

# Action Learning Project Proposal

## FEDERATED LEARNING APPLICATIONS IN HEALTH CARE

### **Overview – Context, Story**

As data collection for training machine learning models has been growing, more and more users have started to worry about where and how their personal data is being used and whether or not this data can be traced back to them. Federated learning allows models to be predicted by using data from multiple sources while also ensuring the user's anonymity. Within this study, we will be covering how federated learning is used in the healthcare system to improve processes such as biases in electronic health records, more accurate disease detection, informatic designs, and other use-cases.

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### **Goal – one sentence that reflects the purpose of your proposed project**

To produce an in-depth research analyzing the usage of federal learning predictive models on healthcare applications.

### **Objectives – how you plan to achieve the goal**

Exploring the fundamentals of federated learning, and how it is used to enhance the applications of health care instances before creating a real-world scenario type application to be able to explain its working mechanism, benefits, and how it generally impacts other extensions of the healthcare system.

### **Knowledge skills required**

- Researching
- Academic reading & writing
- Data analyzing & handling
- Machine learning technique applications
- System/network management
- Algorithm knowledge

### **Software, tools, system architecture, and components anticipated**

- Python environment & libraries
- Code development tools (VSC, IntelliJ)
- Machine/deep learning tools (TensorFlow, PyTorch)

- Related datasets
- Code versioning tools (Git)
- Cloud platform & tools (GCP, AWS, Oracle)

### **Research expected**

- Implementation of federal learning
- Federated learning algorithms
- Federated learning in the health sector
- Future of digital health data collection
- Natural learning processing tasks

### **Plan of action**

- Study and research on federated learning and related papers/articles
- Find applications, examine the working mechanism through use-cases
- Poster and thesis preparation
- Experiments on federating learning environment and tools
- Choosing sufficient datasets
- Using different models on federated learning and compare them

Papers:

<https://link.springer.com/article/10.1007/s41666-020-00082-4>

<https://www.nature.com/articles/s41746-020-00323-1>

<https://www.sciencedirect.com/science/article/pii/S138650561830008X>