Artificial Intelligence (CS 571)

Assignment-10: Deep Learning

(Read all the instructions carefully & adhere to them.)

Date: 15-11-2019 **Deadline: 22-11-2019**

Question 1:

Description: Develop a convolutional neural network-based model for intent classification that identifies the intention expressed in a user utterance for an Air Travel Information System. The overall task is to recognize the intent such as flight, airfare, airline, etc. (total 17 categories) expressed in an utterance. For eg.: "I **would like to find a flight from Charlotte to Las Vegas that makes a stop in St. Louis** ", the intent for this particular utterance is " **flight** ". The total number of intent classes are 17 (such as flight, flight_time, airline, aircraft, airfare, airport, ground_service, distance, abbreviation, ground_fare, quantity, city, flight_no, capacity, restriction, meal, day_name).

Training dataset: ATIS.txt. Description of the dataset can be found in https://github.com/yvchen/JointSLU/blob/master/data/atis.train.w-intent.iob

Test dataset:

https://github.com/yvchen/JointSLU/blob/master/data/atis.test.w-intent.iob

Task: Preprocess and extract the data from its corresponding file. Implement a convolutional neural network-based classifier to identify the intent of an utterance.

Input and Outputs of the network:

i) Input: Input to the network should be the unigram vector.

ii) The output layer should have as many neurons as per the no.of classes (i.e. one neuron per category). If an utterance has multiple intents, take only one of the intent from that. Use "softmax" as the activation for the output layer. Represent output categories as:

a) 1 0 0 0.... - flight

b) 0 1 0 0.... - airfare

c) 0 0 1 0.... - airline and so on

iii) Network must have at least one convolutional and pooling layer (can be more as per your choice)

Report :

1. Accuracy of the model
2. Precision and Recall of individual classes
3. Overall F1-measure
4. Some test cases with its corresponding output from the model

Instructions :

a) For implementation, you can use any library.

b) Try with different **loss functions/activation functions/optimizer** and observe :

i) Weights

ii) Loss

iii) Accuracy

Question 2:

Design a Part-of-Speech (POS) tagger using a Recurrent neural network which assigns syntactic categories to each word in the text (https://drive.google.com/file/d/1iq1VznVZMIw_t7fH9rLY_NjMPE8rJY_5/view).
Divide the dataset into train, validation and test set.
Input: A tokenized sentence.
Output: POS tags for each token of the sentence.

Dataset Format:

- Each line represents one sentence.
- Sentences are already tokenized.
- Words in a line have the format word_tag.

Report:

- Overall precision, recall, and F1-score
- Tag-wise precision, recall, and F1-score

Instructions :

a) For implementation, you can use any library.

b) Try with different **loss functions/activation functions/optimizer** and

observe :

i) Weights

ii) Loss

iii) Accuracy

Submission Instructions:

- Please submit your assignment here: https://bit.ly/377iqXi
- The submission file should be as follows:

  Group-NUMBER Assignment-NUMBER.zip