Project Assignment

Deep Learning

Academic year 2019/2020

Instructions

This document contains all the instructions for successfully developing the project for this course. The main idea of the project is to apply some of the topics covered in the course to address a problem that is of interest for you. The problem considered could be a regression, classification, image analysis, or time-series task.

You must present the problem you want to solve as well as the general strategy for solving it in the last week of the course. You can use a power point presentation for this first task.

Students are required to work in a team of 4 components.

The salient aspects that must be highlighted during the development of the project are the following:

- Task definition: What does the proposed system do (what is its input and output)? What real-world problem does this system try to solve? It is important that the scope of the project is not too narrow or broad. The definition of the task is one of the most important parts of the project.

- Evaluation measure(s). An important part of defining the task is the evaluation. In other words, how is it possible to measure the success of the proposed system? For instance, a natural evaluation metric for a classification problem is accuracy, but memory or running time could also be considered. To evaluate the system, it is necessary to obtain a reasonably sized dataset of example input-output pairs, either from existing sources or collecting one from scratch. If the project uses existing datasets which are already preprocessed (e.g., Kaggle), students will be expected to do more with the project. Additionally, in this case, existing solutions must be compared against the solution you're proposing.

- Approach. Identify the challenges of building the deep learning model and the phenomena in the data that you are trying to capture. How should you model the task? What deep learning architectures are appropriate for handling the models that you came up with, and what are the tradeoffs between accuracy and efficiency? Are there any implementation choices specific to the considered problem?

- Error analysis: Design a few experiments to show the properties of your system (overfitting, generalization ability of the model). Analyze the data and show either graphs or tables to illustrate your point. What is the take-away message?

By the 10th of June, you must deliver your source code, a link to the datset used, and a report that discusses the previous points and where you explain your choices. There is no need to explain what a CNN is, what a RNN is, etc. The length of the report must **NOT** exceed 8 pages (Arial font, 11pt. size).

You must deliver your work through Moodle (a Turnitin assignment will be available soon). The required files must be uploaded in a unique zip/rar file named with the group number (e.g., GROUP_1.rar). For this purpose I will create an excel file that you have to fill with some information. The defenses will be held on the 19th and 20th of June (Friday and Saturday).

The grade of the exam will be obtained by evaluating the following features:

- ability to formalize an optimization problem and its originality;

- ability to design and implement Deep Learning models;

- ability to analyze the results obtained and to use Deep Learning concepts in the correct way;

- quality of the report and language adequacy.

Additionally, a comparative analysis among the different projects will be performed. This criterion will also contribute at determining your final grade.

The fact that you are working in a group does not imply that all the components of the group will receive the same grade.