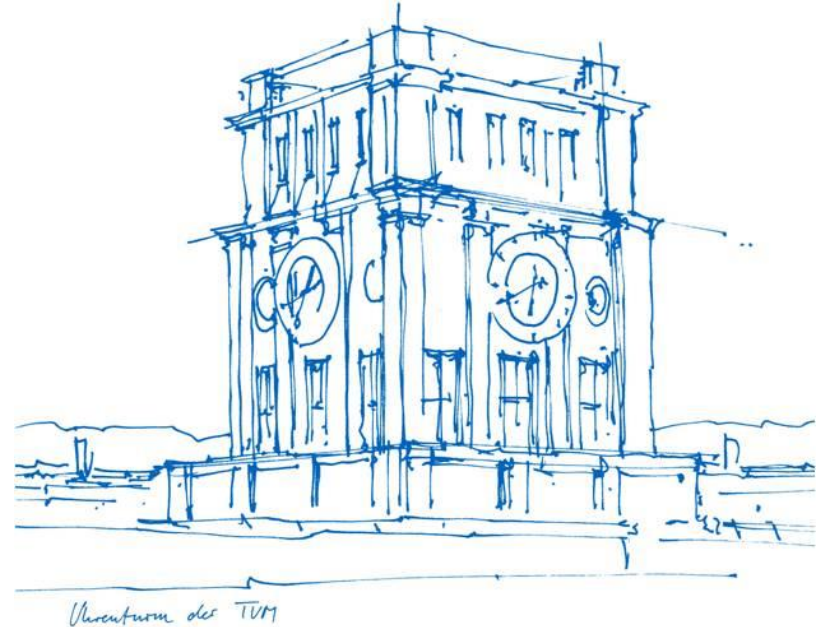


Last Update – Connectome Informed Attention

Andres Zapata | Mohamed Said Derbel | Niklas Bühler

Munich, November 2022



Last Update – Connectome Informed Attention



Overview

1. Introduction
 - Goal
 - Current Status
2. Final Evaluation & Discussion
 - Big Picture Analysis
 - Result Analysis
 - Significance of Connectivity
3. Future Work

1. Introduction

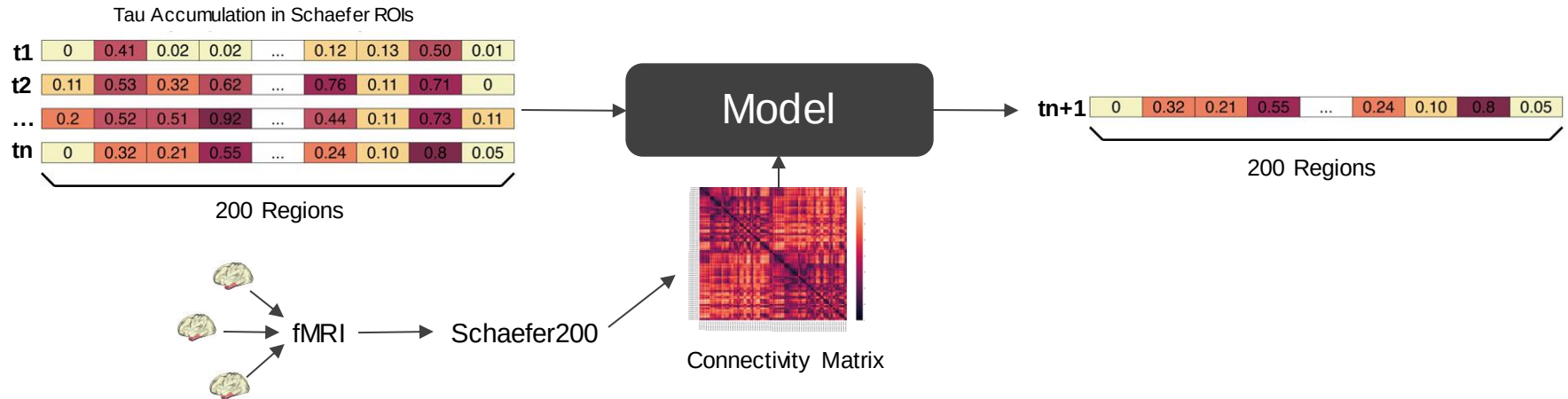
- Goal
- Current Status

1. Introduction

- **Goal**
- Current Status

Goal

Connectivity-informed future Tau-accumulation prediction in Schaefer ROIs

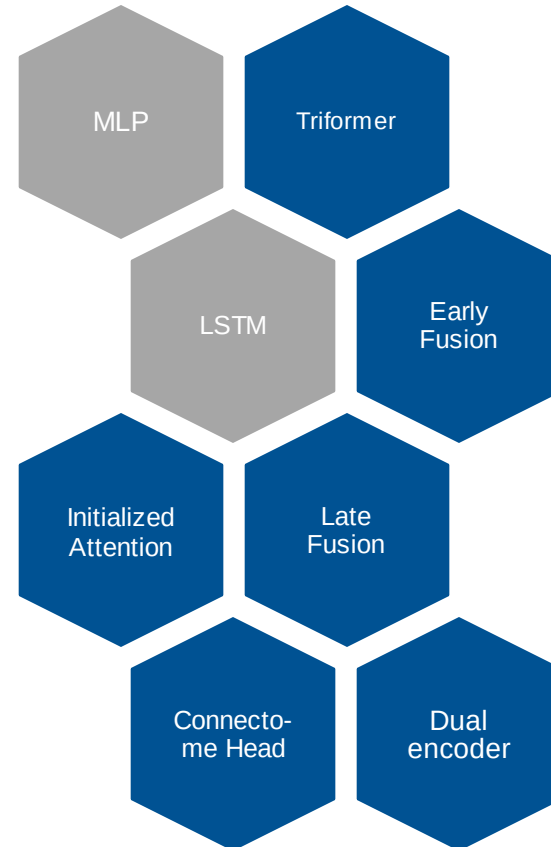


1. Introduction

- Goal
- **Current Status**

Current Status

	Test Loss	Test Accuracy
MLP	0.036	0.898
LSTM	0.0297	0.939
Transformer	0.03215	0.9482
Early Fusion	0.0282	0.9529
Late Fusion	0.0441	0.9120
Initialized Attention	0.0306	0.9445
Dual-Encoder	0.035	0.91
Triformer	0.0312	0.9498
Connectome-head	0.0319	0.9438



Current status

How meaningful are our predictions?

How is the model's performance across different classes and input lengths?

Is connectivity data **significantly** improving our results?

If so, which architecture profits the most from the connectivity matrix?

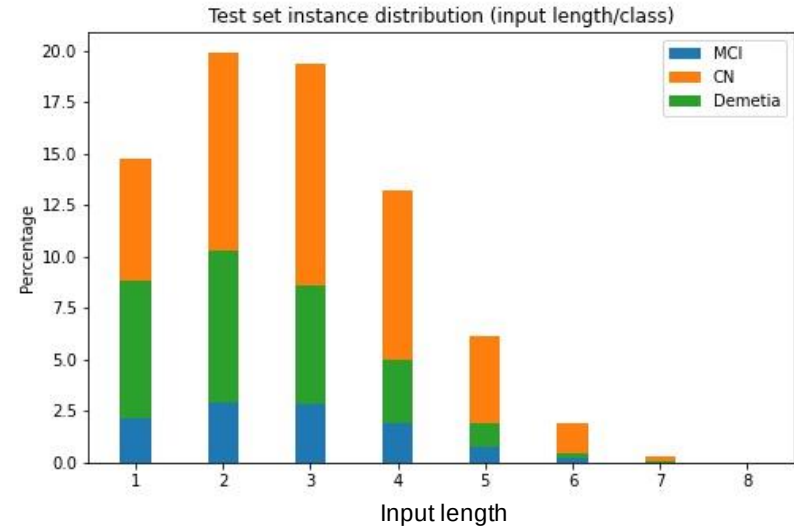
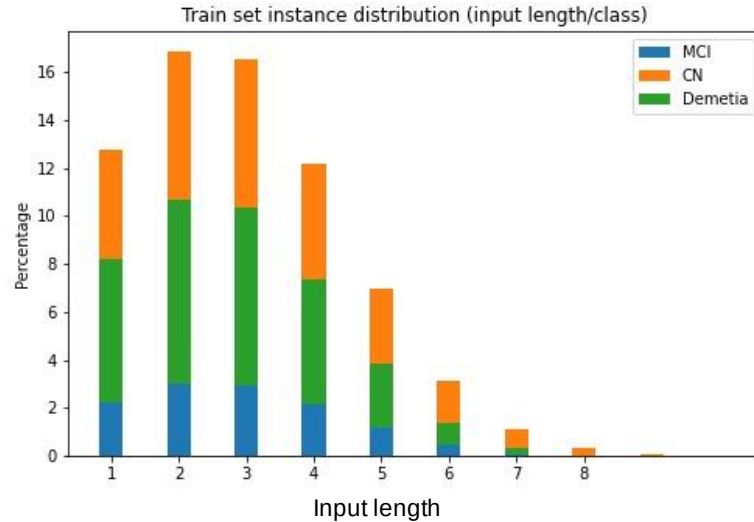
2. Final Evaluation & Discussion

- Big Picture Analysis
- Result Analysis
- Significance of Connectivity

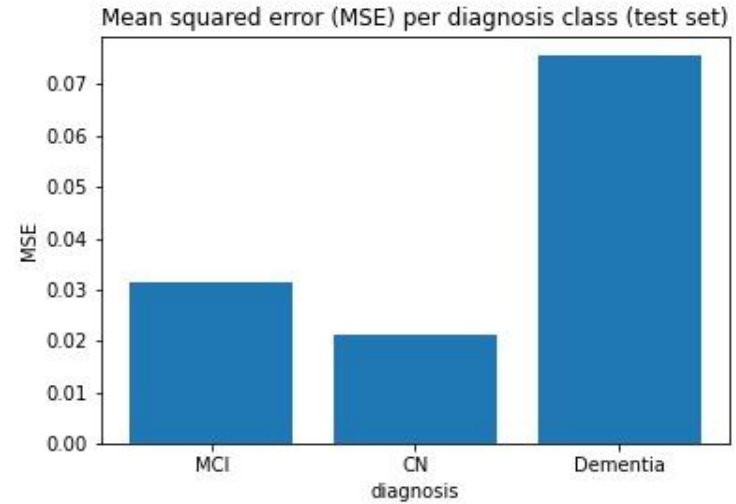
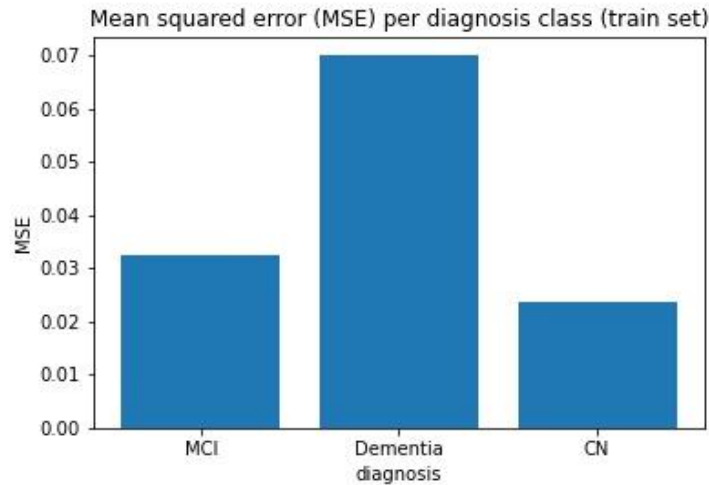
2. Final Evaluation & Discussion

- **Big Picture Analysis**
- Result Analysis
- Significance of Connectivity

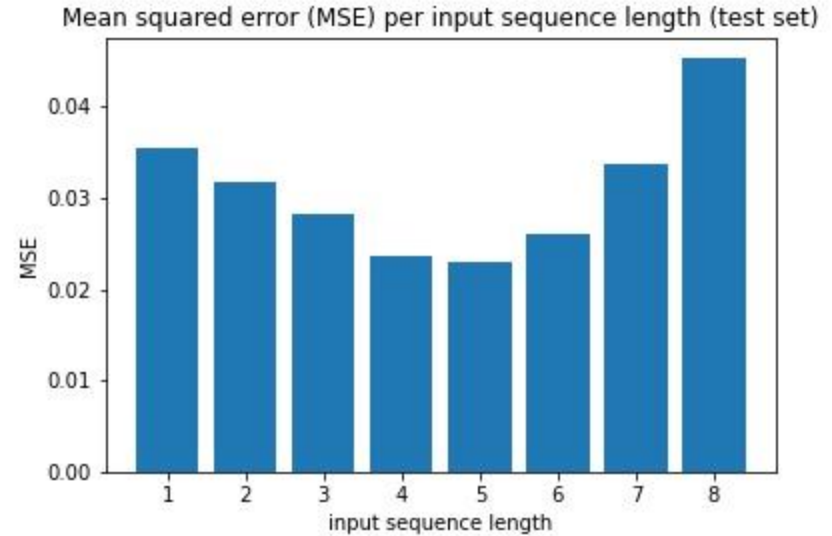
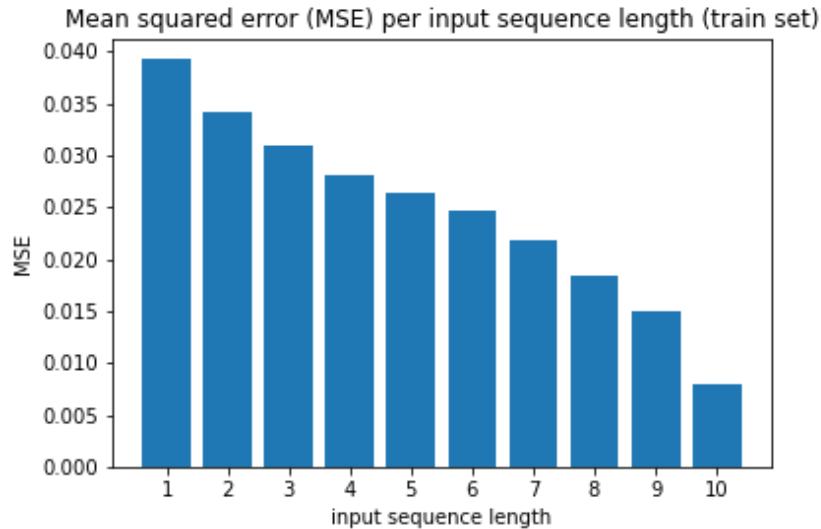
Input length/Class Distributions for Test Set



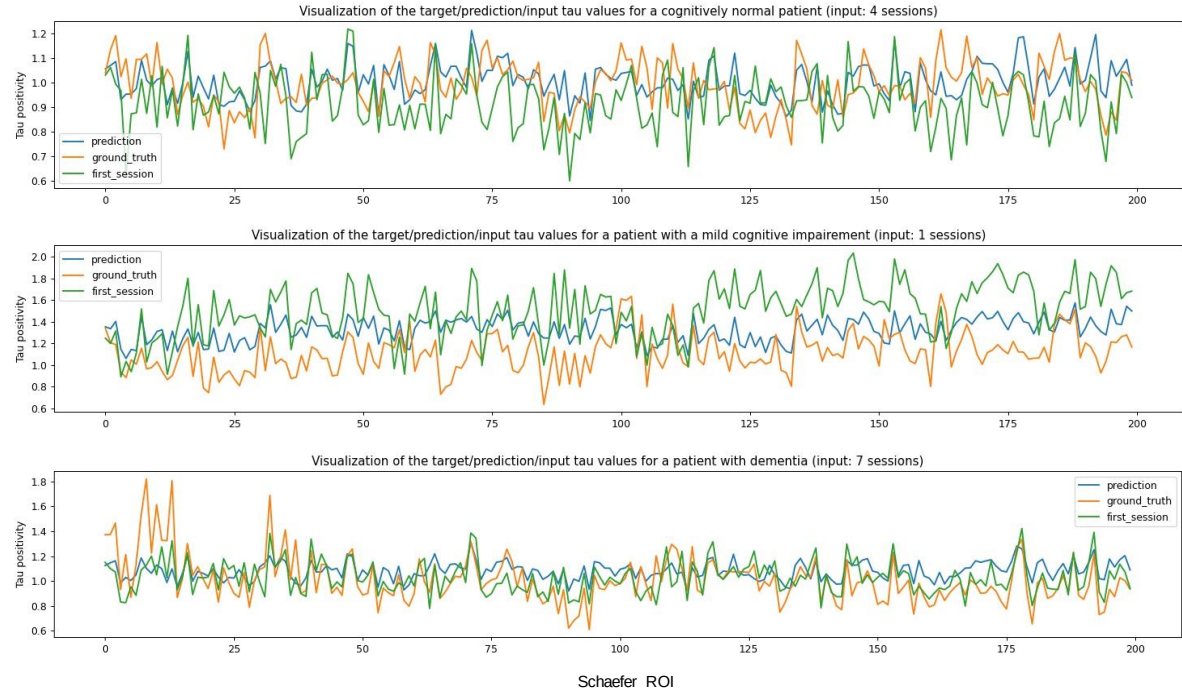
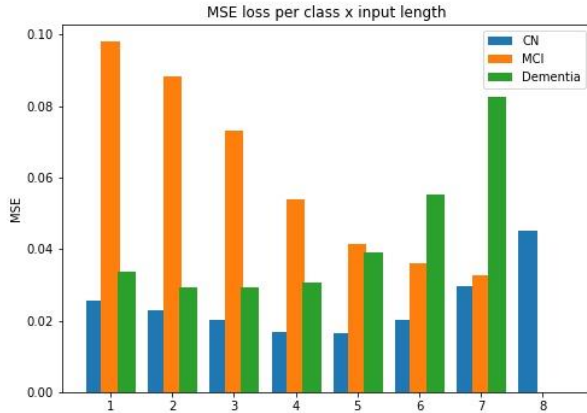
MSE per Class for Train and Test Set



MSE per sequence length for Train and Test Set



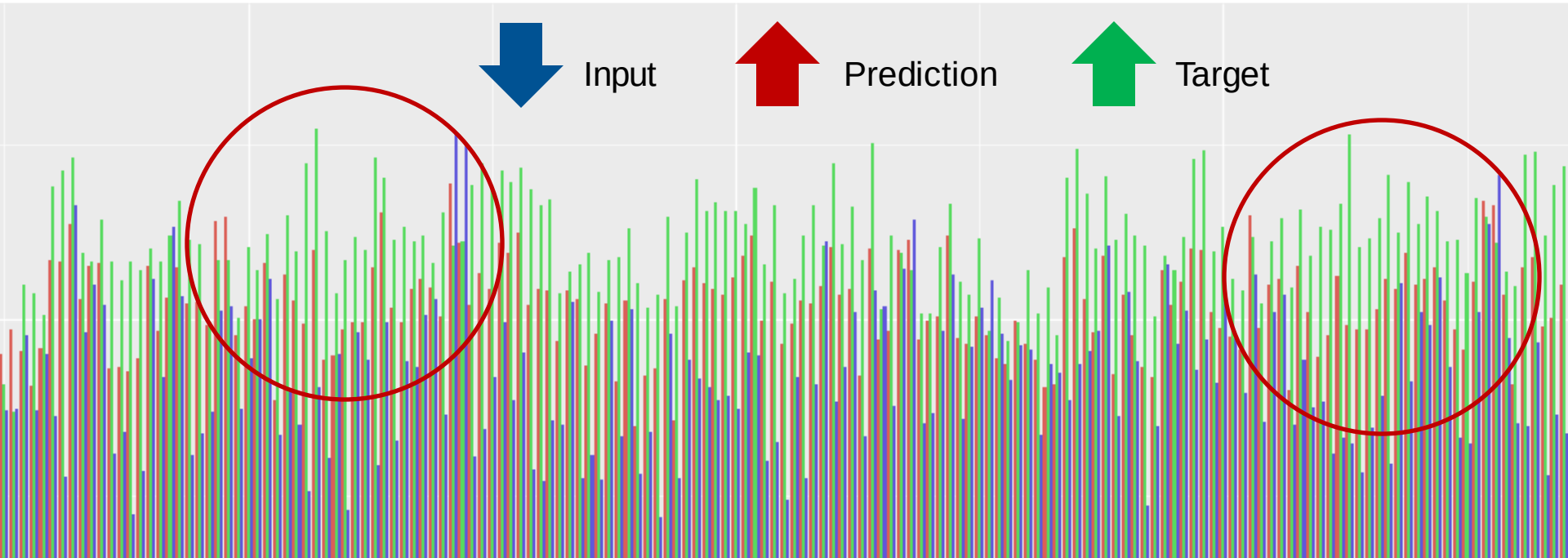
MSE per Class for Train and Test Set



2. Final Evaluation & Discussion

- Big Picture Analysis
- **Result Analysis**
- Significance of Connectivity

Predictions follow trends of Targets, despite differing Input

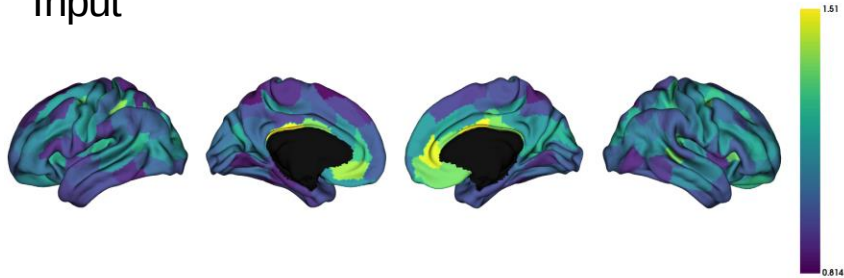


Cognitively Normal

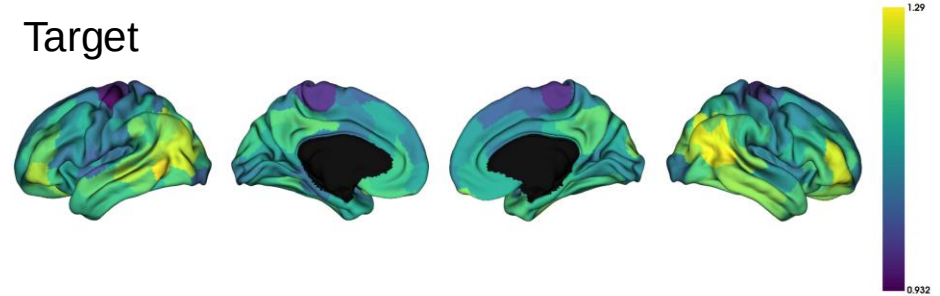


Cognitively Normal

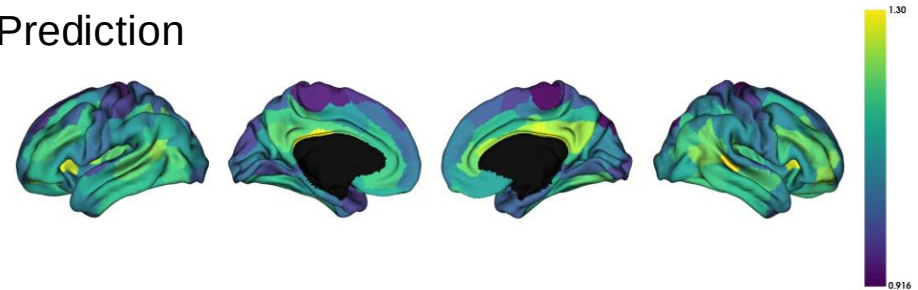
Input



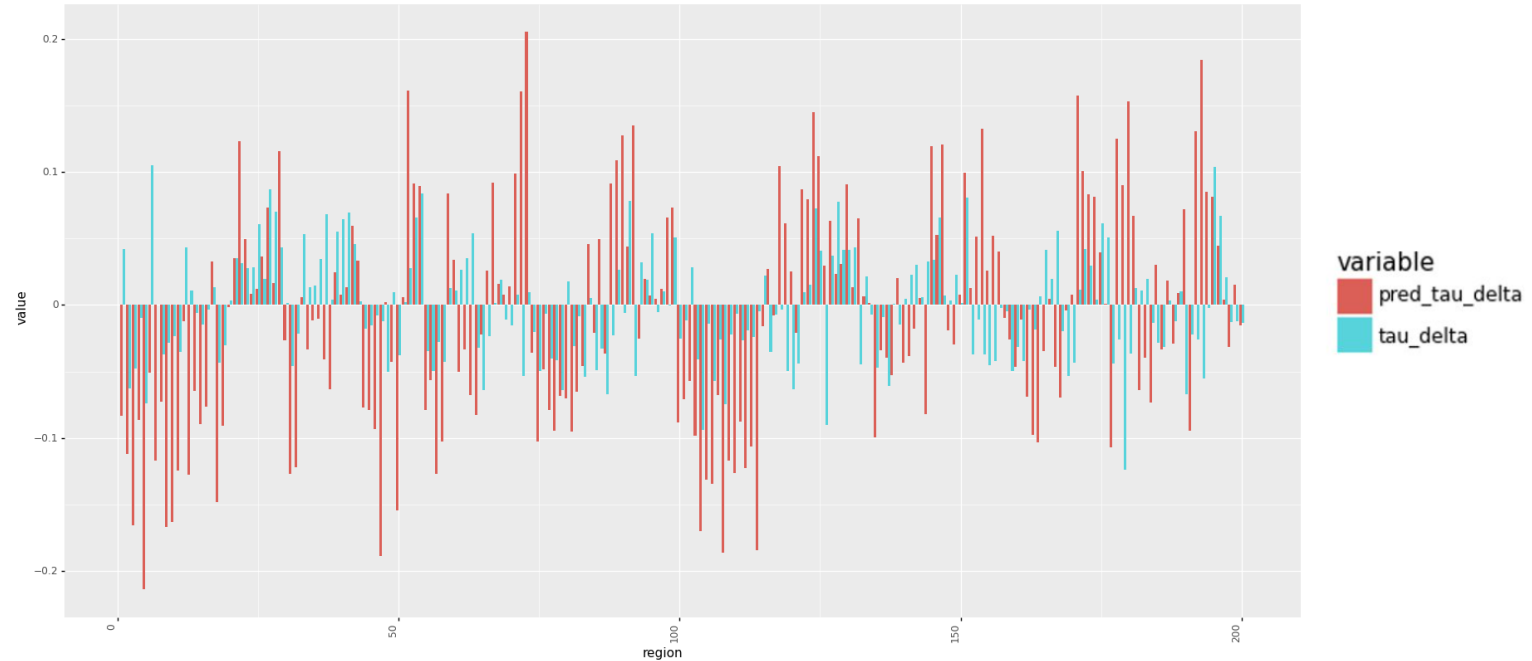
Target



Prediction

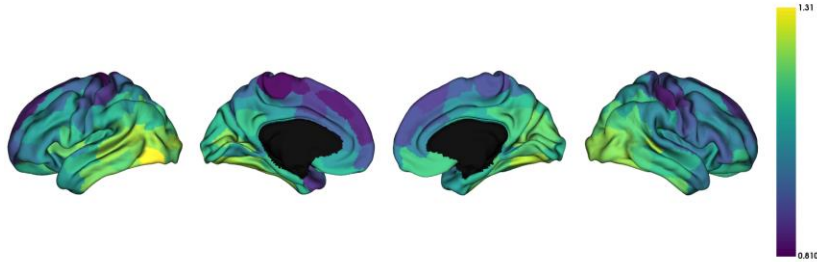


Mild Cognitive Impairment

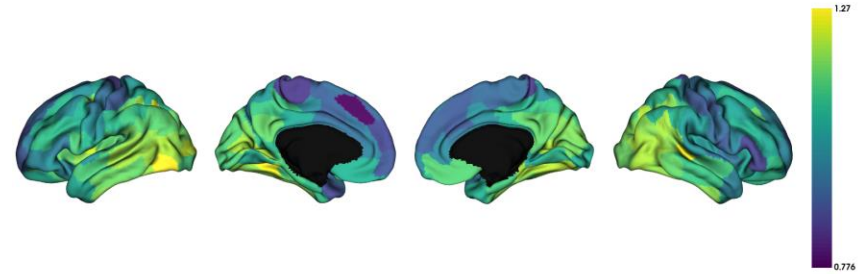


Mild Cognitive Impairment

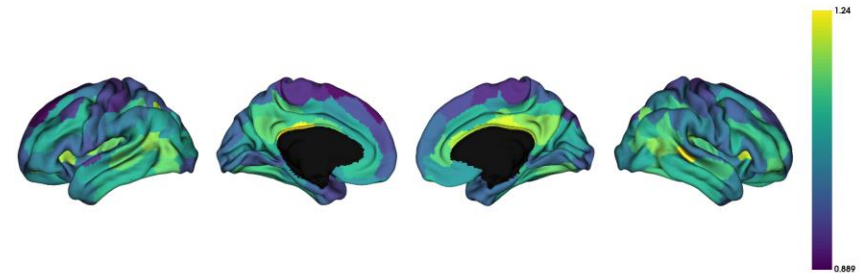
Input



Target



Prediction

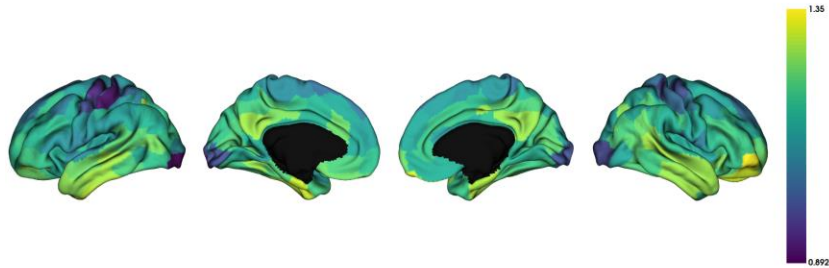


Dementia

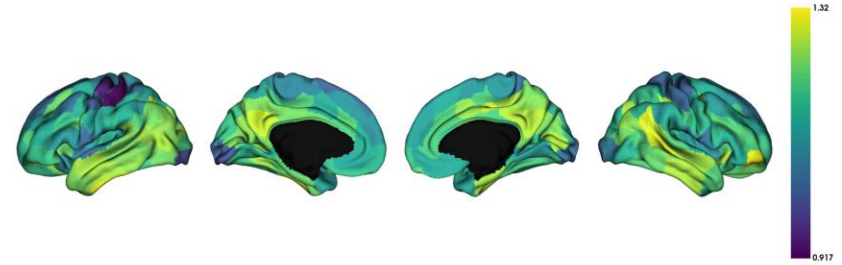


Dementia

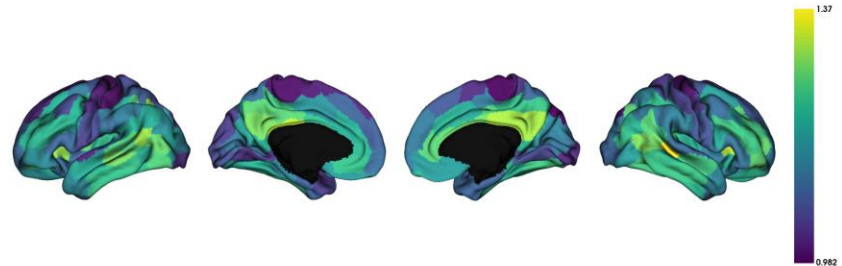
Input



Target



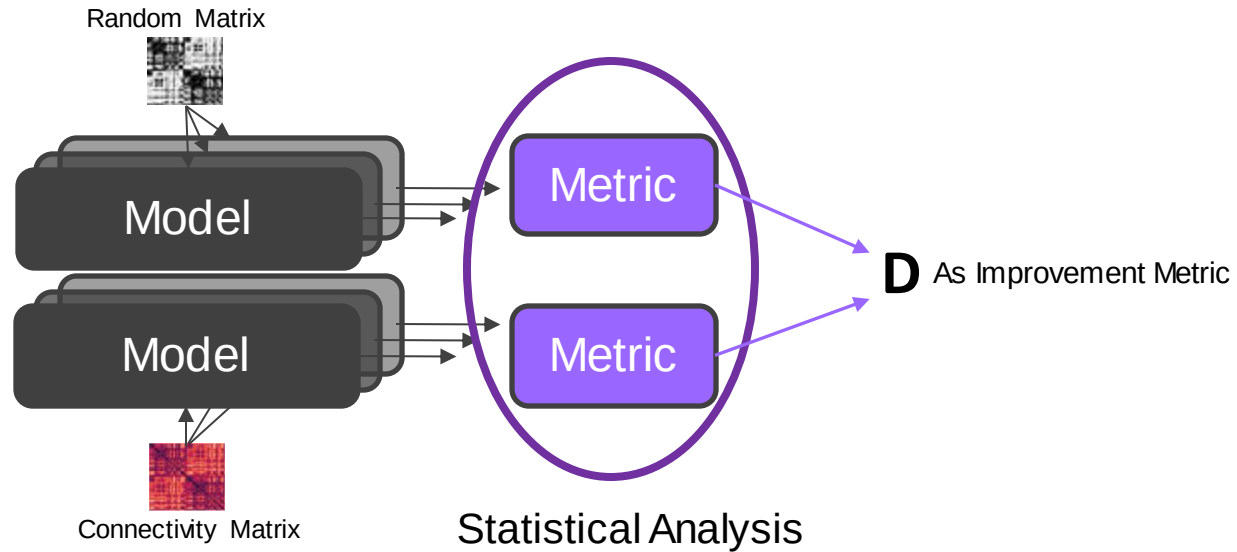
Prediction



2. Final Evaluation & Discussion

- Big Picture Analysis
- Result Analysis
- **Significance of Connectivity**

Current Status



Significance of Connectivity

Welch's t-test

Assumptions:

- Populations are normally distributed
- Populations are sampled randomly and independently

No assumption on equal variances
required

Null Hypothesis:

There is **no significant** difference between the means of the two samples $\mu_a \approx \mu_b$

Alternate Hypothesis:

There **is significant** difference between the means of the two samples $\mu_a \neq \mu_b$

Significance of Connectivity

Null Hypothesis:

There is **no significant** difference between the means of the two samples $\mu_a \approx \mu_b$

If **p-value < 0.05**

we reject this hypothesis and accept the Alternate Hypothesis

Alternate Hypothesis:

There **is significant** difference between the means of the two samples $\mu_a \neq \mu_b$

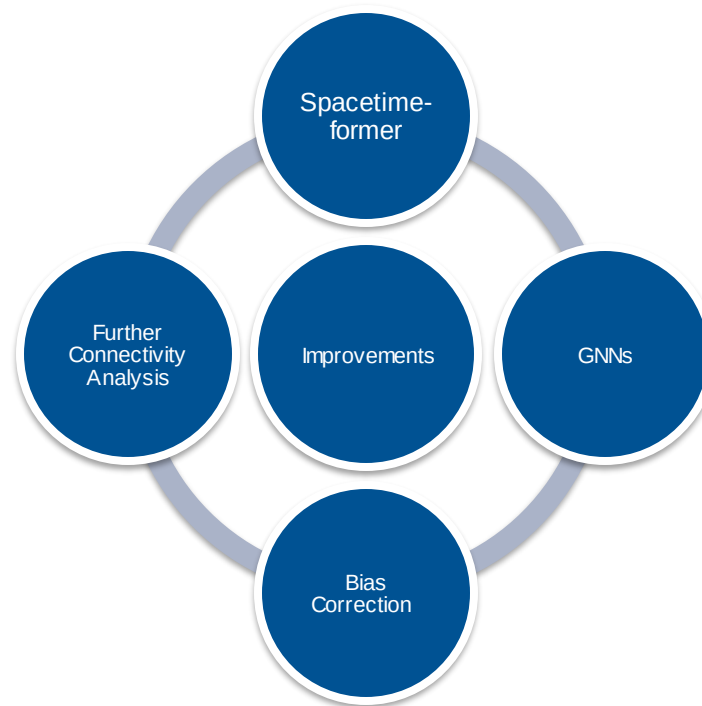
Our result : 0.0218 for early fusion



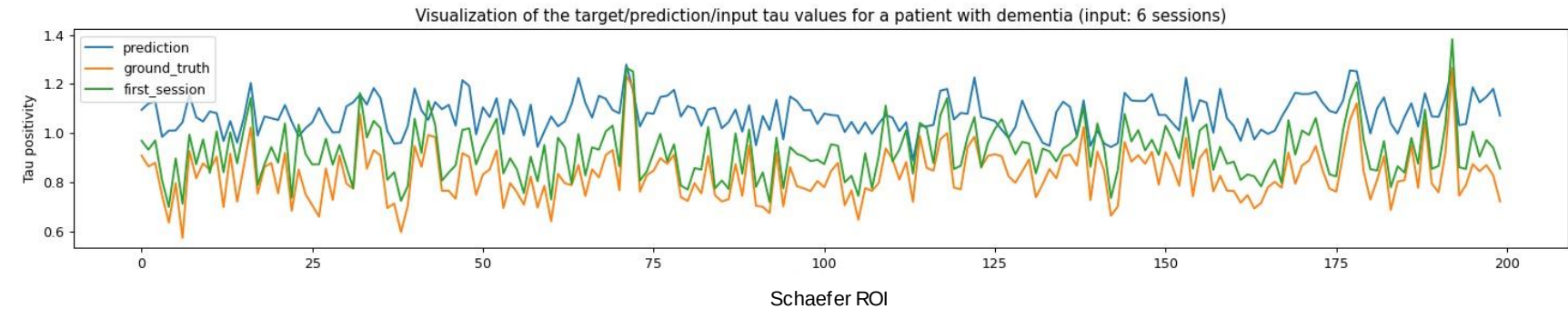
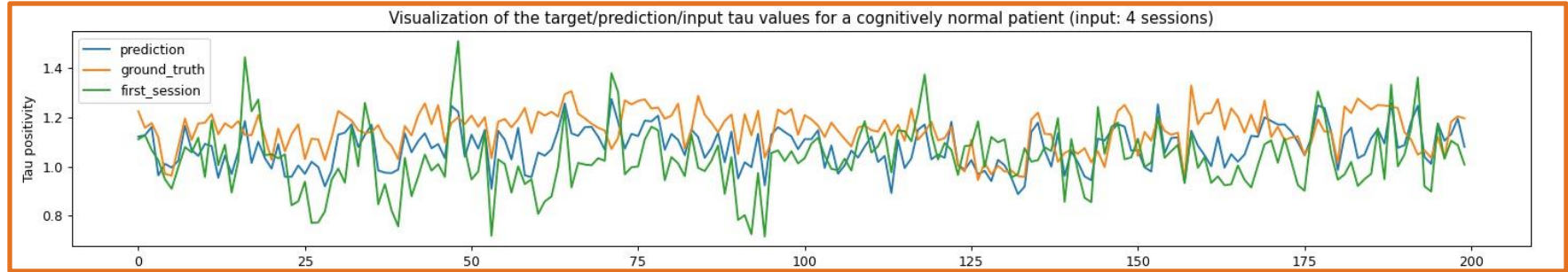
We reject Null Hypothesis and accept Alternate Hypothesis !!

3. Future Work

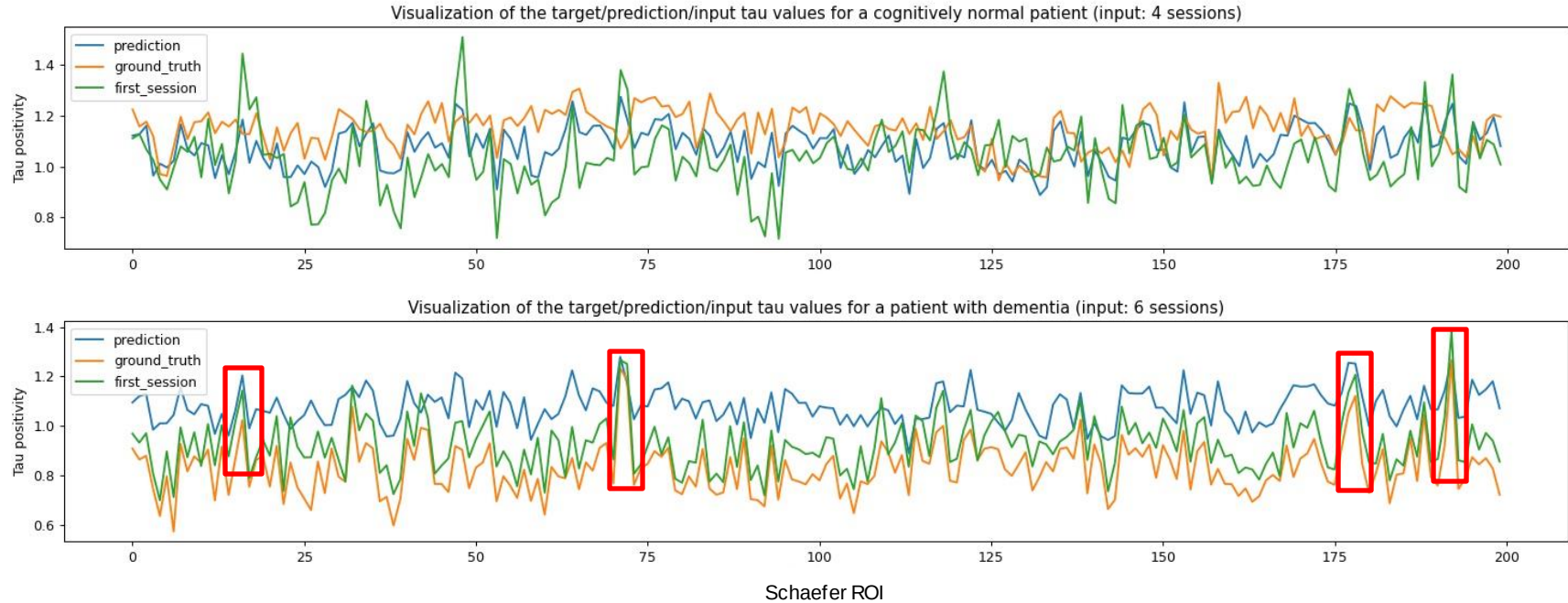
Future Work



Connectivity



Connectivity



Thank you for your attention!