MegaData: Federated Machine Learning: Projects

Find the attached project and description. And propose your own!

1. "Communication-efficiency in Federated Learning: A Comparative Analysis"
   This project focuses on designing and comparing different communication approaches to reduce the data exchange costs in federated learning.

2. "Secure Aggregation in Federated Learning: A Cryptographic Approach"
   Investigating cryptographic methods for ensuring data privacy and integrity in federated learning environments.

3. "Adaptive Network Topologies in Federated Learning for Scalable Deployment"
   Exploring different networking strategies to enhance scalability and performance in federated learning systems at scale. This includes SDN, NFV's, and Blockchain.

4. "Handling Non-IID Data in Federated Learning: Techniques and Challenges"
   A project aiming to develop strategies for dealing with non-independently and Identically Distributed data in federated learning, including a taxonomy of methods.

5. "Data Skew in Federated Learning: An Experimental Evaluation on Aggregation Algorithms"
   Studying the implementation of vertical federated learning in cross-silo scenarios with a focus on privacy.

6. "Federated Learning and LLM in Healthcare: A Collaborative Approach for Multi-Institutional Data Analysis"
   Implementing federated learning and LLM across multiple healthcare institutions, allowing collaboration without sharing sensitive data.

7. "Optimization of Bandwidth in Federated Learning: A Model Compression Perspective"
   Using model compression techniques to investigate methods for reducing communication overhead in federated learning. This also includes the usability of 5G/6G network.

8. "Robust Federated Learning in Hostile Environments: Security Measures and Considerations"
   A detailed analysis of potential security threats in federated learning and the development of robust countermeasures.

9. "Integration of Blockchain Networks in Federated Learning: Enhancing Speed and Efficiency"
   Exploring integrating blockchain technologies in federated learning to enable high-speed, low-latency communication.

10. "Model, Concept, and Data Drift in Federated Learning: Problem and Solution"
    Investigating the different deployment architectures for online (stream) FL environments, including performance, efficiency, and privacy.

11. “Enhancing Explainability in Federated Learning: Methods, Challenges, and Applications”
    This project aims to investigate methods to enhance explainability in Federated Learning. It will explore various techniques, address the inherent challenges, and examine their applicability across different domains such as healthcare, finance, and IoT.

12. "Federated Learning in IoT and Edge Devices: Optimizing Performance, Privacy, and Scalability"
    This project focuses on optimizing FL's performance, privacy, and scalability in IoT and edge environments. By addressing the unique constraints and opportunities presented by these technologies, the study aims to develop novel strategies (e.g., serverless) that enhance the efficiency and effectiveness of FL applications in real-world IoT scenarios.

13. “Addressing Stragglers in Federated Learning: Mitigation Strategies and Performance Implications"
    This project aims to systematically investigate the impact of stragglers on FL and develop robust strategies to mitigate their adverse effects. The study will explore adaptive algorithms, resource management techniques, and fault-tolerant mechanisms to enhance the performance and reliability of FL systems.