TEMPLATE FOR STUDENT PROJECT FOR
CS-E4740 FEDERATED LEARNING

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ABSTRACT

This paper studies federated learning methods for high-precision weather forecasting.

Index Terms— Federated Learning, Networks, Personalized Machine Learning, Trustworthy AI

1. INTRODUCTION

- Explain the background (real-life scenario) of your ML application (see [1, Ch. 2]).

- Summarize the relevant literature (state-of-the art).

- Briefly outline the structure of this paper.

2. PROBLEM FORMULATION

- Formulate your application as an instance of GTV minimization [2, Sec. 7]

- Discuss you choice/construction of the empirical graph whose nodes carry local datasets and local models.

- Provide a precise definition of the local datasets, their data points, features and labels.

- Explain the source of the data used in your project.

3. METHODS

- Clearly state the number of datapoints in each local dataset.

- Mention any specific characteristics of data and clearly state if any data preprocessing has been implemented.

- Explain your feature selection process (no theoretical justification needed).

- Describe and explain (why?) your choice of local models.

- Describe and explain which FL algorithm you have used to train the local models [2, Sec. 9]

- Describe and explain (why?) your choice of loss function(s), e.g., logistic loss

- Explain the process of model validation - how did you split the data into training, validation and test sets. What are the sizes of each set and why did you make such design choice.

4. RESULTS

- Compare and discuss the training and validation errors obtained for each node of the empirical graph.

- Which is the final chosen method and why?

- What is the test error (for each node) of the final chosen method?

5. CONCLUSION

- Provide a succinct summary of your findings.

- Are the results suggesting that the problem is solved satisfactorily, or might there be room for improvement?

- Ponder about possible limitation of the methods and how it can be further improved.

6. REFERENCES

[1] A. Jung, *Machine Learning: The Basics*, Springer Singapore, 1 edition, Feb. 2022.

[2] A. Jung, "Federated learning," Lecture notes for course cs-e4740, Aalto University, 2023.