UNIVERSITÀ DEGLI STUDI DI MILANO BICOCCA

How to write a report

Lecture 19

Course of:

Signal and imaging acquisition and modelling in environment

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We reached the end of this class. How do we write a good project report?

- Writing a good report is important in many aspects of everyday life. It is an effective tool to present the progress an individual (or a team) made on a project, to assess the cost-effectiveness of further developments (or the difficulties preventing it), etc.

- A good report should provide pieces of information in a concise, coherent, well structured manner. In our case we do present the results of a scientific investigation. The report should therefore contain:
  - An **abstract**, summarizing the motivations and main results of the work for a quick assessment of the content of the full report.
  - An **introduction** describing the motivation of the project chosen and that puts the analysis into a broader context. The advantages of addressing the problem with AI techniques should also be mentioned.
  - A **data and methodology** section describing the techniques used and the technical aspects of the datasets. (Why is the chosen technique adequate for the problem presented in the introduction? Which other algorithms could have been used?)
  - A section presenting the main **results** achieved and a discussion of the general findings in the context of the previous knowledge in the field, as discussed in the introduction.
  - A short section summarizing the main **conclusions** and presenting what further developments can be envisioned in the future (with new data or with more powerful computational facilities)

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- Some concrete examples of what to do or not do:

  - Avoid a simple description of the tasks performed in project, but focus on the goal/results. E.g. instead of saying: " Then we prepare a CNN made with the Keras framework with X layers, N filters, a kernel size of Y x Y", you could say: "The problem under analysis is ideally treated by a CNN that extracts this and that feature from the dataset. After testing (describe how) we selected the CNN parameters to be: … "
  - Avoid a simple description of the results plotted in figures, but offer an explanation for why we observe some trends. The figure can speak for itself, so focus on your interpretation of the data.
  - Since all the projects are based on AI techniques, the performances of the codes are important. What is the computational cost of your algorithm? How would it scale with the size of the images/spectra/time series?
  - A good report should compare different models (in terms of the type of network or the architecture of a network), evaluating the performances and justifying the final choice made.
  - You should explore the effects of data augmentation. Does it improve the overall performance? Does it introduce a bias? Justify your findings.

Details of the report.

- What do we expect?
  - A report of 10 pages max (including figures and references) for **one of the projects** we proposed
  - Written in English
  - It is an **individual** piece of work (largely similar reports can be identified thanks to AI codes)
  - You can use the framework you prefer (Keras/Tensorflow, PyTorch, …)
  - **The report and the jupyter/colab/python files must be sent to us** both (Federico De Guio and Matteo Fossati) at least 7 days before the exam.

- The Exam
  - At the oral exam (~30 min) we will start by discussing the project presented in your report. You should be able to comment on the content of the report, on the interpretation of the figures and on the conclusions.
  - We will ask a few questions on the material presented during the classes, therefore a good knowledge of the lectures is expected.
  - The report and the oral exam will count towards the final mark.