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An Adaptive Temporal-Causal Network Model to Analyse Extinction of Communication over Time.

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INTRODUCTION

The persistence of information communicated between humans is difficult to measure as it is affected by many features. Our paper presents an approach to computationally model the cognitive processes of information sharing to describe persistence or extinction of communication in Twitter over time.

This paper introduces an adaptive mental network model that explains, for example, how an individual can experience information overflow on a topic, and how this affects the sharing of information. Parameter tuning by Simulated Annealing is used to identify characteristics of the network model that fit to empirical data from Twitter. The data collected is related to the independentism in Catalunya, Spain, which is considered a global issue with repercussion in Europe.

Human sharing process is complex and can be driven by multiple factors. Engagement, and information overload among others.

Engagement of an event is defined as how motivated people are to share their opinion about a specific event.

The closeness to the event, the amount of offline interaction the user has in their circle, and the popularity the event has online in addition to all the factors mentioned above trigger the engagement.

Information Overload means that the more information a user receives, the more performance he or she will have but only up to a certain point. After a tipping point, the performance of an individual will rapidly decline when more information is received.

METHOD - DATASET

We created our own dataset.

- It consisted in the twitter behavior on the Catalanian independence of certain individuals in Twitter.
- Information on newspapers reporting on the topic.

The input was used based on a time interval at which newspapers wrote about the subject. It was collected between October and December 2019.

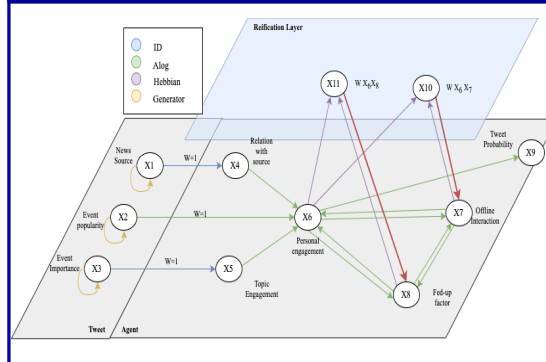
METHOD

ADAPTATIVE MENTAL NETWORK MODEL

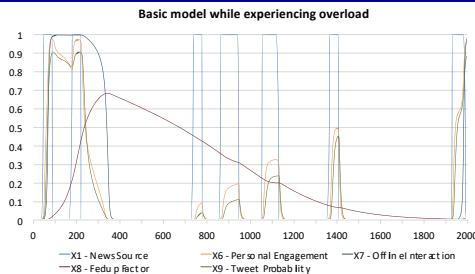
An adaptive model was created to model the internal process:

- Use of Hebbian functions to model a temporal learning process.
- Sigmoid activation functions
- Offline interaction has a positive effect on personal engagement
- Fed-up factor negatively influences both personal engagement as offline interactions
- Events are split into 3 components:
 - Event popularity
 - Event importance
 - News source

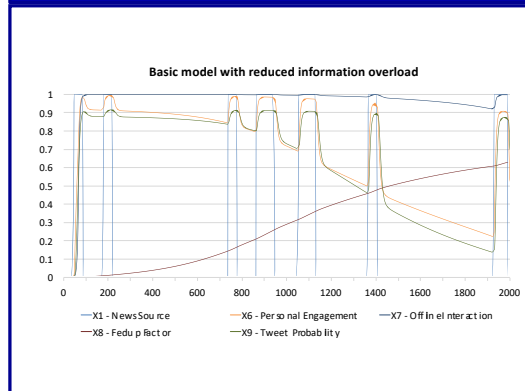
MODEL STRUCTURE



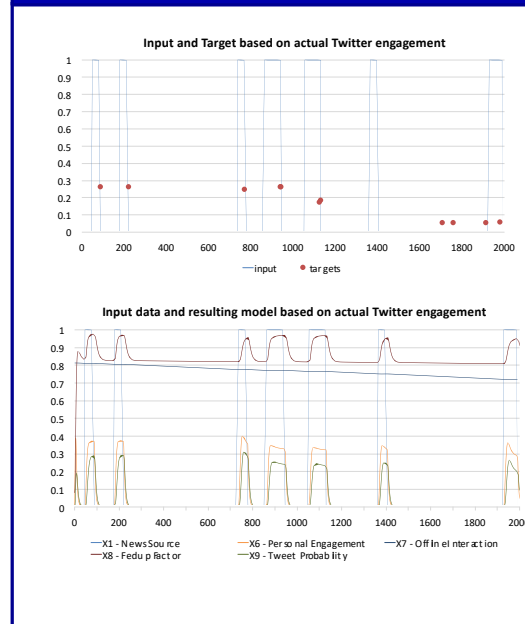
MODEL 1 - INFORMATION OVERLOAD



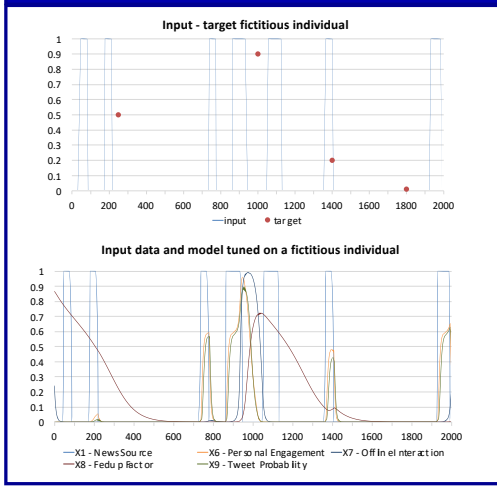
MODEL 2 - REDUCED INFORMATION OVERLOAD



MODEL 3 - ACTUAL TWITTER BEHAVIOR



MODEL 4 - FICTIVE INDIVIDUAL



CONCLUSIONS

- Using an adaptive mental network is a good approach for modeling human sharing behavior
- Offline behavior is an important addition as it adds a new dimension to the problem and allows better explainability of the results
- Model proved to be flexible modelling different individuals with different tolerances levels.
- Information overload better describes the information persistence process and how individuals are willing to share.

ACKNOWLEDGMENTS & REFERENCES

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