Segmentation of Brain Tumor MRI Images Using Deep Learning

Abstraction

The human brain is susceptible to tumor development when cell division goes awry, forming abnormal clusters within or around the brain. These tumors, generically termed brain tumors, arise from uncontrolled cellular growth and can vary in severity.
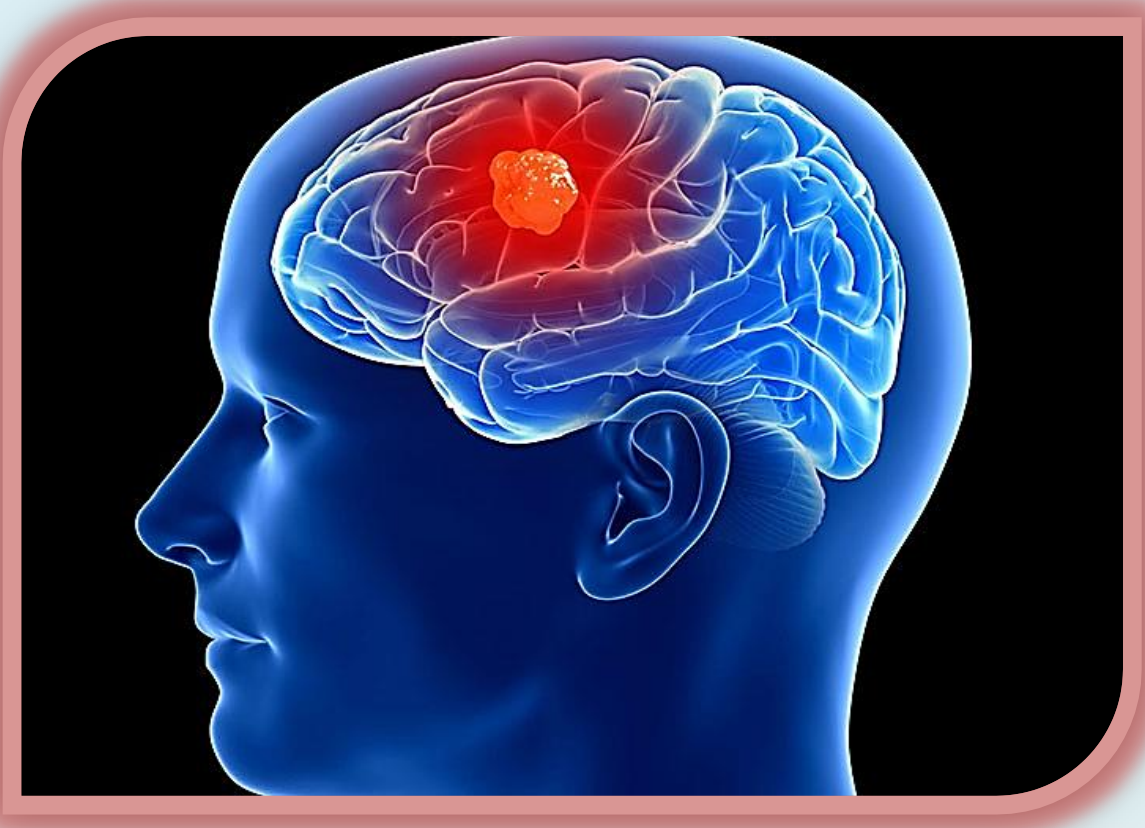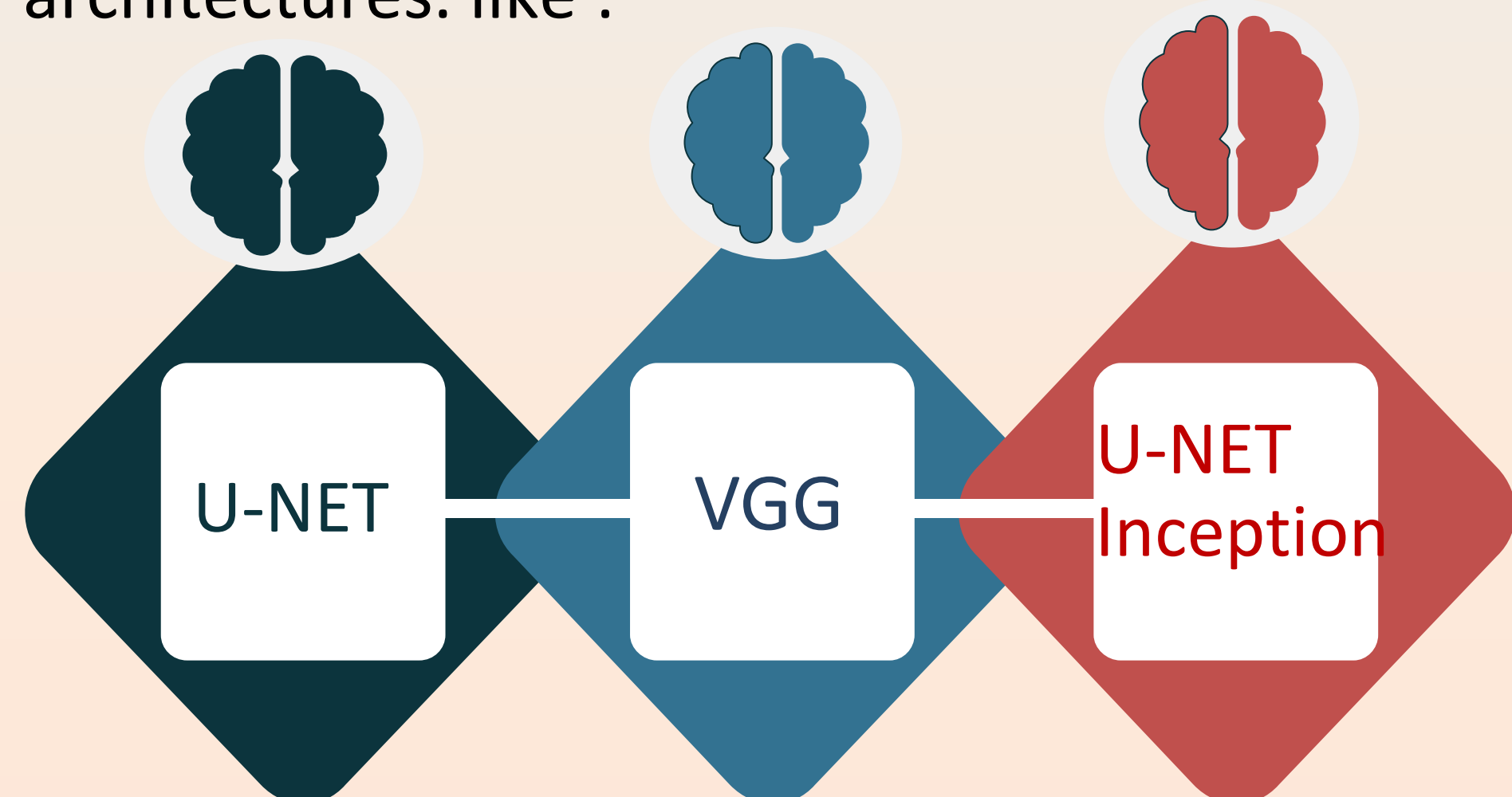
Figure 1 Brain tumor

Introduction

Brain tumor segmentation plays a critical role in medical imaging for accurate diagnosis and treatment planning .The objective of this project is to perform brain tumor segmentation on MRI images using different deep learning architectures. like :

U-NET VGG U-NET Inception

Literature Review

Inception Modules Enhance Brain Tumor Segmentation:

- U-Net with Intra-Tumoral Structures.
- U-Net with Glioma Sub-Regions
- 1.U-Net with Inception Modules and Intra-Tumoral Structures Objective
- 1.U-Net with Inception Modules and Glioma Sub-Regions Objective

Rigorous evaluation demonstrated significant improvements in tumor segmentation performance when integrating Inception modules into the U-Net architecture.

MRI Brain Tumor Segmentation Using U-Net:

The main objective was to develop an automated system to segment brain tumor images with minimal error using the U-Net algorithm. Apply U-Net for image segmentation to precisely identify and localize tumors.

Dataset Description

The dataset utilized comprises two distinct folders (images and masks), each containing 3064 PNG images. The images are grayscale and possess dimensions of 512x512 pixels, portraying MRI scans of the brain.
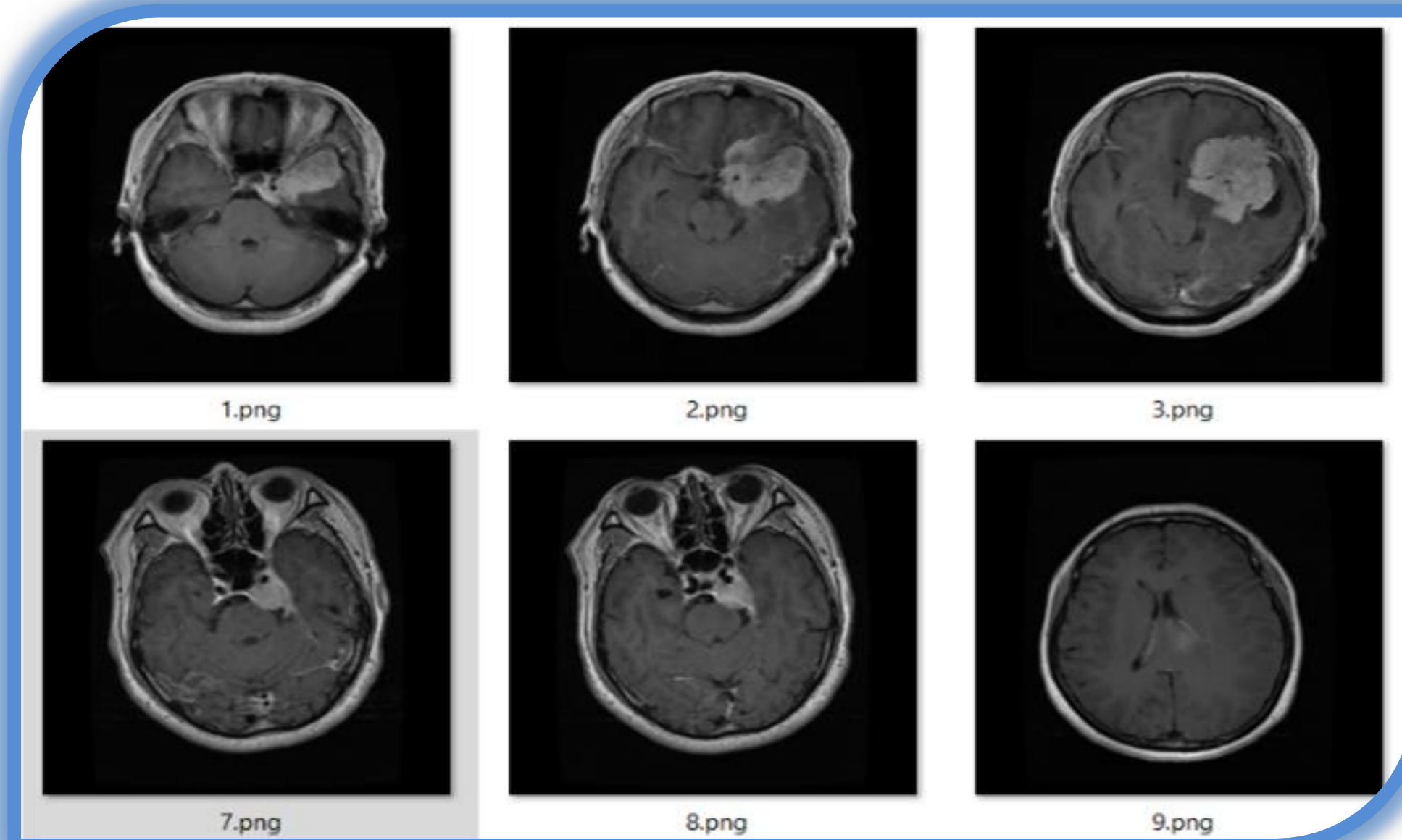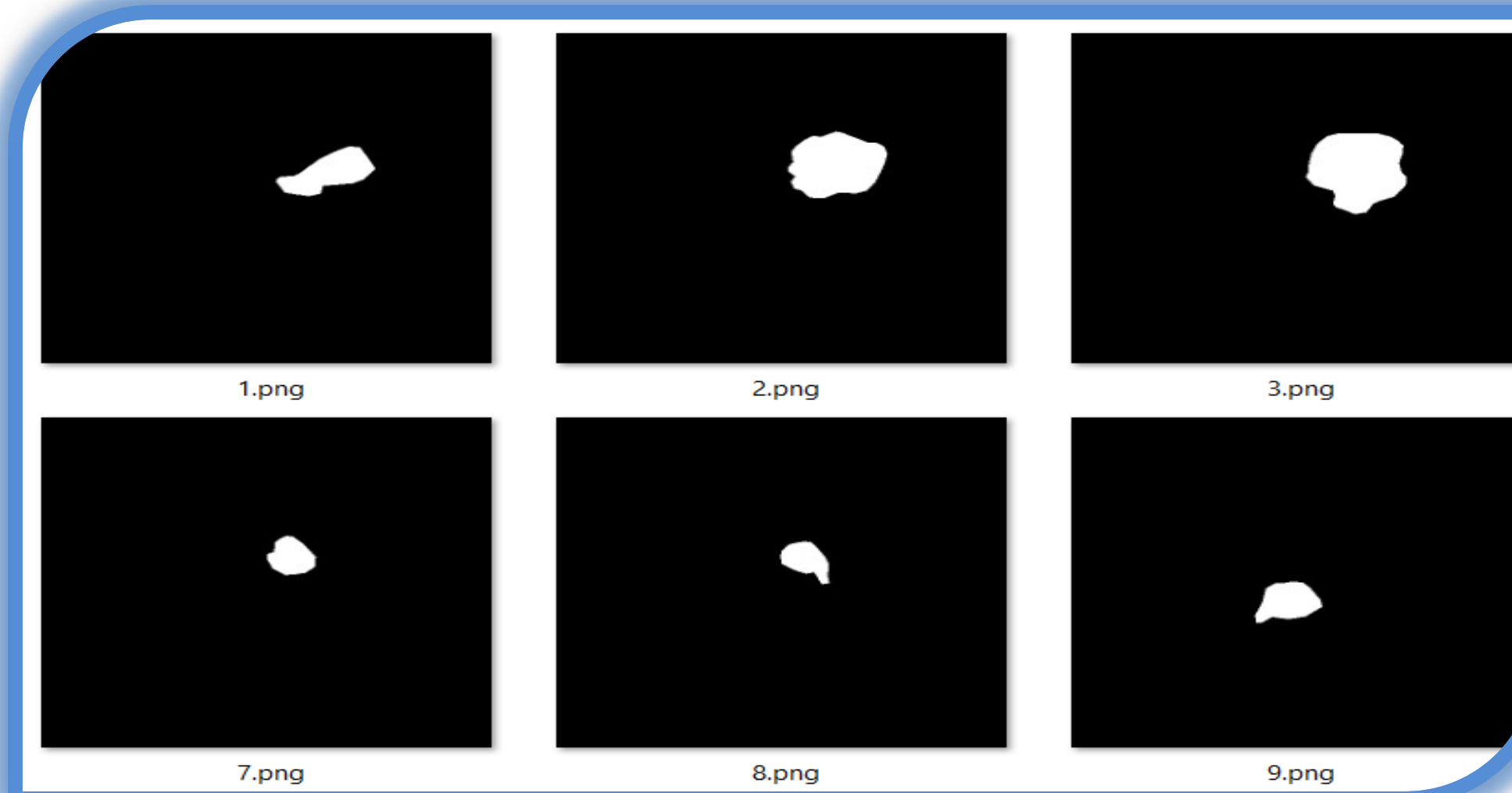
Figure 2 MRI Images
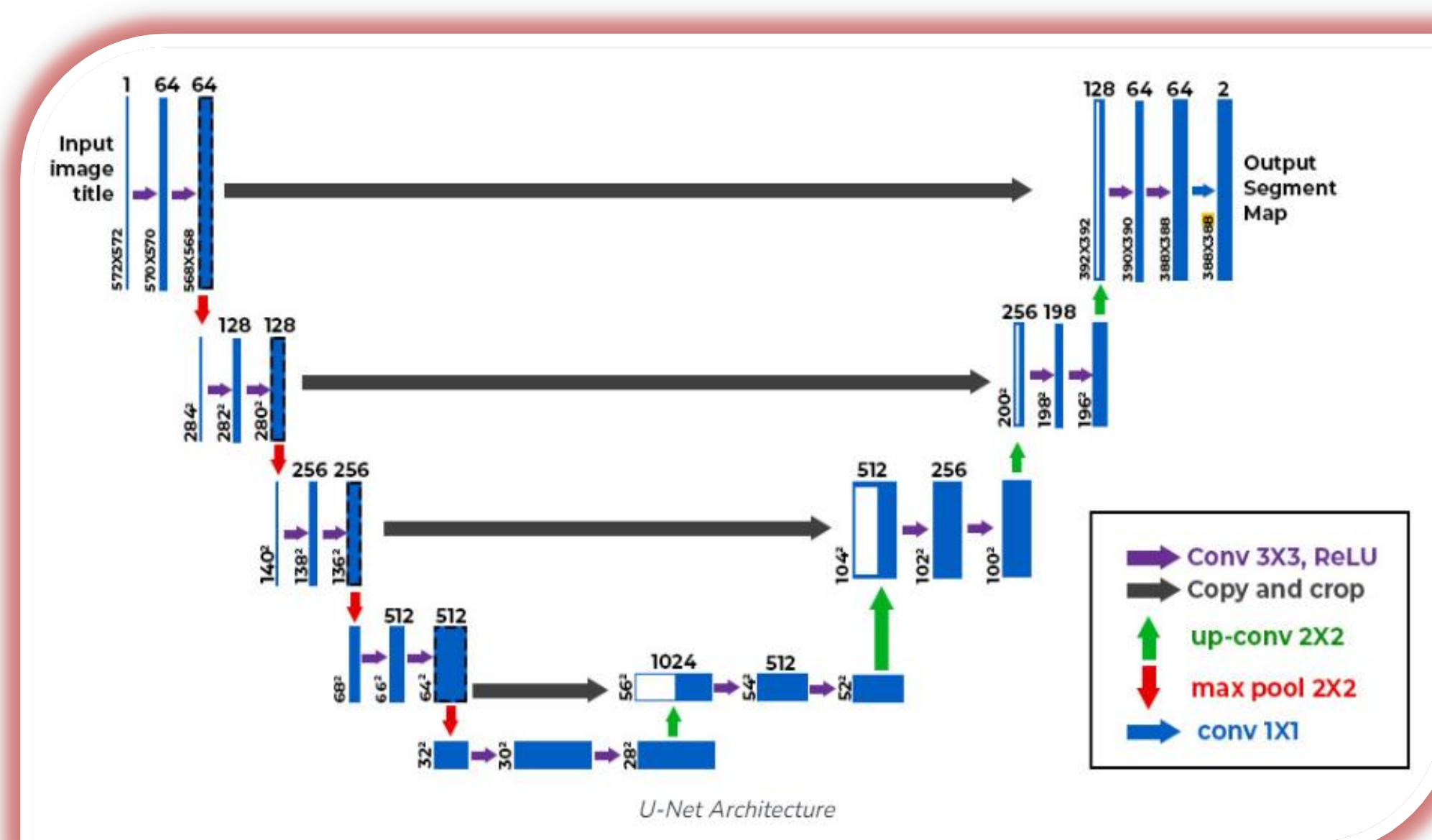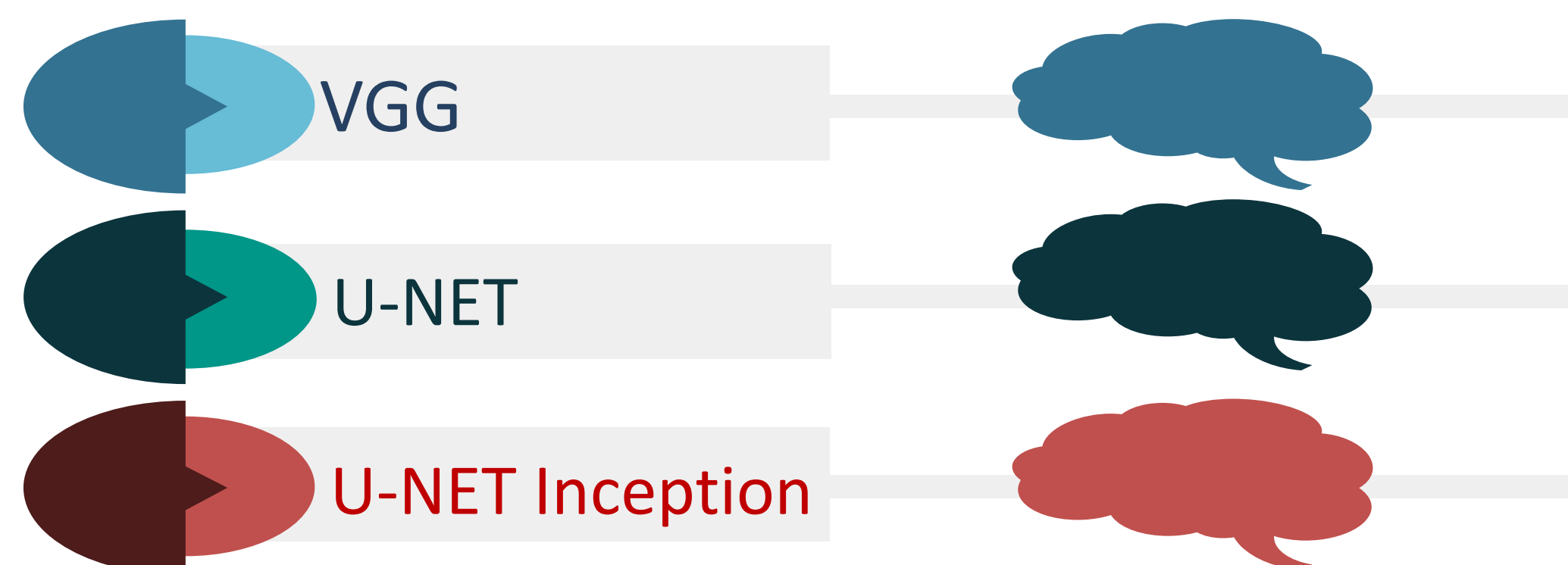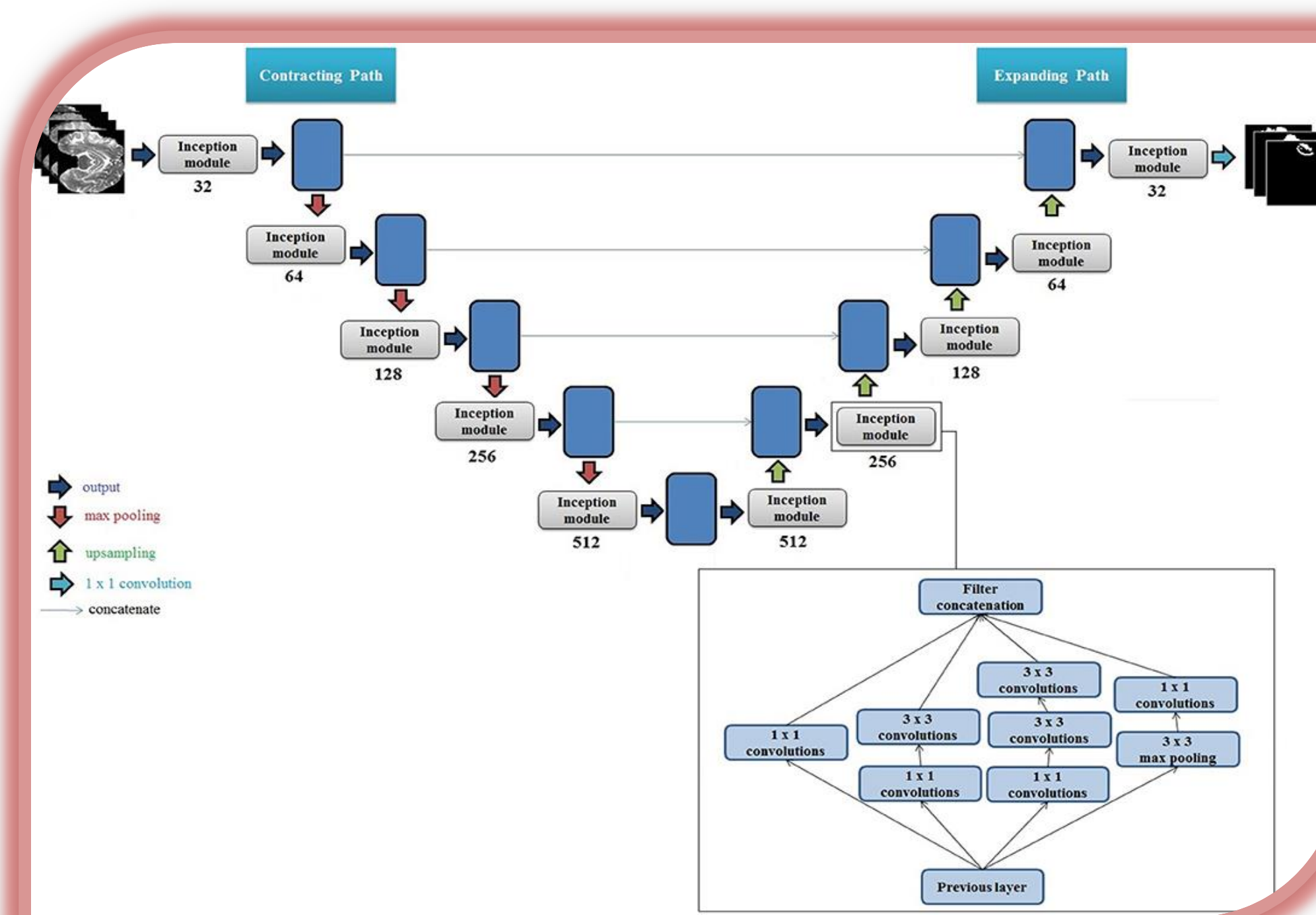
Figure 3 Masks

Methodology

VGG

U-NET

U-NET Inception

Figure 4 U-Net

Figure 5 Inception U-Net

Methodological Steps

Data Preprocessing

Model Implementation and Compilation

Training Procedure

Model Evaluation

Model Evaluation

98.42.%

U-Net

loss:0.55
Dice Coefficient:0.44

98.25%

Inception U-Net

Loss:0.651
Dice Coefficient:0.37
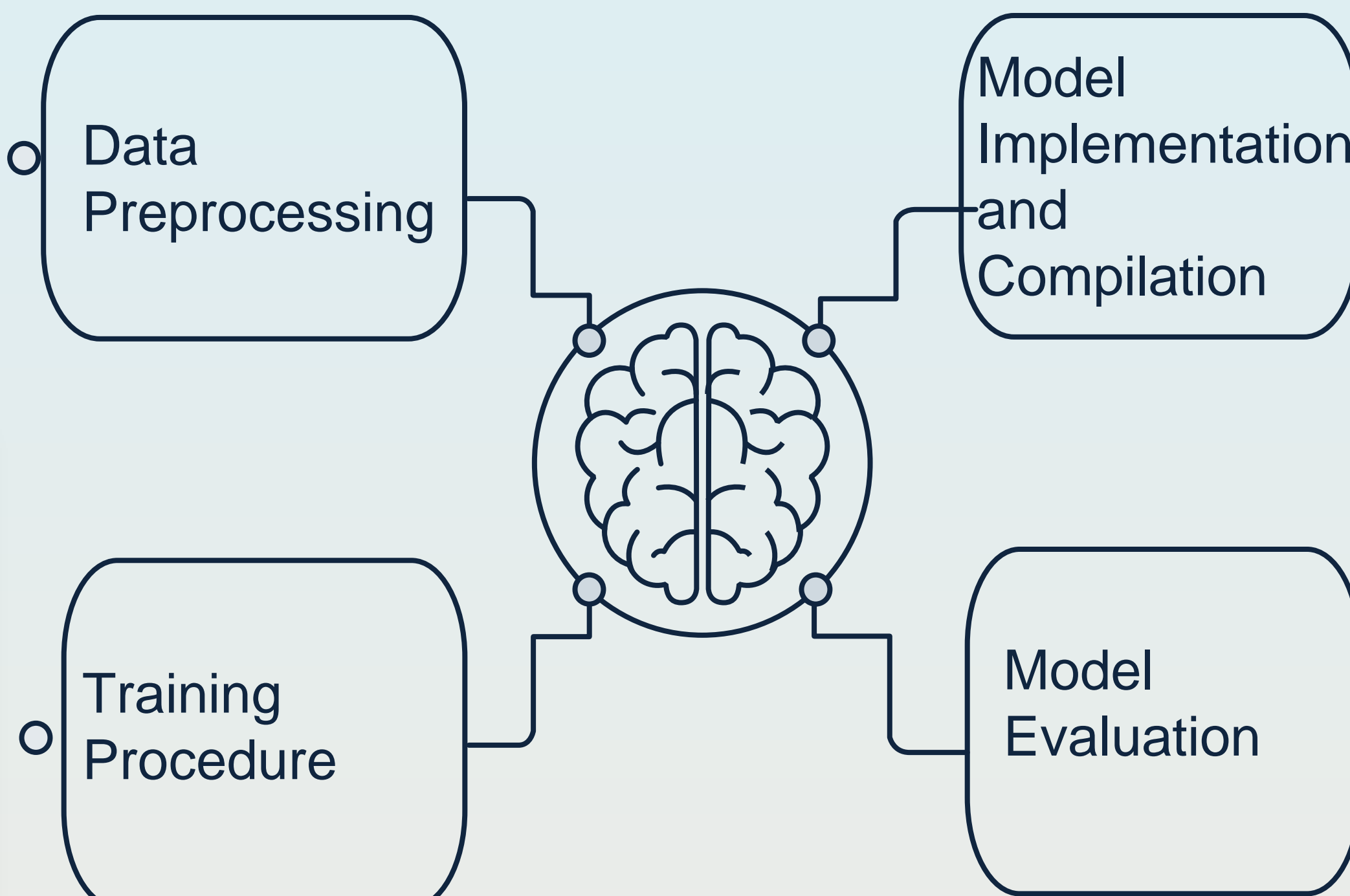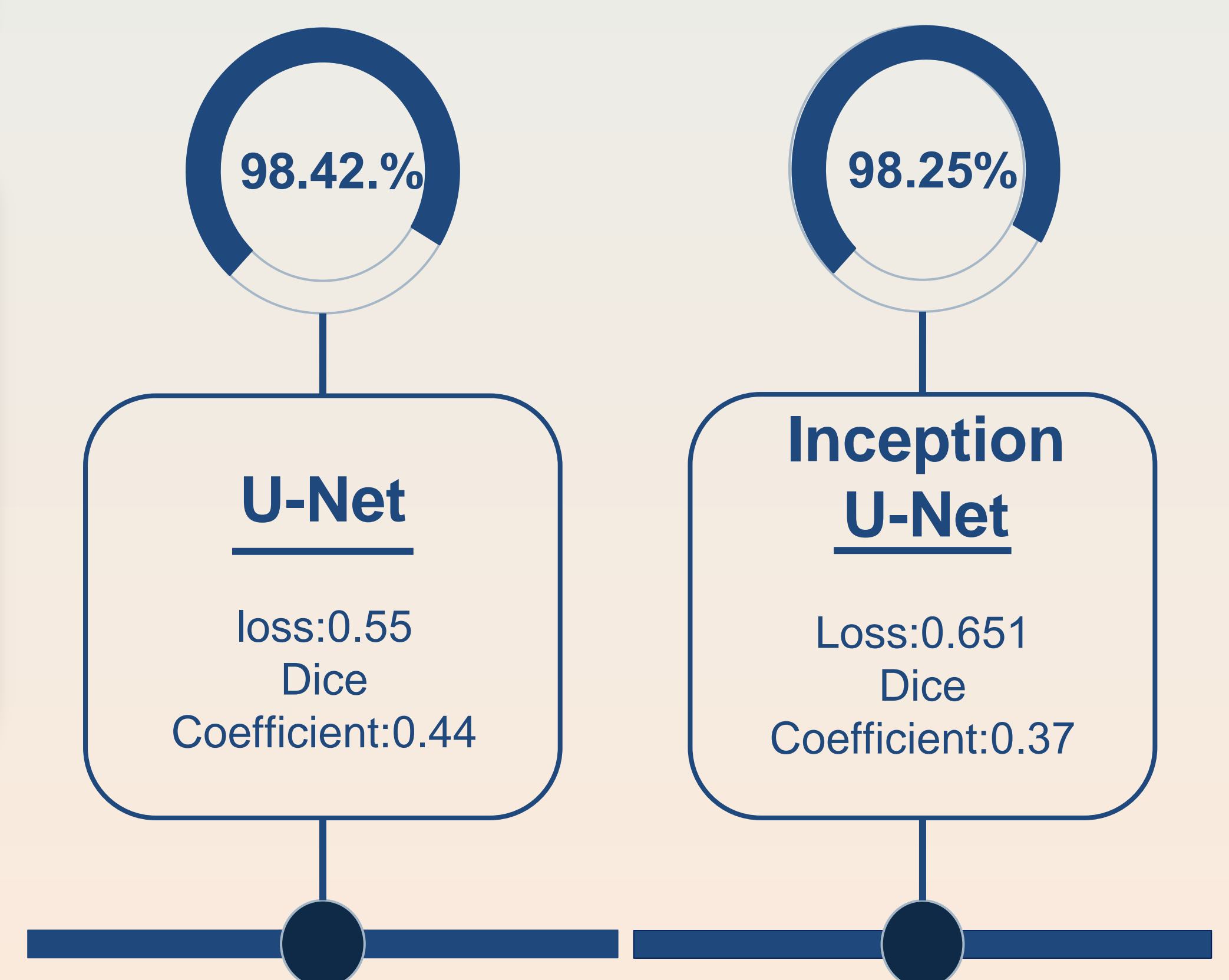
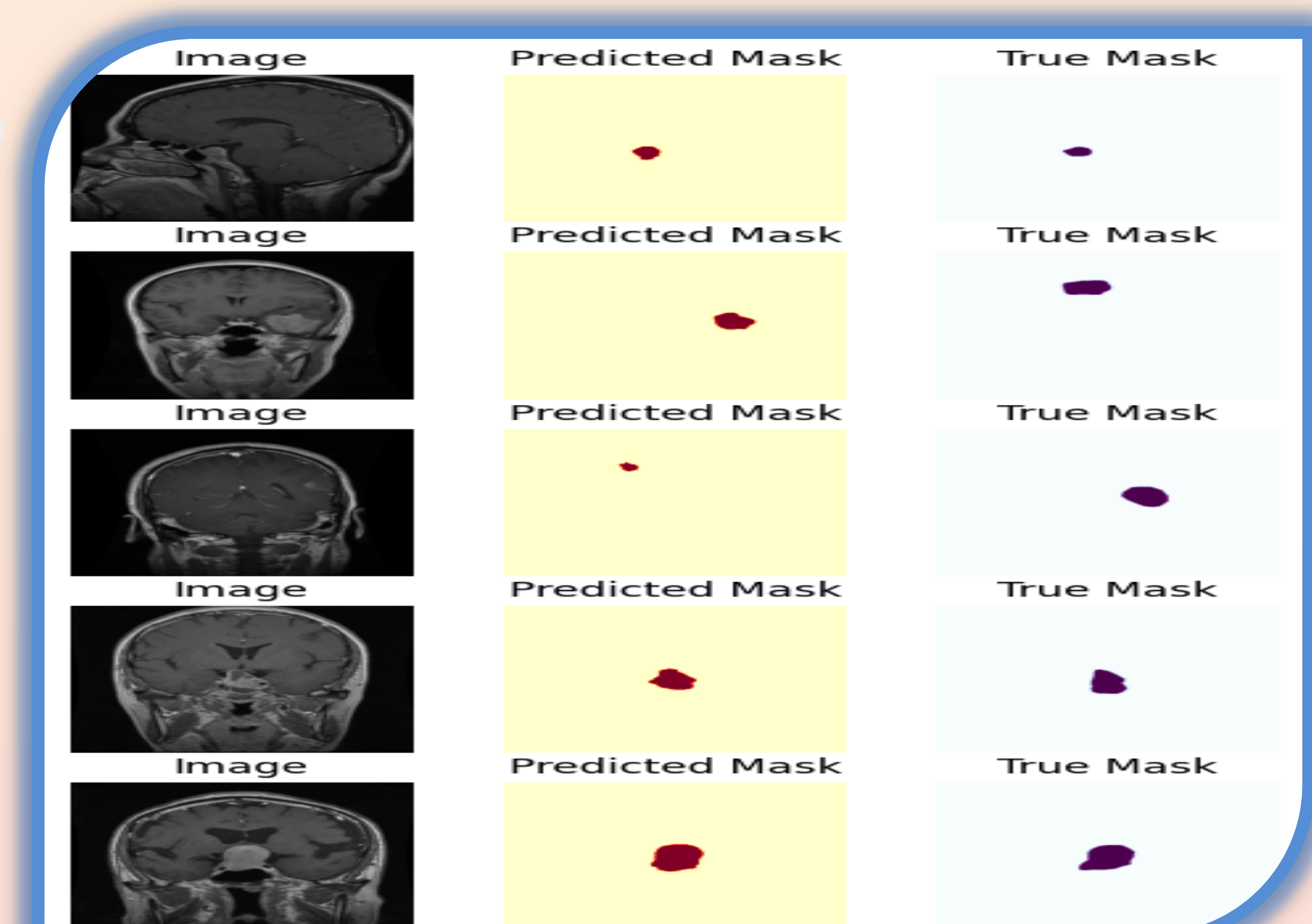## Sample Of Predicted and Actual Masks

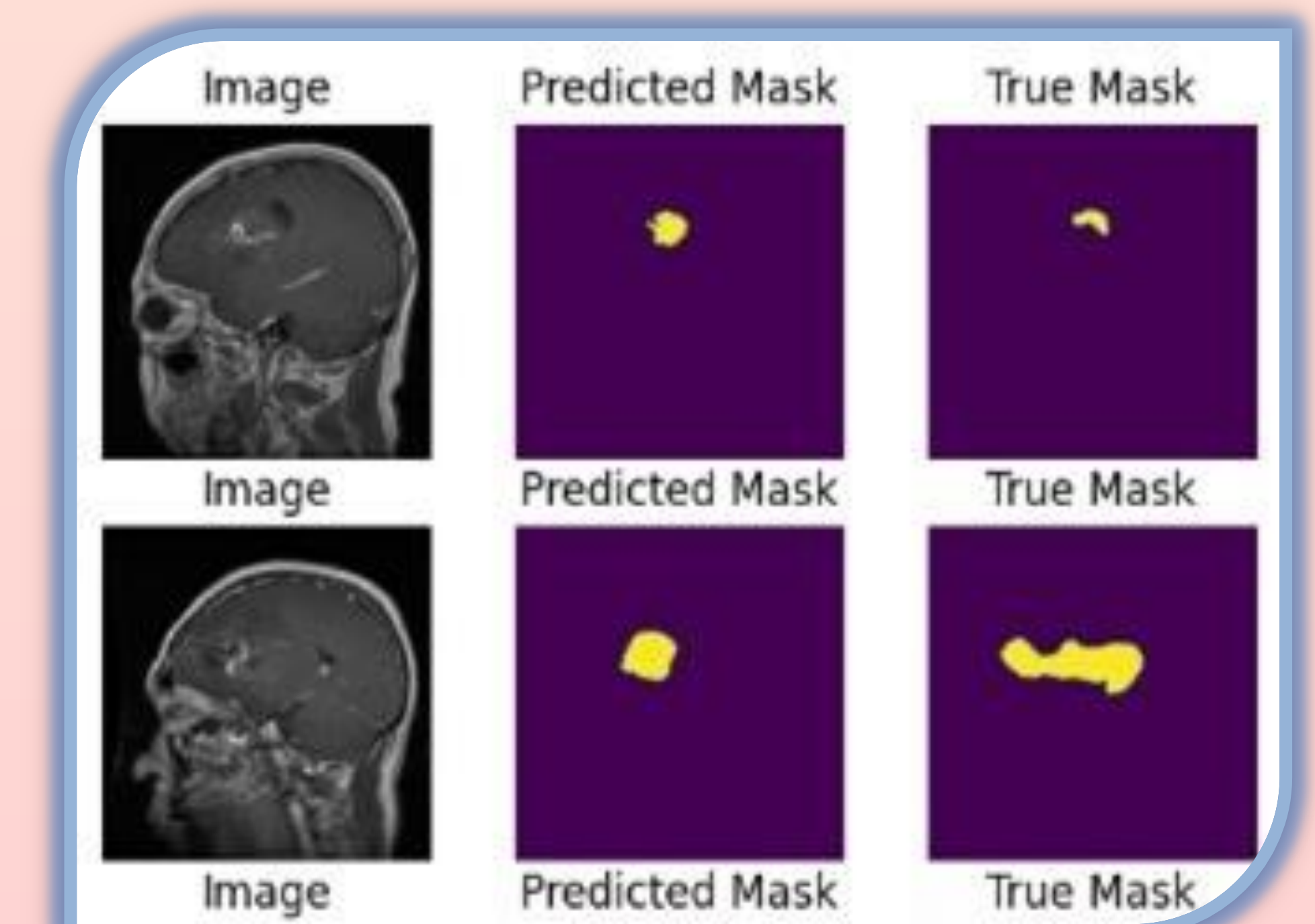Figure 6 Sample Of Predicted and Actual Masks For Inception U-Net

Figure 7 Sample Of Predicted and Actual Masks For U-Net

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