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Information from social networks is becoming a goldmine for marketing and advertising companies. Now, a team of computer languages and systems researchers at the Autonomous University of Madrid (UAM) has also spotted great potential for analysing the emotions transmitted by users in the most popular of these networks: Facebook.

As Álvaro Ortigosa, Director of the UAM's National Centre of Excellence in Cybersecurity, explains to SINC, he and his team have developed an application called SentBuk, which is capable of automatically deducing the emotional states of Facebook users by analysing their messages on the social network using algorithms. The results of the study have been published in the journal *Computers in Human Behavior*.

"SentBuk is an application external to Facebook which, with the user's permission, analyses the messages he/she publishes and calculates his/her emotional state. The tool is based on two algorithms: the first calculates the emotional load of each message and classifies it as positive, negative or neutral. The second deduces emotional state by comparing it with the emotional load of recent messages."

The tool –Ortigosa continues– "utilises a natural language analysis technique to recognise significant words with emotional load. It also uses an automatic, machine-learning-type classification system. Based on a large bank of sentences classified by humans, the application has been trained to learn to reproduce human judgment. The emotional load

assigned to each sentence arises from a combination of both calculations."

Adaptive e-learning

The UAM scientists believe that this application could be used in adaptive online education, i.e. education that attempts to suggest tasks to the student at the most appropriate time.

"The information obtained via SentBuk, with the approval of the user," Ortigosa insists, "will be able to be used to avoid recommending especially complex pieces of work at times when it detects that the student is in a negative state of mind or one that is less positive than usual."

In these situations, by contrast, "activities with less pedagogical content but designed to motivate students could be assigned."

In his opinion, analysing the general trend of a group of students during internet courses "may afford the teacher similar feedback to that obtained by looking at students' faces in an in-person class – information it is not normally possible to get online."

Field tests

Ortigosa and the study's co-authors have performed tests with SentBuk and have included the information on students' emotional states in an e-learning system.

According to the expert, in its most basic form, the application alerts professors when it detects that a significant number of students are in a negative frame of mind. "These messages are analysed in context.

Although there may be many reasons for the emotional state, the hypothesis is that these negative emotions should be uniformly distributed across time."

On the other hand, he adds, the students of an online course have little to no relation to each other, beyond being classmates in that particular course. For this reason, "if at any given moment a negative emotional peak is detected in a representative sample of the students, it is highly probable that such emotional variation is due to some situation relating to the course, and thus the tool will send a warning message to the teacher."

Other applications

Álvaro Ortigosa says that it is a non-intrusive technique that "enables teachers to have an emotional state thermometer for Facebook users." Once all the necessary permissions for the application have been given, it deduces their emotional state by observing the behaviour in their interaction – presumably normal and spontaneous – with the social network.

This information could be used in several contexts. "For example, to complement remote monitoring of those who are ill or to measure user satisfaction. In this area, companies could use the information to alter products or services offered to potential consumers.

 The UAM team's research is part of a broader project seeking to infer general characteristics, such as personality and emotional load, of those who use social networking sites like Facebook and Twitter.

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