

# EPI update

Corinne Allaart  
17<sup>th</sup> of January 2024

# Projects

1. Private and Secure Distributed Deep Learning: A Survey  
(submitted to Computing Surveys)
2. Vertical Split Learning - an exploration of predictive performance in medical and other use cases  
(published IJCNN 2022)
3. Predicting stroke outcome: a case for multimodal deep learning  
(Published at Artificial Intelligence in Medicine )
4. Secure vertical federated learning for predicting stroke outcome
5. Qualitative evaluation of a prediction model for stroke outcome and its visualizations (submitting to JMIR human factors)

# Projects

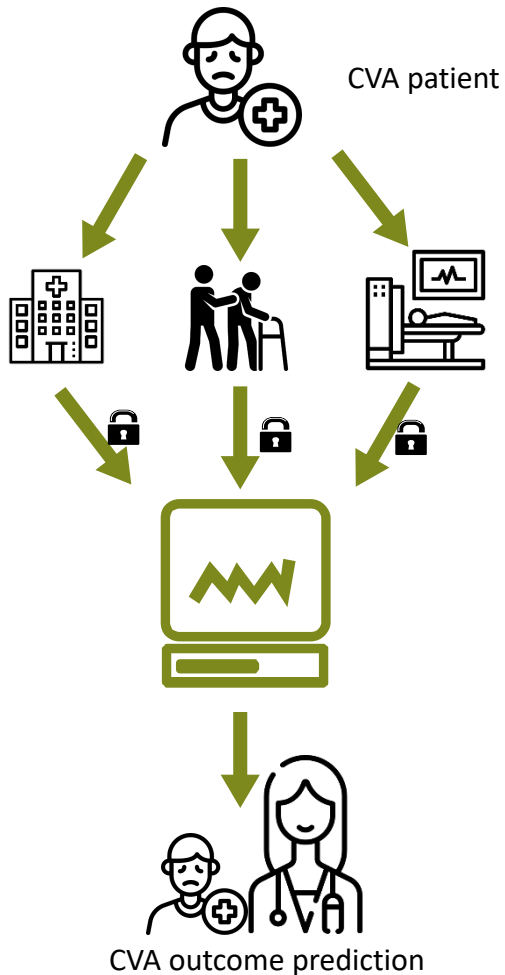
1. Private and Secure Distributed Deep Learning: A Survey  
(submitted to Computing Surveys)
2. Vertical Split Learning - an exploration of predictive performance in medical and other use cases  
(Published IJCNN 2022)
3. Predicting stroke outcome: a case for multimodal deep learning  
(Published at Artificial Intelligence in Medicine )
4. **Secure vertical federated learning for predicting stroke outcome (DISPERSE project)**
5. Qualitative evaluation of a prediction model for stroke outcome and its visualizations (submitted to JMIR human factors)

# DISPERSE: Vertical federated learning for predicting stroke outcome

Goal: predicting MrS score after 3 months



Comparison of 3 situations

- Prediction model St. Antonius Ziekenhuis
- Prediction model Rehabilitation clinics
- Prediction model both -> **Vertically** partitioned data
  - Fully centralized
  - Vertical Federated Learning (VFL)
  - Secure VFL



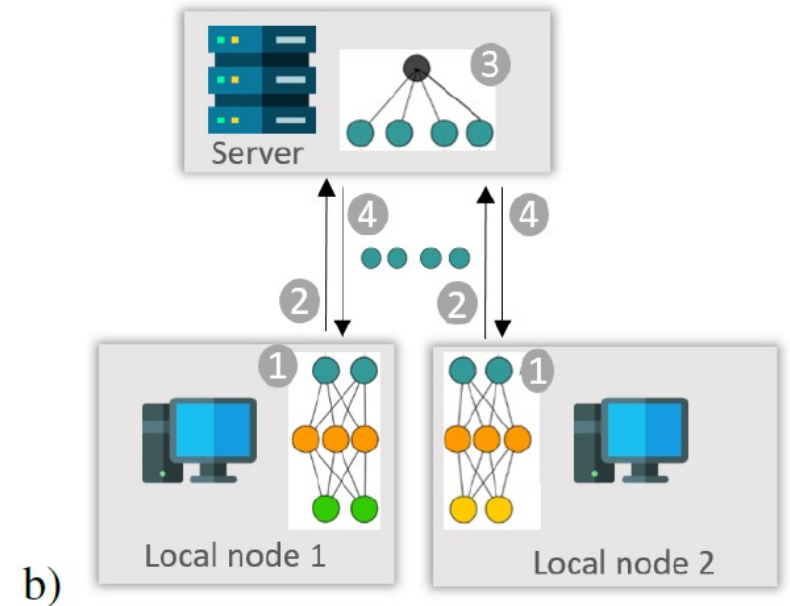
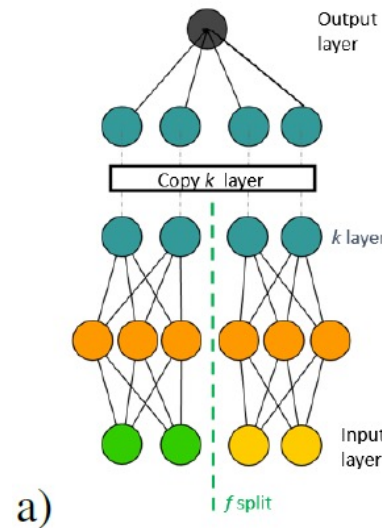
	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	A <sub>4</sub>	A <sub>5</sub>	....	A <sub>m</sub>
x <sub>1</sub>							
x <sub>2</sub>							
x <sub>3</sub>							
x <sub>4</sub>	Partition 1			Parti-tion 2			Parti-tion n
x <sub>5</sub>							
...							
x <sub>n</sub>							

# DISPERSE: Data Collection

	Acute phase 	Rehabilitation phase 	Long term
Location:	Hospital	Rehabilitation clinic Geriatric rehabilitat. Home	Nursing home Home
Data:	Medical History Treatment data <i>(DTNT e.g.)</i> Admission data <i>(complications e.g.)</i> Perfusion CT-scan	Intake data <i>(scores e.g.)</i> Admission data <i>(duration e.g.)</i> Discharge data <i>(scores e.g.)</i>	Functional status, location Readmissions, complications
Timeframe:	Minutes to days <input checked="" type="radio"/>	Days to months <input type="radio"/>	>Months <input type="radio"/>

# Secure Vertical Federated Learning

- Vertical Split learning [1]
- Data leakage of data and labels
- Security
  - Encrypting the models and the information exchanged between parties
- Evaluate for predictive performance, efficiency and security



# Secure Vertical Federated Learning

- First results:
  - better security and accuracy
  - at the cost of efficiency
- Future work:
- Apply the framework to St. Antonius data
- Goal: Artificial Intelligence in Medicine (AIME) '24
  - Deadline 12 feb

ANY QUESTIONS?