

FEDERATED LEARNING PROJECT REPORT TEMPLATE

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ABSTRACT

This abstract provides a concise summary of the project, including the FL application, empirical graph modeling, variation minimization approach, and the FL algorithms used.

Keywords: Federated Learning, Networks, Personalized ML, Trustworthy AI

1. INTRODUCTION

Instructions (Remove before submission)] Introduce the background and motivation for your FL project:

- A real-life scenario motivating your FL application.
- Summary of state-of-the-art methods relevant to your project.
- Brief outline of the structure of your report.

2. PROBLEM FORMULATION

Instructions (Remove before submission)] Model your FL application as a FL network (see [1, Ch. 3]). In particular, clearly define and explain:

- **Nodes:** What real-world devices do they represent?
- **Local Models:** Describe the models used at each node.
- **Loss Functions:** Specify local loss functions for training.
- **Edges:** How are edges and their weights chosen?

3. METHODS

Instructions (Remove before submission)] The project requires you to apply GTVMin-based methods to the FL application modelled in Section 2. In this section you need to clearly state and explain:

- Your choice of variation measure.
- Your choice of FL algorithm and its message passing implementation.

4. NUMERICAL EXPERIMENTS

Instructions (Remove before submission)] Describe implementation details and analyze results:

- **Data sources used.**
- **Model validation, selection, and diagnosis methods** (see [2, Sec. 6.6]).
- **Report training, validation, and test losses.**

Important: Your report must include a zip archive containing a single Python script along with any necessary data files. Minimize the use of non-standard Python packages to ensure ease of execution and reproducibility.

5. CONCLUSION

Instructions (Remove before submission)

- **Discuss whether the obtained results solve the problem satisfactorily.**
- **Identify limitations and suggest potential improvements.**

6. REFERENCES

- [1] A. Jung, *Federated Learning: From Theory to Practice*, Aalto, 2025. Available: <https://github.com/alexjungaalto/FederatedLearning/blob/main/material/FLBook.pdf>.
- [2] A. Jung, *Machine Learning: The Basics*, Springer, 2022.