Deep Learning Projects

Here two project that involves Deep Learning architectures are presented. In case anyone is interested a starting code will be provided as well as datasets on which experiment on.

Character Level Word Embeddings in Keras. (Hard)

The project is to implement a character level embedding layer in Keras. During the theoretical lesson, we have seen that it is possible to create representation of Increasing complexity starting from words embedding.

The aim of the project will be to add an additional layer of complexity as input of the network. In this scenario you should associate each character of each words in a sentence to a “character embedding” from that using a convolutional or recurrent neural network create a word representation (a vector) starting from character. This representation (that encodes morphological information) will be concatenated to the pre-trained word embeddings to be fed to the sentence model.

Examples in the literature:
End-to-end Sequence Labeling via Bi-directional LSTM-CNNs-CRF
http://www.cs.cmu.edu/~xuezhem/publications/lstm-cnn-crf.pdf

Learning Character-level Representations for Part-of-Speech Tagging
http://jmlr.csail.mit.edu/proceedings/papers/v32/santos14.pdf

Suggestions:
Use the TimeDistributed wrapper of Keras. This allows to apply the same layer (The charater-level CNN/RNN) for every column of an input matrix.

Motivation:
Character-level embeddings helps to create stronger models where the input words are noisy (Twitter, Forums, ..).

Add QA-Relevant features to a NN for Question Answer Selection. (Simple)

Adding additional features to a simple Neural Network for Question Answer selection. Examples of features are:

- Question focus;
- Question category;
- Relational Informations.

Suggestions:
This informations can be added to the network using an embedding layer. The output of this layer can be concatenated to the word embeddings and fed to the NN.