CS365 : Artificial Intelligence Programming

Evaluating Temporal Information Understanding with QA

Project Proposal

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Motivation and Objective

The area of temporal information processing proposes a wonderful challenge and advances in this field could help in many of the Natural Language Processing applications. It could help in better question answering, textual entailment, summarization, etc (more specifically related to timed events). Such temporal information is more naturally evaluated through Question Answers (QA). We plan to work on the TempEval task of evaluating systems that extract temporal expression and temporal relations as defined in TimeML standard [Pustejovsky et al. 2003] timeml.org. The tasks are:

1. Task A : Timex Extraction and normalization
2. Task B : Event Extraction and classification
3. Task C : Annotating temporal relations

Varied type of temporal questions could possibly be answered given a TimeML annotation of the document. However, we would look only on yes/no type questions as described by the SemEval 2015 Task 5. The temporal knowledge of the documents represented by the annotations will be used as an input for a temporal QA system [UzZaman et al. 2012] which will try to answer the questions.
The very challenging task of obtaining temporal relations from self extracted timexes and events was addressed to some extent in the TempEval-3 task.

Data

We will be working with the English Dataset provided as a part of the TempEval-3 challenge.
A set of plain documents with DTC in TempEval-3 will be used for training in tasks 1,2 and 3.
Training Data for QA systems is available in the form of TimeML annotated data from two different datasets, TBAQ and TE3-platinum, which is made public as part of SemEval 2015 Task 5.

Approach

We plan to solve the tasks using machine learning methods (SVM, Logistic Regression, Maximum Entropy Classifier) and also the google word2vec model. Google word2vec model efficiently implements continuous bag-of-words and skip-gram architectures for computing vector representations of words. We will use it for timex extraction and normalization and also for event extraction and classification.

Related Work

J. F. Allen, “Maintaining knowledge about temporal intervals,” Communication ACM, vol. 26, no. 11, pp. 832-843, 1983.

J. Pustejovsky, J. M. Castao, R. Ingria, R. Sauri, R. J. Gaizauskas, A. Setzer, G. Katz, and D. R. Radev, “TimeML: Robust Specification of Event and Temporal Expressions in Text” in New Directions in Question Answering, M. T. Maybury, Ed. AAAI Press, 2003, pp. 28-34.

M. Verhagen, R. Gaizauskas, F. Schilder, M.Hepple, G Katz, J. Pustejovsky, “SemEval-2007 Task 15: TempEval Temporal Relation Identification” in Proceedings of the 4th International Workshop on Semantic Evaluations, Ed. ACL, 2007 pp. 75-80

M. Verhagen, R. Sauri, T. Caselli, and J. Pustejovsky, “Semeval-2010 task 13: Tempeval 2,” in Proceedings of International Workshop on Semantic Evaluations (SemEval 2010), 2010.

UzZaman et al “Semeval-2013 task 1: Tempeval 3”, in Proceedings of International Workshop on Semantic Evaluations(SemEval 2013),2013.

UzZaman, Llorens and Allen. 2012. Evaluating Temporal Information Understanding with Temporal Question Answering. IEEE ICSC