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STUDENT PERFORMANCE QUANTIFIER USING SENTIMENT ANALYSIS

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Abstract—Academic feedback is essential in secondary schools to keep a rapport between students, teachers, and parents and guardians. There are three main factors that contribute towards a student's progress: attitude, attendance and aptitude. Monitoring their progress is key to a student's development in school and allows both teachers and parents or guardians to support them to a greater extent. Annual reports are sent to a student's home to summarize their performance over the academic year, following set criterion from the government. One aspect of a student's report is the teacher's written comment, providing more details on a student's attitude towards their learning. However, families whose primary language is not English may struggle to interpret this information. Working in schools has demonstrated the diversity of students and their wide range of backgrounds, including – but not limited to – language barriers. This work proposes a system called SENSE (Student performance quantifier using Sentiment analysis) for improving the information conveyed in secondary school reports through means of natural language processing. By combining the three key features which contribute towards a student's progress, a numerical representation is produced for an easier interpretation. This reduces the likelihood of a tarnished relationship between home and schools through better means of conveying information and maintains communication between students, teachers and parents or guardians. Index Terms—NLP, student performance, technology social factors, academic reports, artificial intelligence.

I.INTRODUCTION

Monitoring student progress is instrumental to a student's success and keeping them on track to enable them to reach their goals.Results of their progress should be shared with parents or guardians in the form of a formal school report, which gives them context as to what their child is learning and what progress has been made.In the UK,1in5 students comes from aboard and their families barely speak English.Annual reports do not always accommodate to these Black, Asian and Minority Ethnic (BAME) families, as teacher's written reports may not be fully understood by them. Schools are encouraged to write school reports in the students primary language, however this is not always achievable. There are currently no computer-based methods of translating report data to a qualitative output that considers not just a student's attendance and test scores, but also their attitude. As subject grading is well standardized, achievements may not improve, but a teachers satisfaction may increase if the student's attitude changes.Typically, there is a positive correlation between students with good attitudes towards their learning and successful exam results; hence, this data should be considered when monitoring a student's performance.

In recent years computationally intelligent techniques (CIT) have been applied to a variety of tasks including biological data mining image analysis financial forecasting anomaly detection disease detection natural language processing (NLP) and strategic game playing.Following this, the automatic analysis of the written human language can be done through means of NLP, a theory-motivated range of

computational techniques.Mining opinions and feelings using CIT is a powerful and effective way of studying the interpretation of narratives. However, it is a difficult task, as the model needs a clear understanding of the rules of explicit and implicit, regular and irregular language, and syntactic and semantic language. Currently, the majority of the existing techniques are based on the syntactic representation of text – a process that relies primarily on levels of word co-occurrence. One of the most commonly used applications of NLP is sentiment analysis, which basic tasks are emotion recognition and polarity detection. While the former emphasies on collecting a set of emotion labels, the latter discovers the targets on which opinions were expressed in a sentence, and then determines whether the opinions are positive, negative or neutral.In our case, the target is the student, and its attributes are the student's behaviour.

For example, in the sentence, "John is a cheerful, positive pupil who always gives of her best", the comment is on "John" and the opinion is positive. This work uses sentiment analysis to analyse and understand the context of teacher's written comments in the school report, turning those comments into quantitative data. Combining this with attendance and attainment, the system determines each student's academic progress from these three factors. This system will allow educational establishments to cope with the demands over a trafficked school network and to be in line with how companies use advanced technology, as schools should not be treated any differently to other business sectors. The rest of the paper is organized as: related research about sentiment analysis is presented in section II. The employed technique and datasets are presented in section III. The results and their discussion are presented in section IV, while conclusions and future work are outlined in section V.

II. RELATED WORKS

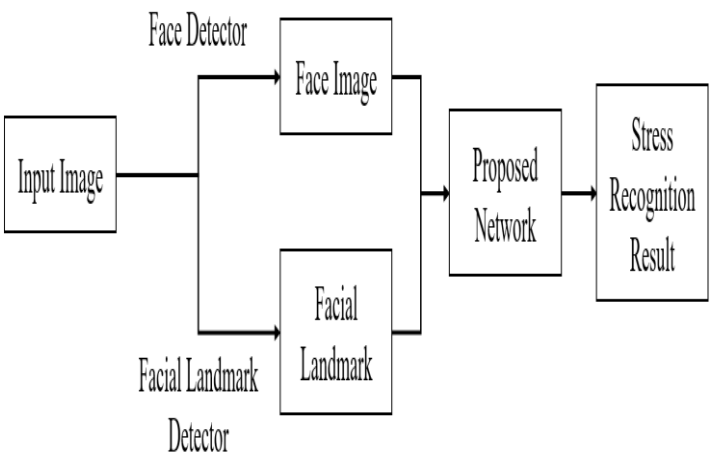
Sentiment analysis is being used widely with a lot of applications areas. Cognovi Labs created a tool, 'Twitris', which can interpret several users' comments to calculate a polarity score for future predictions.One case it was used was during the 'Brexit' vote, whereby it collected the view points of Twitter's users to build a bigger picture on the likelihood of leave/remain.Another example is eBay's use of sentiment analysis for their customer feedback. This form of NLP allows for large number of customer feedback to be analyzed in a quicker time frame whilst still presenting as accurate and reliable.In the medical field, CIT's have been used in medicine to predict the future of a patient's health. They provide creation of a diagnostic system that understands pathology and radio logical results, and scanned images to provide a comprehensive report to the user. NLP can predict, for example, the likelihood of a patient receiving successful cancer treatment based on the narratives of their diagnostic results.In the education field, the use of sentiment analysis has mainly been advocated to the evaluation of teachers performance. Other applications in education include the automatic analysis of feedback of students using support vector machines (SVM) to detect different issues students may have with a lecture; the study of students learning diaries to track emotion based on Plutchik's eight emotion categories as an informative feedback source for instructors. It considers the student's emotional wellbeing,and the analysis of a student's feedback with SVM, for real-time interventions in classrooms, to address problems like confusion and boredom,which affect students engagement.Additionally,used VADER (Valence Aware Dictionary and sentiment Reasoner)- a parsimonious rule-based model, to analyse Student Evaluations of Teaching (SET) of single-course lessons from three different sources.They contrasted the positive and negative valences of this sources, defined which key words are commonly used in SET comments and assessed the effect on the positive or negative of the comments that included them. In the official course SET comments, they determined positive or negative values by question. Results show that the correlation between overall sentiment analysis scores for a review and overall scores given to a class appear to foster legitimacy of sentiment analysis as a measurement. Rule-based sentiment analysis methods have previously been proven to be highly accurate. For example, the approach of Poriaetal which exploits common-sense knowledge and sentence dependency trees to detect both explicit and implicit aspects, achieved the highest accuracy for two popular review datasets. The latest trends in

sentiment analysis include word representations for sentiment analysis capsule networks for challenging NLP applications, and LSTM language models.

III. WORKING MODEL

Sentiment analysis was used to analyse the context of teacher's written comments. The logical thinking behind sentiment analysis is depicted in Fig.1.When performing sentiment analysis, the following assumptions were made: the chosen language for the reports was English, teachers across the country use similar terminology for describing students, comments were in full sentences in a paragraph format, and comments contained no spelling mistakes.The VADER function from Natural Language Toolkit was used to perform sentiment analysis on the teacher's written comment for a student.Subsequently, the mean of the compounds was calculated as a percentage in the following form:

$$X=\Sigma^{n}_{i=1}C_i \text{ x } 100/n$$



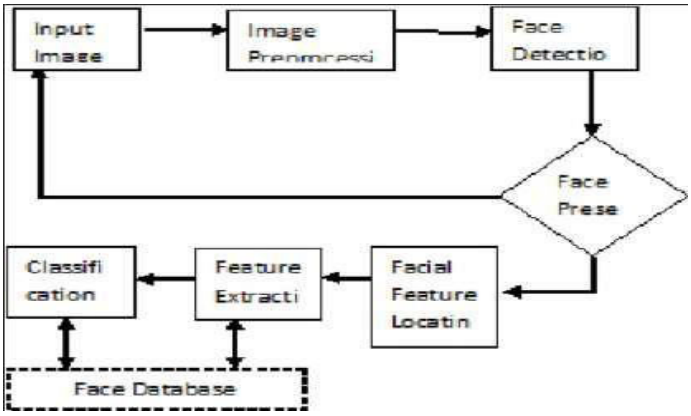


Fig 1:- Proposed System Model & Data Flow Model

IV. RESULTS AND DISCUSSION

Table I is representative of the wide range of reports used. Text files 1 to 18 are extracts from real secondary school reports from different students, subjects, teachers and schools. Text files 19 and 20 are controlled paragraphs that were introduced to compare the extremities of the system: one from a 'worst case' student, and one from a 'best case' student.

TABLE 1:- Results for testing sentiment Analysis

• Student 1: This student has a great attitude towards their learning, has achieved a high combined average of their test scores over the academic year, and has full attendance. Their combined average accurately represents the high progress the student has made.
• Student 2: This student received very negative comments about their attitude to learning, has performed badly in class tests as a result, and has a lower attendance record than most students. Their combined average accurately represents the poor progress the student has made.
• Student 3: This student received a mixture of positive and negative comments regarding their learning from the teacher. Their test scores have shown both a good and poor understanding of the subject material, and they have a high attendance. Their combined average accurately represents the academic progress the student has made.
• Student 4: This student has received mostly negative comments regarding their attitude in class, but has achieved very high test scores and has a respectable attendance. The combined average is still representative of their academic progress during the year. • .Student 5: This student demonstrates a mostly positive attitude towards their learning and is achieving above average results in examinations. However, their attendance is far below the average of their peers. The combined average is a fair representation of their progress during the academic year.

Students	Attitude(%)	Apptitude(%)	Attendance(%)	Average(%)
1	86	93	100	93
2	0	18	88	35
3	41	53	99	64
4	25	89	96	70
5	74	86	75	78

Table II is representative of a selection of students who received different combined averages, where it can be seen the impact of each factor.

TABLE 2:- Result for overall student performance

Text Files	Key Words	Negative (%)	Neutral(%)	Positive(%)	Average(%)
1	steadily, slightly, well presented, but, more details	0	61	14	35
2	tremendously, bright, well behaved, excellent	0	63	37	73
3	Strong, good	0	53	14	61
4	Polite	0	53	22	68
5	Talent,Hard work	1	57	22	76
6	Focused	0	56	19	53
7	Excellent	0	46	34	57
8	Top Mark	2	58	20	65
9	Extremely Disappointed	20	60	0	0

V. CONCLUSION

The research has successfully found a method to represent a student's attitude to their studies in quantitative means, for an easier analysis and for accommodating the needs of BAME families; VADER has proven to be a good API for the beginnings of this field of research.

The system is user-friendly and can be easily adapted for personal use by changing the terminology to analyse. The system shows the need for concentrating on other factors such as attitude. This evidently have a greater

impact on a student's educational journey than their attendance, which typically is more closely monitored. Currently, it is at a stage where it could be used actively within educational establishments. In the future, this project could see aspects of optical character recognition, so sentiment analysis could be applied to a teacher's handwritten comments. This would encompass both handwritten reports and those typed on the computer with the use of comment banks.This project proposes an approach for recognizing the category of facial expressions.

Face Detection and Extraction of expressions from facial images is useful in many applications, such as robotics vision, video surveillance, digital cameras, security and human-computer interaction.

This project's objective was to develop a facial expression recognition system implementing the computer visions and enhancing the advanced feature extraction and classification in face expression recognition.

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