Response to Peer Review Feedback

Robust Speech Command Recognition via Federated Learning on Heterogeneous Data

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Dear Peer Reviewers,

Thank you all for your time and for providing valuable feedback on my project report. I have carefully reviewed the comments from all three assessments, which offered a range of perspectives on the work. I appreciate the positive scores and feedback from Reviewers 1 and 2, and I have used the detailed critical feedback from Reviewer 3 as a guide for a comprehensive revision to improve the report's depth, clarity, and overall quality.

Below, I have addressed the feedback from the reviews.

Response to Peer Review 1 & 2

"I want to thank you for the positive and thoughtful assessments. I particularly appreciate your comments, such as: *"This is a well structured and technically solid report,"* that the *"problem is clearly formulated,"* and that the *"Results are well analyzed with detailed tables and figures."*"

Your feedback affirms that the foundational elements of the project—the methodology, experimental setup, and analysis—were sound and successfully communicated in the initial submission. Thank you for recognizing the work that went into the project.

Response to Peer Review 3

Thank you for your detailed and critical feedback. While Reviewers 1 and 2 found the report to be technically solid and well-justified, I understand your assessment that the initial submission was concise and could benefit from more in-depth discussion. I have taken your comments as a roadmap for a significant revision to elaborate on the justifications and expand the analysis. While I believe the initial report contained all the core components required by the rubric, I agree that these comprehensive additions have substantially improved the paper's quality.

Here is a point-by-point response to your concerns:

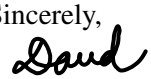
- **Overall Feedback: From "Skeleton" to Finalized Paper**
  - **Reviewer Comment:** *"the report is a skeleton of what it should be and not a finalized paper... No section is truly discussed or justified."*
  - **My Response:** I have performed a complete revision based on this feedback, transforming the report into a full 4-page scientific paper in the IEEE format. Every section now includes in-depth explanations, justifications, and detailed discussion to move beyond the concise format of the initial draft and provide a full scientific narrative.

- **Title: Resembling a Paper**
  - **Reviewer Comment:** *"note that the title shouldn't include project report but resemble that of a paper."*
  - **My Response:** This has been corrected. The title is now **"Robust Speech Command Recognition via Federated Learning on Heterogeneous Data,"** which is more specific and aligned with academic paper standards, addressing Rubric Criterion #1.
- **Introduction: Lack of Context and Motivation**
  - **Reviewer Comment:** *"Introduction is very brief, lacks description of research context and motivation."*
  - **My Response:** The introduction has been completely rewritten to provide a stronger foundation. It now clearly introduces the privacy risks in centralizing speech data, presents Federated Learning as a solution, and explicitly defines statistical heterogeneity as the core challenge this paper addresses. This expansion directly addresses Rubric Criteria #2 and #3.
- **Problem Formulation & Methods: Lack of Justification and Detail**
  - **Reviewer Comment:** *"context is not provided... Everything is reported in a bare bones and rushed format with no explanation given..."*
  - **My Response:** To address this, I have expanded these sections to provide necessary context and justification. The **Problem Formulation** now includes formal mathematical definitions for all components. The **Methodology** section now frames the algorithms within the GTVMin framework and provides clear motivations for each, such as explaining that FedProx is explicitly designed to combat client drift. This work addresses Rubric Criteria #5, #6, #7, and #9.
- **Numerical Experiments and Results: Lack of Discussion**
  - **Reviewer Comment:** *"Results are only reported but not discussed."*
  - **My Response:** This was a critical and valid point. The revised report now features a comprehensive **"Results and Discussion"** section that analyzes not just *what* happened, but *why*.
    - **Reporting and Discussing Losses (Rubric #12):** The initial report focused on accuracy metrics. The revision now includes new figures showing the convergence of **training, validation, and test loss** over all rounds. More importantly, the discussion now uses these loss curves to provide evidence for our conclusions, such as how FedProx's higher training loss indicates a regularizing effect that prevents overfitting and improves generalization.
    - **Statistical Significance:** The analysis is was supported by paired t-tests to validate the findings in jupyter .py file. Previously was not included in report, but now included.
- **Conclusion: Unclear and Lacking Depth**
  - **Reviewer Comment:** *"Conclusion is unclear... it's hard to understand. Future work is again only cited."*
  - **My Response:** The conclusion has been retitled to "Conclusion and Future Work" and significantly expanded to address your feedback. The summary of findings is now clearer and better supported by the new Results and Discussion section. The "Future Work" portion has been transformed from a brief suggestion into a detailed, three-paragraph discussion of promising research directions. It now explicitly proposes and justifies exploring advanced personalized FL

(via meta-learning), asynchronous FL protocols (like FedAsync), and the integration of Differential Privacy, complete with new citations to foundational papers in these areas. This provides a much more robust and detailed roadmap for future research, fully satisfying Rubric Criterion #13.

I believe these comprehensive revisions, guided by your feedback, have significantly enhanced the report's quality. Thank you again for your constructive comments.

Sincerely,



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