EE-559
Deep Learning

What's on today?

- Learning outcomes (recap!)
- Project deliverables
- Assessment criteria
- Poster and poster session
- Paper
- Convergence to project success!

Learning outcomes

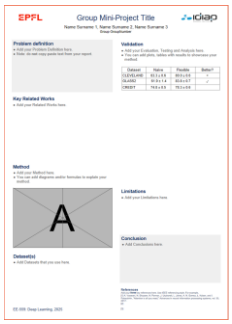
EE-559: Learning outcomes

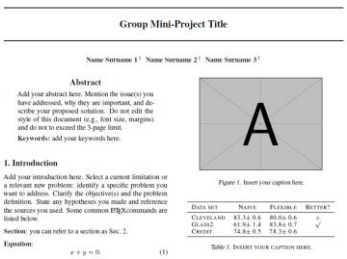
- By the end of the course, you will be able to:
  - **Justify** the choices for training and testing a deep learning model
  - **Interpret** the performance of a deep learning model
  - **Analyze** the limitations of a deep learning model
  - **Propose** new solutions for a given application

Deliverables

EE-559: Group mini-project

- Deliverables (deadline: 10th June)
  - the code + a screencast of the code running
  - a poster (*template provided*)
  - a 3-page paper (*template provided*)





Assessment criteria

Group mini-project

- **Assessment criteria**
  - Literature review and methodology (up to 20 marks)
  - Evaluation, testing, and analysis (up to 20 marks)
  - Communication of the findings (up to 20 marks)

Group mini-project: assessment criteria (1/3)

- **Literature review and methodology**
  - thoroughness of literature review
  - clarity of the objectives and problem definition
  - evidence of creativity and novelty of the adopted methodology

Group mini-project: assessment criteria (2/3)

- **Evaluation, testing, and analysis**
  - quality of the results of the proposed solution and their analysis
  - discussion of the limitations of the proposed solution
  - justification of the choices for the experiments
  - evidence of critical thinking

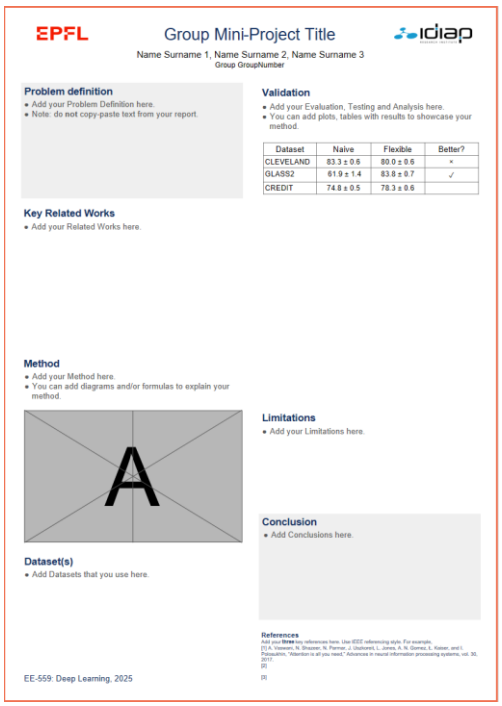
Group mini-project: assessment criteria (3/3)

- **Communication of the findings**
  - ability to clearly communicate the findings
    - in the poster
    - during the oral presentation of the poster
    - in the written report

Poster

Poster preparation

- Highlight your key results and findings
- Facilitate visual impact: use diagrams and plots
- Prioritize clarity and conciseness
  - keep the poster focused and uncluttered
  - do not copy paste & paste material from your paper!



Poster presentation

- All group members to be involved in the presentation
- Engage with the questions
- Keep your answers short and to the point
- Enjoy the experience!

Poster session on 28th May

- Open to the whole EPFL community
- Valuable opportunity to showcase your work and get feedback!
- At least one group member should be at the poster for the whole poster session (8h30-13h40)
- Assessment slots (*all members to be present*)
  - Groups 1-6, 18-23, 35-40 → 8:30-10:20
  - Groups 7-12, 24-29, 41-46 → 10:20-12:10
  - Groups 13-17, 30-34, 47-50 → 12:10-13:40

Paper

About the paper

- Clearly present the objective(s) of the project
- Identify and discuss relevant related works that is specific to your project
- Leave enough space for the analysis of the results
- Support *all* your statements with evidence (from papers or your results)
- Use consistently the IEEE references style (see *template*)
- Proof-read carefully before submission!
- Remain within the 3-page limit!

Group Mini-Project Title

Name Surname 1 [1] Name Surname 2 [1] Name Surname 3 [1]

Abstract

Add your abstract here. Mention the issue(s) you have addressed, why they are important, and describe your proposed solution. Do not edit the style of this document (e.g., font size, margins) and do not to exceed the 3-page limit.

Keywords: add your keywords here.

1. Introduction

Add your introduction here. Select a current limitation or a relevant new problem: identify a specific problem you want to address. Clarify the objective(s) and the problem definition. State any hypotheses you made and reference the sources you used. Some common LaTeXcommands are listed below.

Section: you can refer to a section as Sec. 2.

Equation:

$$x + y = 0. \quad (1)$$

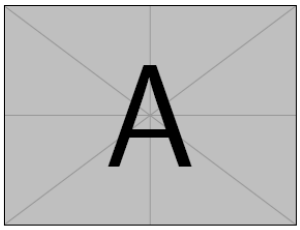


Figure 1. Insert your caption here.

DATA SET	NAIVE	FLEXIBLE	BETTER?
CLEVELAND	83.3± 0.6	80.0± 0.6	×
GLASS2	61.9± 1.4	83.8± 0.7	√
CREDIT	74.8± 0.5	78.3± 0.6	

Table 1. INSERT YOUR CAPTION HERE.

You can refer to an equation as Equation 1.

Figure: you can refer to a figure as Fig. 1.

Table: you can refer to a table as Tab. 1 in your text. `https://www.tablesgenerator.com/` is useful for creating custom tables.

Reference: you can cite a source using command `\cite`, e.g. [1]. To add a reference, you can find your source on Google Scholar, click "Cite" and select BibTeX. Then copy the reference to `main.bib`.

2. Related Work

Add your literature review here. Discuss the limitations of the literature.

3. Method

Use what you have learnt in EE-559 to address the limitations you identified. Describe and motivate your methodology.

[1] Group GroupNumber.

4. Validation

Implement your ideas and test them. Add your evaluation, testing and analysis here. Justify the choices for the experiments. Analyse the results and the performance: why does your hypothesis work / doesn't work? Compare with alternative ideas / hypotheses. Discuss the limitations of the proposed solution.

5. Conclusion

Add your conclusion here.

References

[1] A. Vaswani, N. Shazeer, N. Parmar, J. Uszkoreit, L. Jones, A. N. Gomez, Ł. Kaiser, and I. Polosukhin, "Attention is all you need," *Advances in neural information processing systems*, vol. 30, 2017.

Project objective(s)

- What is the need?
  e.g. Scarcity of diverse, high-quality labelled data for hateful speech in text [REF1, REF2].

- What is the goal?
  e.g. To overcome the lack of the high-quality data for the hateful speech in the text domain.

- What did we do?
  e.g. *We used X [REF1] in combination with Y [REF2] to enhance data availability and improve detection accuracy.*

Literature review

- What are the closest related works to your project?
  Identify the most relevant papers that align with your research goals or solve a similar problem.

- What are their limitations?
  Discuss the gaps or weaknesses in those papers. State which gaps/weaknesses you addressed.

- How does your project differ and (in which aspects) is it better?
  Explain how your project improves upon these papers, and what are the differences.

Methodology

- What are the papers that informed your approach?
  Briefly discuss the paper(s) whose methodology inspired your approach to the project.
- What was done by you?
  Clearly separate what is your actual work from what was done in the literature.
- Which models and datasets did you use?
  Justify the choice of the models (e.g. BERT, Llama3.2) and dataset(s) you used.

Evaluation, testing, and analysis (1/2)

- Clearly explain your experimental setup, including any pre-processing steps.
- Use baselines for comparison.
- Ensure that the setup for the comparison with the literature is fair.
- Use multiple seeds and evaluate the variance in your model's performance.
- Make sure that the data split reflects the one that was used in the literature.

Evaluation, testing, and analysis (2/2)

- Support all your statements with a reference to the literature or your results.
- Show what happens if key elements of the method are removed (ablation study).
- Explain the possible reasons for the results you obtained.
- Acknowledge the limitations of your method.

Convergence to project success!

Your mini-project choices

To be aligned with the course learning objectives and your broader transversal skill development

- Learning objectives
  - interpret the performance of a deep learning model
  - analyze the limitations of a deep learning model
  - justify the choices for training and testing a deep learning model
  - propose new solutions for a given application
- Transversal skill development
  - respect relevant legal guidelines and ethical codes
  - take account of the social and human dimensions
  - …

Data

Objective: high-quality, well-labelled data

Get familiar with the benchmarks on the task you are addressing

Do you really need to train a model from scratch?

Can you apply fine-tuning?

Check if your model overfits

Discuss your choices in the report

The amount of data required for training a neural network depends on several factors, such as problem complexity and model size.

Model

- **Multi-modal models are cool!**

  however check if they are necessary for your problem

- **You can use a pre-trained model as a basis of your project**

  justify in the report why you are using a pre-trained model

- **Having the best-performing model in its class is highly gratifying!**

  however this is not the main goal of the mini-project
  it depends on the other contributions/innovations with respect to the learning outcomes
  (performance can be slightly lower if compensated by innovation/creativity elsewhere)

Framing your mini-project

- **Select a current limitation or a relevant new problem**
  - identify a specific problem you want to address
  - discuss in the report the limitations of the literature
  - use what you have learnt in EE-559 to address the limitations you identified
- **Implement your ideas**
- **Test them**
- **Analyse the performance**
  - why does your hypothesis work / doesn't work?
  - compare with alternative ideas / hypotheses

Do not forget to …

- State in the report any hypotheses you made
- Reference the sources you use
- Comment your code

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andrea.cavallaro@epfl.ch