



# Triplanar Convolutional Neural Network Approach for Hippocampus Segmentation and Major Depressive Disorder Classification



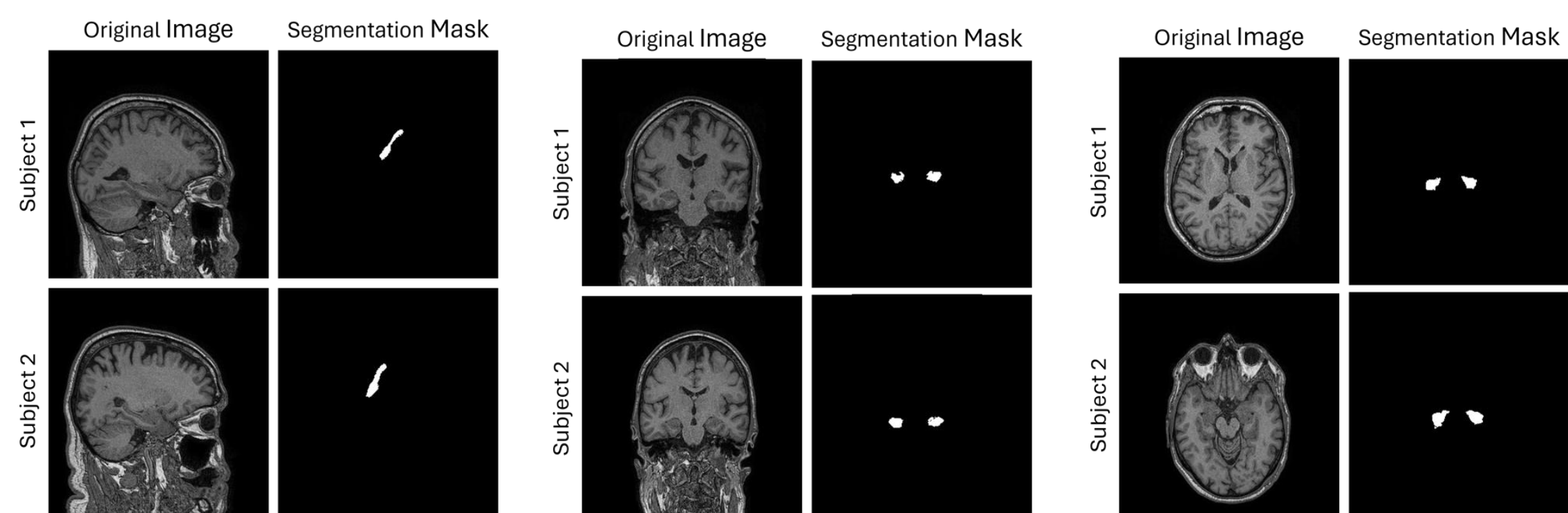
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## Introduction & Motivation

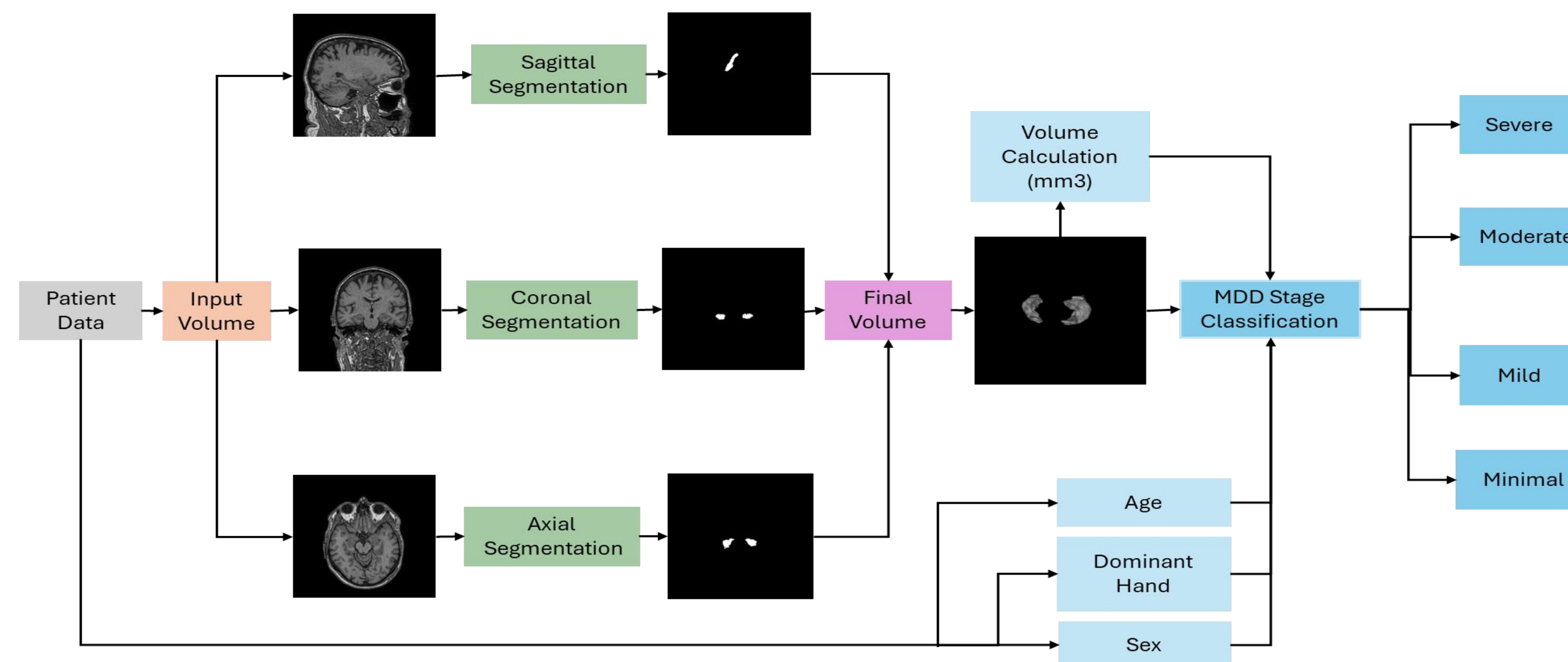
- Major depressive disorder (MDD) affects around 280 millions of people globally.
- Hippocampal volumetric alterations have been identified as a potential biomarker for MDD.
- Current methods for MDD diagnosis rely on self-assessment and clinical observation, lacking on quantitative data.
- Manual segmentation is the “gold standard” but has limitations.
- Convolutional Neural Networks offer accurate automated image segmentation, addressing challenges of manual methods.

## Datasets



- CC-359 Dataset:** T1-weighted volumes and masks from 359 subjects.
- Epileptic/Non-Epileptic Dataset:** 50 T1-weighted MRI scans with manual segmentation masks.
- SRPBS Open Dataset:** Data from 1,410 subjects with several disorder

## Methodology



- Model: Use of 2D U-Net architecture for hippocampal segmentation in axial, sagittal, and coronal orientations.
- Volume Calculation: Summing volumes of segmented voxels for hippocampus volume.
- MDD Classification: Volume analysis for MDD classification based on BDI-II scale: minimal, mild, moderate, and severe.

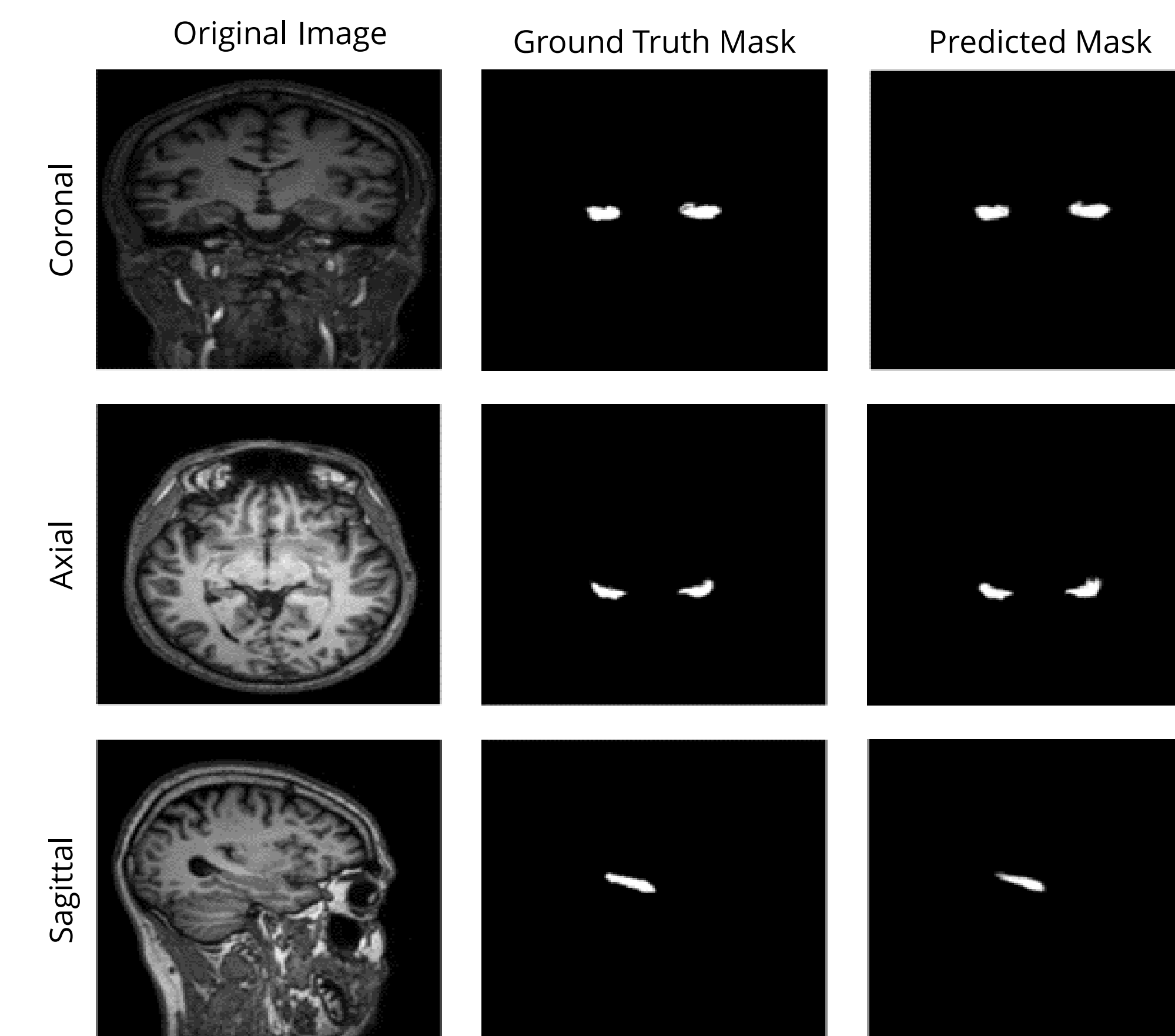
## Results

### Preliminary results for the hippocampal segmentation.

Quantitative segmentation results:

Plane	CC359 Dataset		Epileptic/ Non-Epileptic Dataset	
	Dice Score	Dice Loss	Dice Score	Dice Loss
Axial	89.97%	0.16%	75.47%	0.11%
Coronal	88.54%	0.19%	71.67%	0.23%
Sagittal	81.73%	0.14%	73.82%	0.18%

Visual Comparison of ground truth masks and predicted masks using the CC-359 Dataset:



## Conclusion

- Effective hippocampal segmentation using U-Net across three orientations.
- Preliminary results show promise for MDD diagnosis.
- Future work to include volumetric calculations, MDD stage classification and optimization for clinical application.
- Continued efforts to improve neuroimaging research in psychiatric disorders