

**Title: <Your Proposal Title Goes Here>**

## **Overall Summary from Papers**

*The objective of this section is to prepare One(1) page comprehensive summary from selected papers included in the folder attached to this assignment. These papers are related, so avoid independent summary (i.e. you should avoid elaborating on each paper per paragraph). What it means is you need to narrate by comprehending and discussing papers in a cohesive manner; telling what these papers are about and how they are related to each other. Here is detailed instruction for preparation of the summary for this page:*

- 1. carefully read all papers in detail. I highly suggest to read them at least twice before you start summarizing the papers. Create a summary of each paper off-the-record*
- 2. prepare high-level abstraction by providing overall summary of the papers and avoid independent structuring. They should be linked together and articulate on their relationships from your own viewpoint. Try to narrate in a cohesive way to explain the problem and the evolution over different papers and how they are related*
- 3. provide an overall understanding and elaborate on pros/cons. Please be mindful that this is not your proposal section, it is just review from all papers your read.*

*Please make sure to avoid creating subsections under “Summary” section. In other words you should not break the page in different sections of your own unless it is instructed across all your proposal.*

*here is also a format for citation e.g. [1]*

## Problem Statement & Objectives

*This section must fit on ONE PAGE ONLY.*

**Problem statement.** *In this section, articulate a single research problem grounded in fMRI analysis, the low-data regime, and diffusion-based generative models, using insights drawn directly from the subset of research papers you selected for this assignment. Your hypothesis and proposed idea must build upon themes, limitations, or gaps identified in those papers, and should be technically focused rather than application-design oriented. When preparing this section, address the following:*

*What specific problem in low-data fMRI learning arises from the papers you reviewed? Explain the challenge clearly (e.g., insufficient labeled data, inter-subject variability, high noise, spatiotemporal complexity).*

*Why is this problem significant for deep learning and computer vision?*

*Discuss how the papers highlight the limitations of current generative or self-supervised approaches, and why diffusion models offer a promising direction for modeling complex fMRI distributions. Optionally mention relevance to downstream medical imaging tasks (e.g., neurological disorder studies, cognitive-state prediction).*

*How does your proposed idea relate to, extend, or differ from the specific existing methods in the chosen articles (e.g., VAE-based augmentation, GAN-based synthesis, contrastive fMRI representation learning)? Clearly state the novelty of applying or modifying diffusion models to address unresolved limitations observed in the literature subset.*

**Research Objectives.** *List a set of objectives that stem logically from your problem statement and are aligned with the insights from the papers you selected. Each objective should highlight its novelty in the context of the low-data fMRI problem and describe how it contributes to your overall research direction. Examples may include designing a spatiotemporal diffusion model for fMRI, incorporating subject-conditioned priors, enforcing neuroscientific constraints, or evaluating synthetic data for improving downstream tasks. Avoid subsections and keep all content within this unified section.*



**Figure 1:** Image Caption Here

## **Research Methodology**

*This section needs to be articulated on TWO PAGES MAX.*

*Given the objectives from previous section, you need to articulate in detail on possible research methodology to address each objective independently. Here is the overall guideline*

- propose your research methodology in detail to support how are you going to implement the proposed solution in mind.*
- why do you think this is the best way of solving each objective?*
- are there any other method to solve this problem and what would be the cost-benefits compared to your selected research methodology?*
- what would be the potential risks and how would you mitigate them (i.e. risk mitigation)*

*Note: It is suggested that you prepare (a) an intuitive figure for visually demonstrating the pipeline of your methodology, (b) mathematical/analytical formulation to elaborate on the idea, and (c) execute a pseudo-code for implementation of the idea.*

## **Expected Results & Novelty**

*This section needs to be articulated on ONE PAGE ONLY.*

*what kind of results are you expecting from your proposal research methodology to solve the objectives you have mentioned? Elaborate on the novelty of your research methodology/objectives/hypotheses and how it can create a paradigm shift in the field. Please search for the keyword “paradigm shift” in google so you understand the terminology and perhaps what is really expected as a proposal here.*

**References**

- [1] Jia Deng, Wei Dong, Richard Socher, Li-Jia Li, Kai Li, and Li Fei-Fei. Imagenet: A large-scale hierarchical image database. In 2009 IEEE conference on computer vision and pattern recognition, pages 248–255. Ieee, 2009.