspects
No analytical thinking in state board syllabus
Samacheer kalvi education does not give additional information and more knowledge when compared to others.so it needs more information and improve the system for better gaining of knowledge.
educational system in tamilnadu is not good. it does not fullfil the knowledge aspect at all. it does not even the standard to follow as cbse have a better standard focus only on the students wellfare as state bo
always stateboard is the best of reading

Figure 3 Represents sample text reviews from online opinion system

Table 1 represents the data set details. The task of opinion identification has found 80 % of the average opinion sentences. The important fraction of the sentence which is identified can be used to validate the use of common school education system.

Table 2 Types of aspects in data set

Aspect Type	Total	Percentage
Explicit	890	92.22%
Implicit	75	7.8%
Total	965	100

Table 2 shows the manually extracted aspect expression; the representation of the explicit aspect extraction is 92.22 %. The below reviews are extracted from the web. They are, "scope of *samacheer kalvi is not bad"* the sentence directly expresses the positive feeling of the reviewer. Similarly, there are many aspects extracted and sentiment analysis is carried out to predict the polarity value for each aspect of the domain. There are reviews like *"State board syllabus is easy", "Analytical thinking is poor in state board"," No child-centered studies in state board", "TN board syllabus is fair"* and *"State board has uniformity"* etc. In this case, the term TN, State Board, *samacheer kalvi* and *samacheer* is taken as same meaning in order to group relevant domain sentences.The collection of above the specification is extracted and then evaluated to analyze the way in which the proposed opinion mining algorithm performs when applied to s*amacheer kalvi* domain. The rule from Hu and Liu (2004b) is used to extract aspect expression for performing sensitivity data analysis. The below tables 3 describes the precision and recall values for the different task carried out in our proposed work. The below result for the task feature extraction is not good in s*amacheer kalvi* domain since user reviews contain more complex sentences. But, the work for sentiment categorization has achieved better result. The significant observation in this experiment is that the precision and recall values will be decreased when all the feature expressions are considered for extraction. So, the precision and recall values for aspect extraction changes depending upon the feature set that is being selected.

PERFORMANCE EVALUATION

Table 3 represents the performance comparison between proposed algorithm and Bing Liu's methods. The precision value for the task subjective classification is improved with 18% and recall value is 21% increased over the baseline system. The task of opinion categorization is better here; the precision is 3% and the recall is 6%; comparatively increased over the Bing Liu's algorithm. The performance of the feature extraction is low compared to subjective and opinion categorization task in s*amacheer kalvi* domain because the public opinion contains a large sentence. Also, the task of aspect extraction becomes complex due to more compound sentences in user reviews.

Table 3 Performance comparison with other methods

Name of operation	Precision		Recall		F-Measure	
	Proposed	B.Liu	Proposed	B.Liu	Proposed	B.Liu
Explicit Aspect Extraction	92.22%	79%	70.6 %	67%	80%	73%
Subjectivity Classification	82%	64%	90%	69%	86 %	67%
Sentiment Classification	94%	91%	96%	90%	95 %	90%

The evaluation was made to know the actual performance of the task, feature extraction from the perspective of information retrieval and it calculates the precision at top n of the retrieved aspects, according to their relative importance.

Table 4 Aspect polarity score with relative importance

Aspects	Positive Score	Negative Score	Relative Importance
Uniformity	96%	4.0%	98%
Competitive Exam	10%	90%	92%
Analytical Thinking	20%	85%	90%
Scope	35%	55%	87%
Life skills/Survival Skills	25%	65%	78%
Communication skill	21%	68%	15%

The table 4 describes the score of each identified aspects which are extracted from web. According to these results, many aspects are negatively reviewed by the public user. The web users are given positive opinion at only one aspect which is called "Uniformity". The positive sentiment score for this aspect is 96%, negative score is 4.0% and its relative importance is 98%.

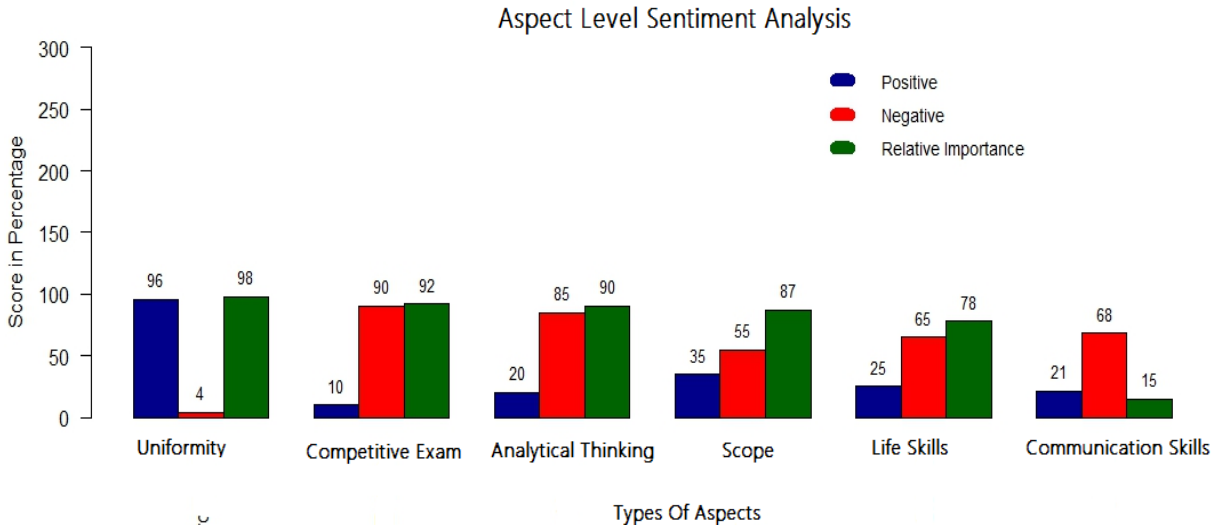

Figure 3 Represents result graph for aspect level sentiment analysis

Figure 3 represents the different types of aspect with their relative sentiment score. The figure 3 represent that people are not happy with *samacheer kalvi* school system. The positive sentiment score for the aspect *competitive exam* is only 10% where as the negative score is 90%. Similarly, the aspects like *analytical thinking, scope, life skill and communication skills* are also poor. Though people are happy with the aspect *uniformity* the system has failed to prove the standardization at many different aspects of the system.

There was a huge support from the public for providing the common education to all children without any discrimination based on their economy, social or cultural background when the system was brought into use. From the above result it is clearly observed that still people need common education system with standardization of the syllabus pattern. The negative impact on many aspects made us to reinvestigate the real scenario of the scheme by constructing online opinion mining system.

Table 5 Polarity review score

Polarity Name/ Category of User	Positive	Neutral	Negative
Student	2473	2038	4397
Faculty	553	783	1316
Public	377	258	555

The above table 5 describes the categories of the user with their corresponding polarity sentiment score for all given questions in the template. The overall sentiment score for the polarity positive is 3403, 3079 is neutral and the negative score is 6268. The below figure 4 represents the overall sentiment score of the questions for each category of the user against polarity name. It is observed that the graph in figure 4 contains the highest polarity value for student's category than the categories faculty and public. The overall polarity value for negative sentiment is 6268 which is 54 % higher than the positive sentiment score and 49 % higher than the neutral sentiment score. Again, these scores are clearly indicating that the users are not happy with the current school education system in Tamil Nadu.

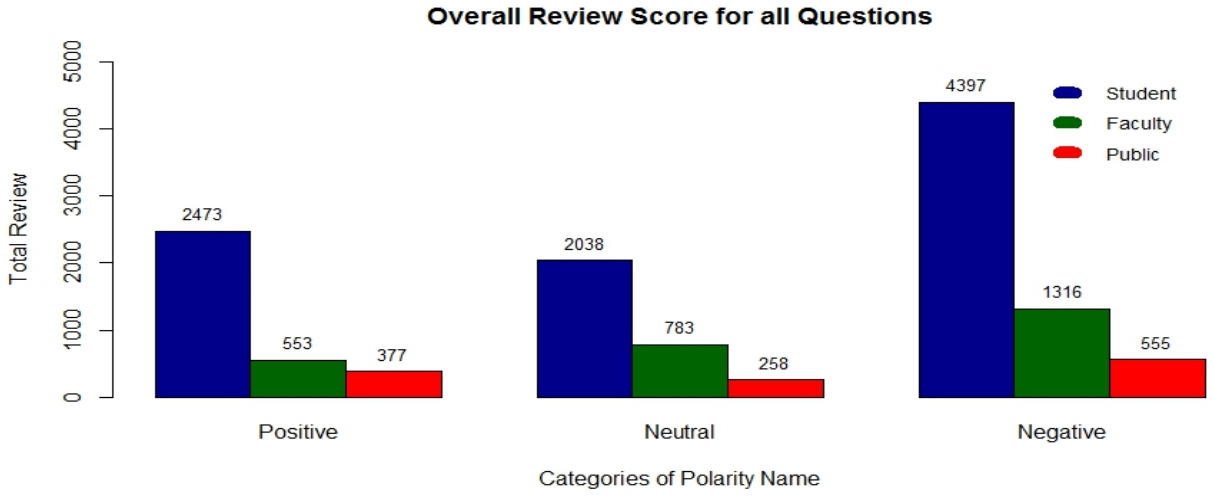

Figure 4 Represents review score for different category of reviewers

The below table 6 describes the polarity values between the state board school students and CBSE students. The following important questions are taken into consideration to predict the sentiment score between these two groups of students.

Table 6 Polarity score between state board school vs CBSE

Polarity Value /Board of school	Positive	Neutral	Negative
State Board	485	538	1665
CBSE	43	86	326

There are six most important questions numbered 1, 2, 4, 15, 16 and 17 which are used to perform the comparative studies between the State Board and CBSE students. The analysis on these preferred questions are necessary for the students who are willing to attend competitive exams like NEET, TNPSC(Tamil Nadu Public Service Commission), UPSC(Union Public Service Commission) and other important government examination. The overall sentiment score for positive polarity is 528, negative polarity is 1991 and the neutral score is 624. Based on the sentiment score it is observed that the students from both streams are not happy with the current school education system of TN. The polarity value for negative sentiment is 26.5 % higher than positive polarity and 31.3 % higher than neutral polarity values. The student participants from CBSE are 76 and state board schools are 448. Out of 526 students, 239 are male and 285 are female, which show that the ratio for female is higher than male students. Based on this observation, it is also confirmed that students ratio for state board school is larger than CBSE. Though the student ratio for state board education is higher, the right to the preparation of NEET question paper is given to CBSE School. Due to this action, the state board students are unable to score more marks in the common examination conducted by NEET for MBBS admission. The students from wealthy family only are able to get admission in CBSE schools; the people below poverty line, from rural and urban areas are totally ignored due to the admission cost of the CBSE. It is most horrible to report that the students who are economically poor could not get admission in CBSE, India, though the students are talented. Today is news (01/09/2017) from "*INDIAN EXPRESSES* "a daily newspaper in Tamil Nadu, a girl has secured 1176 out of 1200 who is unable to get MBBS admission due to NEET policies. A girl named S. Anitha from the backward Ariyalur district of Tamil Nadu was found dead at her home on Friday. She had argued in the Supreme Court last week against NEET score being sought to be the sole basis for medical admissions. According to sources, she was depressed after the refuse of apex court to exempt TN from NEET. Anitha, a daughter of laborer, scored 1,176 out of 1,200 marks in Class XII examinations on the state board syllabus in Tamil language medium. But in NEET, a national test based on CBSE syllabus she is not familiar with, Anitha managed only a score of 86. This is a real scenario of our state board school education system.

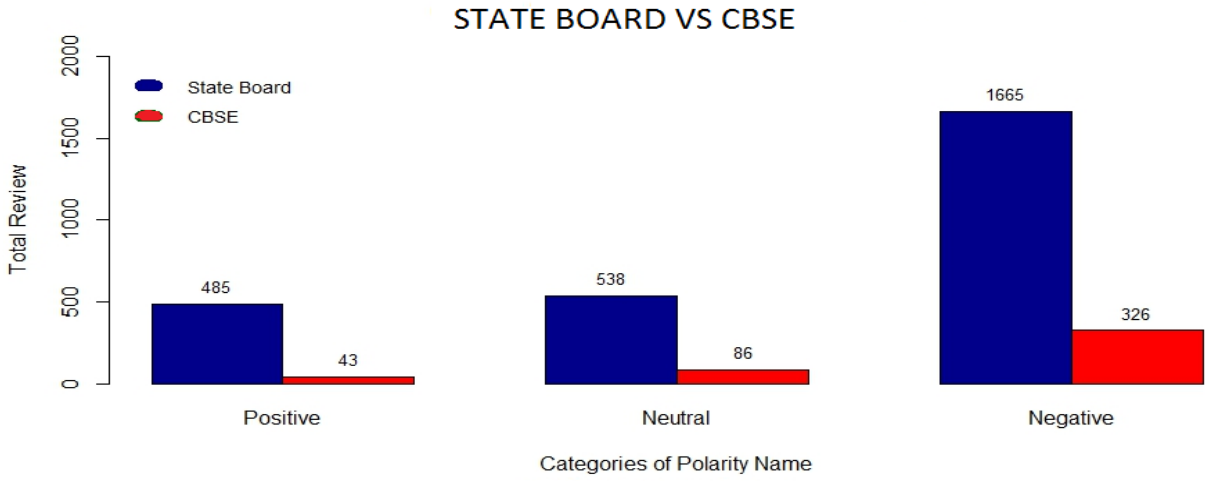

Figure 5 Graph represents the students review score between state board and CBSE

The above graph figure 5 represents the range of differences of their review score between the two streams of students about common education system.

The below question template in figure 6 describes the novel questions which are helpful in drilling out the real scenario of current education policy by gathering opinions from different field of users.

Qns 1	Does the system teach about life skills/survival skills?
Qns 2	Does it improve analytical thinking of students?
Qns 3	Is the system child centered?
Qns 4	Does it help students for competitive exam?
Qns 5	Does the system help students to discover their passions?
Qns 6	Does the system have age appropriate learning?
Qns 7	Do students have joy of learning?
Qns 8	Does the system provide uniformity?
Qns 9	Does it provide quality education to all children without any discrimination based on their eco1my, social or cultural background?
Qns 10	Is the student, completely ready for higher education?
Qns 11	Does the system give additional knowledge than Metric Syllabus?
Qns 12	Does teacher have adequate knowledge to teach Samacheer Kalvi syllabus?
Qns 13	Does adequate teacher development program conducted to improve teachers skills to meet new curriculum and syllabus?
Qns 14	Does the system provide Yoga classes for students?
Qns 15	Do state board students perform equal to CBSE students in Higher Education?
Qns 16	Do state board students get equal placements like CBSE students?
Qns 17	Do state board students compete with other students in NEET Exam?

Figure 6 Represents question template

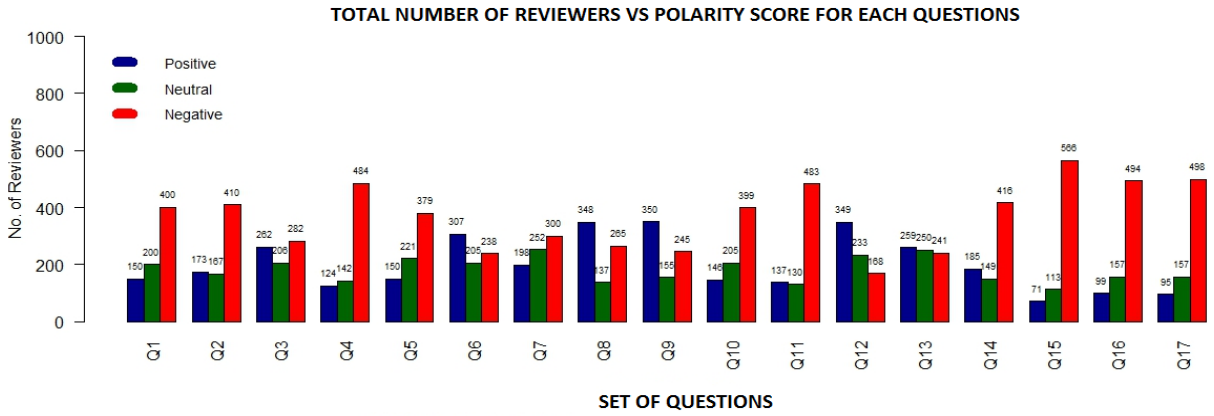

Figure 7 Represent review score of online opinion mining system

The questions in the template reveal interesting knowledge about our state school education system. Figure 7 describes the outcome of the proposed work in detail. The analysis has been made for all 17 questions where the polarity values are calculated into the categories positive, negative and neutral. The polarity score for the question numbers 6, 8, 9, 12 and 13 are positive while 1, 2, 3, 4, 5, 7, 10, 11, 14, 15, 16, 17 are negative. The above graph in figure 7 represents the total reviewer strength for each polarity against each question in the template. The question number 1 is scored highest value which is 400; this is 62.5 % higher than a positive score and 50% larger than the neutral score. The question number 2 has secured 57.8 % higher than positive score and 59.2 % larger than the neutral score respectively. Similarly, the percentage of differences for the question numbers 3, 4, 5, 7, 10, 11, 14, 15, 16, 17 are 7%, 74.3 %, 60.4%, 34%, 63.4%, 71.6%, 55.5%, 87.4%, 79.9%, and 80.9% higher than positive score, and 50%, 59.2%, 26.9%, 70.66%, 41.6%, 16%, 48.6%, 73%, 64.1%, 80%, 68.2% and 68.4 % larger than neutral polarity score. The question number 6 has secured 22.4% higher than negative score and 33.22% higher than neutral score. The question numbers 8, 9, 12 and 13 has secured 23.8%, 30%, 51.8%, and 6.94% higher than negative score, and 60.6%, 55.7%, 33.2%, and 3.47% greater than neutral score. The numbers 12, 9, and 8 are top three questions which are positively reviewed by the user while the numbers 15, 17 and 16 identified as the top three questions which are negatively reviewed by the user. According to these results, the online users are satisfied with the following aspects namely *"Uniformity", "Age Appropriate Learning", "Teacher Skill" and "Teacher Development Program"* while the other important aspects of *"Competitive Exam", "Analytical Thinking", "Life Skills" And "NEET"* are negatively reviewed by most of the users. So, these results recommend the government of TN to take appropriate action about the curriculum and syllabus pattern of the state board school education system.

CONCLUSION

In our work, we have implemented opinion mining system to predict the quality of Tamil Nadu State Board School Education System. The experimentation is conducted in two ways; the first one is implemented by extracting reviews from open web and the second one is conducted through online opinion mining system by gathering opinions from teaching professionals, students, and the public. The core of our work in the first experiment is based on the extension of the Bing Liu's opinion mining system. In this work, the aspects are ordered according to their relative importance is demonstrated successfully over the issues in the existing system for the task aspect expression extraction. The special rule that was used for the task of both subjectivity and sentiment classification has achieved remarkable performance for our domain s*amacheer kalvi*. With the novelty that we have incorporated with NLP based rule in our extension, we were able to increase the precision and recall values, when compared to the existing system. The aspect extraction and sentiment classification have been done for six different aspects in our first experiment. The polarity value for aspect "Uniformity" is secured 96 % positive score and 4% negative score while all other five aspects had shown the increased score for negative polarity of the system. As far as online opinion mining is concerned the outcome is ensured that people needed common education system with the standard curriculum and syllabus pattern which is most useful for the competitive exam conducted by the government. The experiment conducted in both cases witnessed that our classification result recommends the state board education to move from mark based system to skill based system with the revision of *samacheer kalvi* syllabus.

In future work, the primary objective should be to improve recall and precision value on the task of aspect relation extraction for finding infrequent and implicit aspect expressions. The use of ontologies as in Zhao and Li (2009), Cadilhac, Benamara, and Aussenac-Gilles (2010), and Vallés Balaguer, Rosso, Locoro, and Mascardi (2010), or other methods of studying relations between words, such as the one proposed in Bollegala, Matsuo, and Ishizuka (2007) or in Popescu and Etzioni (2005), could also be very useful to filter undesired expressions that are not components or attributes of this domain. On the other hand, it is observed that *samacheer kalvi* reviews contain an important number of expressions that have no opinions. This causes more noise to the opinion mining process. A new technique to determine opinion orientation and subjectivity need to be tested on the samacheer kalvi domain. The future work should also deal with the problem of converting aspect expressions into features. Here, the objective is to construct ontology or clusters of aspect expressions to deal with the identification of buried relation between group of aspects and opinion sentence categories. This make the system become easier to navigate and more intuitive for users.

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