Project

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CHAPTER

ONE

RESEARCH PROPOSAL

Note

This is a demo project proposal for the mobility in Japan.

1.1 Background of Proposed Research Plan

Understanding of the human brain in terms of functional and strutural architecture has been rapidly increasing due to the advances in imaging and recording technologies such as fMRI, EEG, and MEG. This collective endeavor of scientists around the world proved that decoding neuronal activity associated with cognitive, attentional, perception processes is not beyond reach thanks to the integration of computational modeling strategies with bulk of data [MHL+22]. However, attempting to construct accurate and generalizable models of brain function remains a challenge due to the complexity of neuronal dynamics, inter and intra-individual variability, and high-dimensionality of neuroimaging data. The primary objective of modelling brain using neuroimaging data is to discover dynamics of large-scale neuronal activity associated with cognitive and behavioral processes.

Modeling frameworks are bottom-up or top-down which

1.2 Purpose of Proposed Research

Effective computational models must account for these factors while integrating multimodal data sources to enhance interpretibility and predictive power.

1.3 Proposed Plan

Achieving unified generalizable model to simulate wide range of the large scale brain activity requires to choose the type of modality and

- **Objective 1:** Select and justify the appropriate neuroimaging modality or combination of modalities that best captures large-scale neuronal dynamics.
- **Objective 2:** Develop a robust preprocessing and feature extraction pipeline to manage high-dimensional neuroimaging data.
- **Objective 3:** Construct a computational model that integrates multi-modal data to simulate brain activity associated with cognitive and behavioral processes.
- **Objective 4:** Validate the model using independent datasets and benchmark its performance in predicting functional outcomes.
- **Objective 5:** Assess the generalizability of the model across different populations and cognitive tasks.

1.4 Expected Results and Impacts

CHAPTER

TWO

NEW SECTION

Important

Let's try something

2.1 New Subsection

Okey !

BIBLIOGRAPHY

[MHL+22] Ross D Markello, Justine Y Hansen, Zhen-Qi Liu, Vincent Bazinet, Golia Shafiei, Laura E Suárez, Nadia Blostein, Jakob Seidlitz, Sylvain Baillet, Theodore D Satterthwaite, and others. Neuromaps: structural and functional interpretation of brain maps. *Nature Methods*, 19(11):1472–1479, 2022.