



COMP 576 Introduction to Deep Learning

Final Project Proposal

A Hazard-relevant Twitter Classifier Based on LTSM RNN

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I. Introduction:

Ideally, hazard alert should be sent out promptly to protect nearby civilians from potential damage; however, since the communication delay, there is always a time gap between the hazard and official alert.



Flooding On Campus

Flooding has been reported at entrance 8, Lab Road and College Way at Alumni Dr. For your safety, please avoid the area until storm water has drained.

Figure 1: An official flooding alert from Rice University on Oct 31st

Considering the fact that smart mobile devices and social media are widely used, a more responsive alert mechanism can be built based on deep learning and social media such as twitter to classify users' post and automatically remind other users in the area for the possible incident.

II. Goal

The goal of this project is to train a LSTM model based on twitter data. Ideally, this model should be able to achieve following:

- To judge whether a new twitter message is relevant to a hazard/incident
- To avoid the interference of outdated re-tweet, or unrelated topic which contains couple hazard-related keyword, such as swear or joke.

III. Feasibility

- Data:

The data of "Disaster on Social Media"[1] from Figure Eight will be used for training purpose. It contains over 10,000 twitters, and manually labeled by contributors whether the twitter message referred to a disaster event. Though pre-processing is still required to clean up the data, it is much achievable since data labeling has already been solved.

- Model:

As a classic RNN model, LSTM has been widely applied in various fields, such as image description, handwriting recognition, and more importantly to this project,

natural language processing. Since a twitter is a sequence of at most 140 characters, LSTM network is well-suited to learn from experience to classify, process and predict time series when there are very long time lags of unknown size between important events. [2]

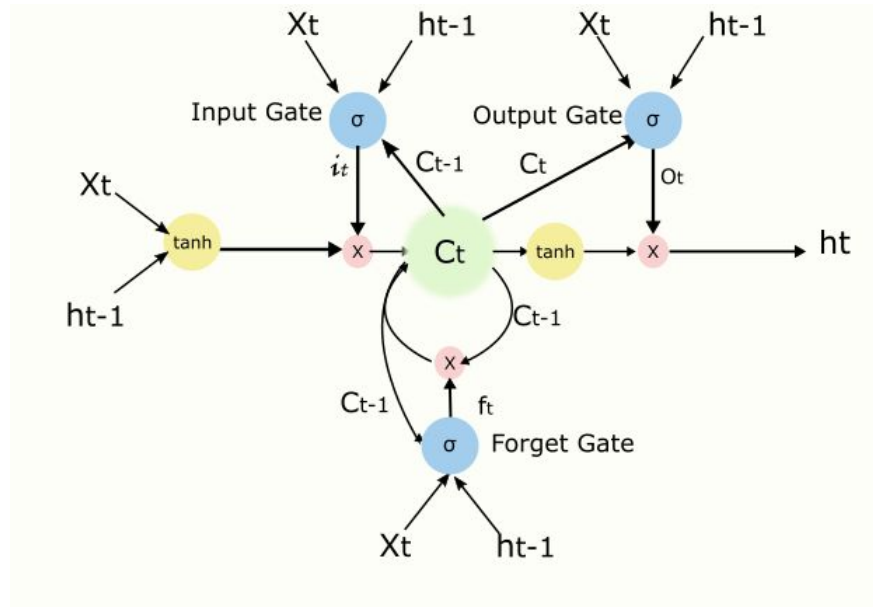


Figure 2: A typical LSTM model.[3]

IV. Possible Approach

- Pre-processing:
 - Each twitter message (140 characters at most) will be cleaned to remove non-alphanumeric characters, convert all text to lowercase, remove stop words.
 - Dataset will be splitted for train and testing purpose.
- Word Embedding

Each pre-processed twitter message will be converted into vector domain, so that each vector has all of the vectors encoding each of the characters, appended end-on-end.
- LSTM for Sequence Classification
 - A simple LSTM RNN can be developed for testing purpose.
 - Add dropout to address possible overfitting
- Potential improvement:
 - An one-dimensional CNN and max pooling layers can be added on top of LSTM to reduce the training time.

Reference:

- [1] “Disasters on social media” <https://www.figure-eight.com/data-for-everyone/>
- [2] “A Long Short-Term Memory Recurrent Neural Network Framework for Network Traffic Matrix Prediction”, Abdelhadi Azzouni and Guy Pujolle LIP6 / UPMC; Paris, France
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- [3] Graves A. Supervised sequence labelling with recurrent neural networks[M]. Heidelberg: Springer, 2012.