Instructions for the Deep Learning paper (version 1, 23-1-2019)

The paper should consist of 6 pages in the IJCAI format (see the accompanying Word and Latex templates). The paper should report on a deep learning experiment (see the suggestions at the end of these instructions). The general outline of the paper is as follows.

Title The title should be covering the main contents/message/finding of the paper

Abstract A short description of the research. A typical abstract consists of one or two opening sentences describing the domain or tasks of study, followed by the research question. Subsequently, the approach and the experiments are briefly outlined. Subsequently, the experimental results are stated. The abstract ends with a conclusion that answers the research question.

1. Introduction
A few sentences describing the issue at hand and a review of existing work attempting to deal with the issue. The **references to existing work are crucial**, because they indicate the context of your work. The review should naturally lead to an open or unsolved problem, which is formulated in a research question. The research question should be stated *explicitly*. For instance, "The research question addressed in this paper reads as follows: .....?" After stating the research question, the approach to answer the question is described. The end of the introduction consists of a very brief outline of the rest of the paper. ("Section 2 introduces the method used to... Then, in section 3 the experimental method is outlined. ...")

2. The deep learning architecture/method
This section describes the deep learning architecture and/or method adopted to answer the research question. Please note that this section contains a formal description of the method, approach, or analysis. Details to enable replication should appear in section 3.

3. Experimental method/Experimental set-up
This section describes the data, the experiment(s) performed, the (hyper-)parameter settings, and the evaluation criteria. The information contained should be sufficient for others to replicate your study. Motivate your choices as much as possible, e.g., "We used the same hyperparameters as used in ....., because..."

3.1 Data
This subsection describes the data and details about its source and format. Any selection or generic pre-processing of the data should be mentioned here. What are the statistical properties of the data? How many classes, how many examples per class? Is the data balanced? (If not, how did you deal with it?) Specify subdivision of the data into training, validation, and test set. Hyperparameter optimisation is performed on the validation set, never on the test set!

3.2 Experiment(s)

For each experiment, the procedure is detailed. What is the experiment about and how is the network (re)trained or analysed? Train/validation/test or cross validation?

3.3 Hyper-parameter settings

What are the settings used in the experiments? Number of epochs, error thresholds, and so forth.

3.4 Evaluation criterion

How is the performance of the network or outcome of the analysis evaluated? What will be a "good" or "bad" outcome? Specify the criterion for the selected performance measure (accuracy, precision, recall, F1, ROC curve, confusion table, ...).

4. Results

Presentation of the results obtained. The quantitative (actual) results are listed in a table. In addition, a bar chart, graph, or scatter plots illustrates the results. These results do not speak for themselves, so the results section should describe explicitly what the results reveal and what they mean. When results are compared (by means of averages), some indication of the variation should be included (e.g., error bars).

The results section may also include some analyses or analyses of the results. It may also contain a discussion of results.

5. General discussion

The general discussion puts the results obtained in the perspective of previous work and the research question. How do the results compare to those obtained by earlier (related) work? What are strengths, weaknesses or points of improvements?

6. Conclusion(s) and further work

This section wraps up the paper by answering the research question in terms of a conclusion. (Please note that the conclusion should be stated explicitly: "We conclude that..." the text on the dotted line should be a concrete answer to your research question.) Some pointers to further work should be given.

References

The cited literature (and the in-text references) should be listed in a consistent format. APA format and IEEE formats are good examples of citation styles.

Suggestions for Deep Learning topics

Given the limited time to perform deep learning experiments, you should be modest in your ambitions. A typical deep learning experiment involves datasets consisting of many millions of instances (e.g. images) and require considerable computing resources. Clearly, such an experiment cannot be performed in the context of this course. You are therefore recommended to focus on small datasets and small deep learning networks. For instance, training a small deep learning network on the famous MNIST dataset is feasible on a standard desktop or laptop. Most deep learning tutorials start with a "LeNet" architecture applied to MNIST. Your paper may vary something about the structure of the network to examine its effect on MNIST performance. Alternatively, you may introduce noise in the data to see its effect on performance. You may even study how you can fool the network by generating adversarial examples.

Instead of training a deep learning network, you may also make use of one of the "pre-trained" networks that are freely available. Pre-trained networks are available for object recognition and many other tasks. You may use a pre-trained network as a "pre-processor" for a conventional classifier to determine if it can learn to recognize objects. Alternatively, you may focus on the analysis of the structure of the network in an attempt to understand how it maps images onto class labels.

Many other ideas are permissible. The only requirements are: (1) that a deep learning architecture is central to your paper and (2) that there is a clear connection with published papers. If you are in doubt about the feasibility or admissibility of your idea, just ask the teacher about his opinion.