

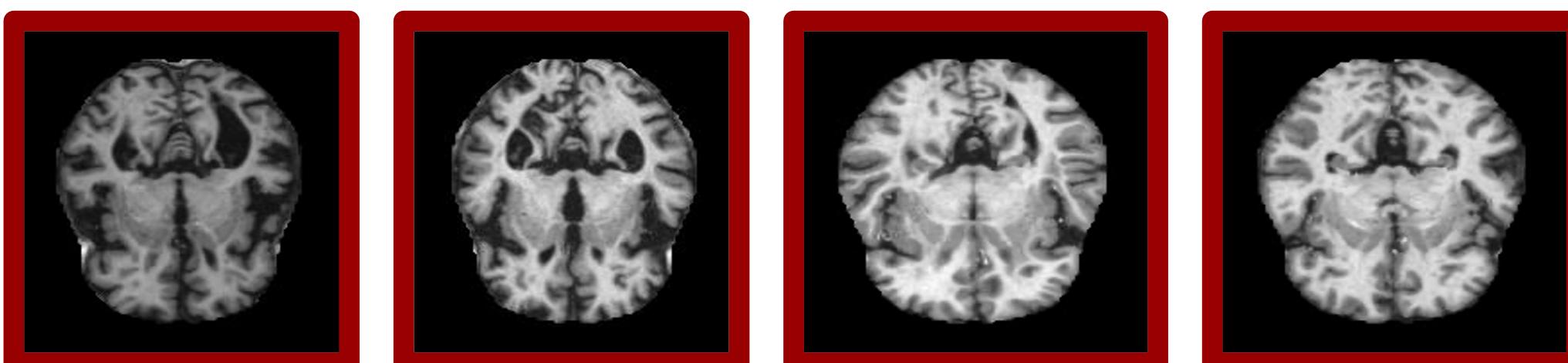


# Alzheimer's diagnosis using Attention-based Models

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## 1. Introduction

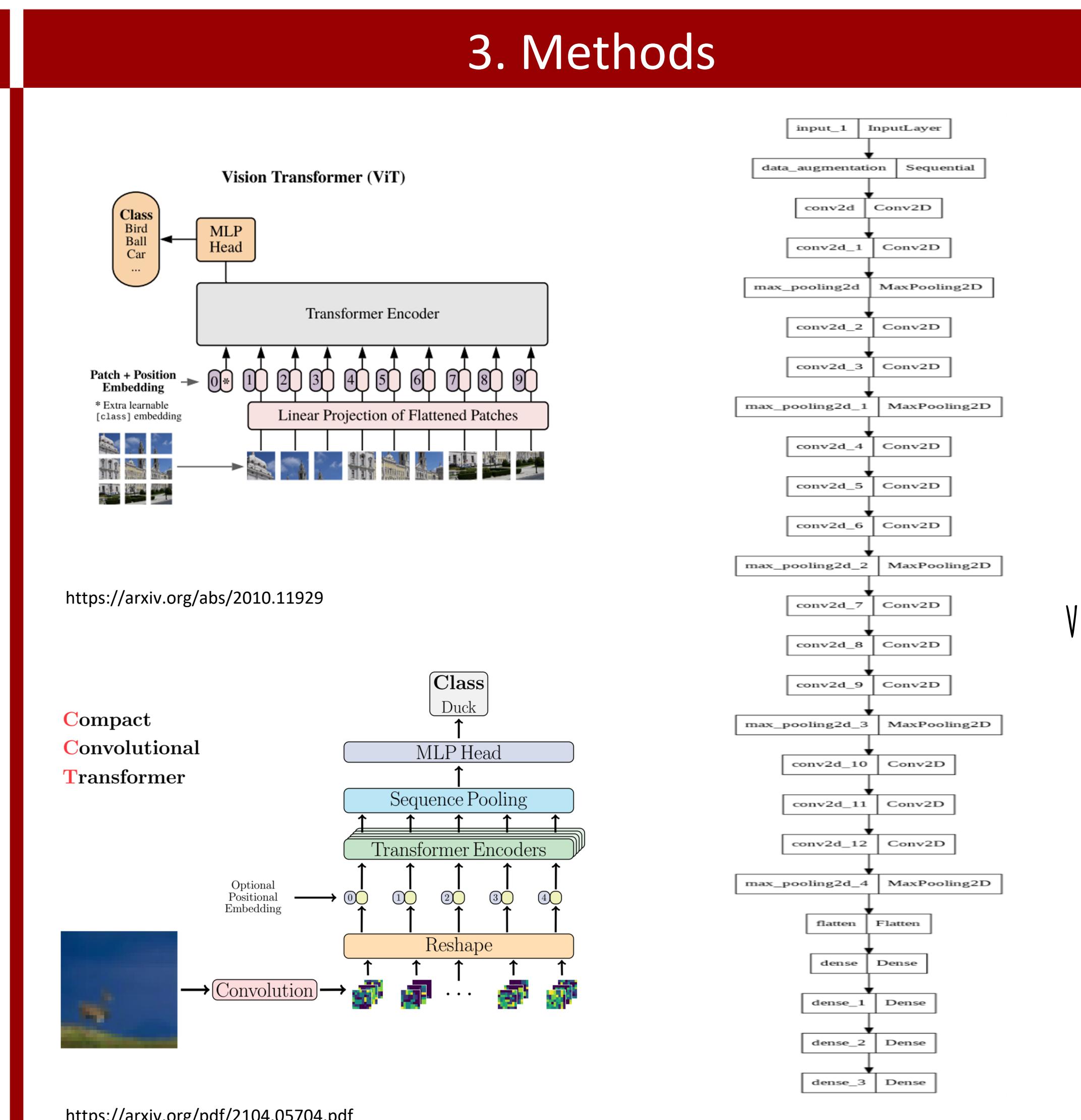
- Alzheimer's disease is a very devastating neurological disease which is caused as a result of abnormal built up of proteins in and around brain cells.
- Recently, transformers for computer vision have been widely used.
- **Attention mechanism** attempts to focus on the parts of the images that are useful for the goal.
- Using these methods, we have implemented 2 models **Vision Transformer and Compact Convolutional Transformers** to understand use of attention in detecting Alzheimer's.
- We also compare our results with the state of the art architectures like **VGGNet, ResNet, and AlexNet**.
- We classify images into 4 classes: Mildly Demented, Very Mildly demented, Non-demented, Moderate Demented.



## 2. Motivation

- Advancement of the medical diagnosis using advanced Computer Vision models
- Reducing the False positive and False negative rates in the medical diagnosis
- Attention models have been used to detect other diseases like Glaucoma.
- Using the attention mechanism to help model focus more on the problem areas than other irrelevant areas

## 3. Methods



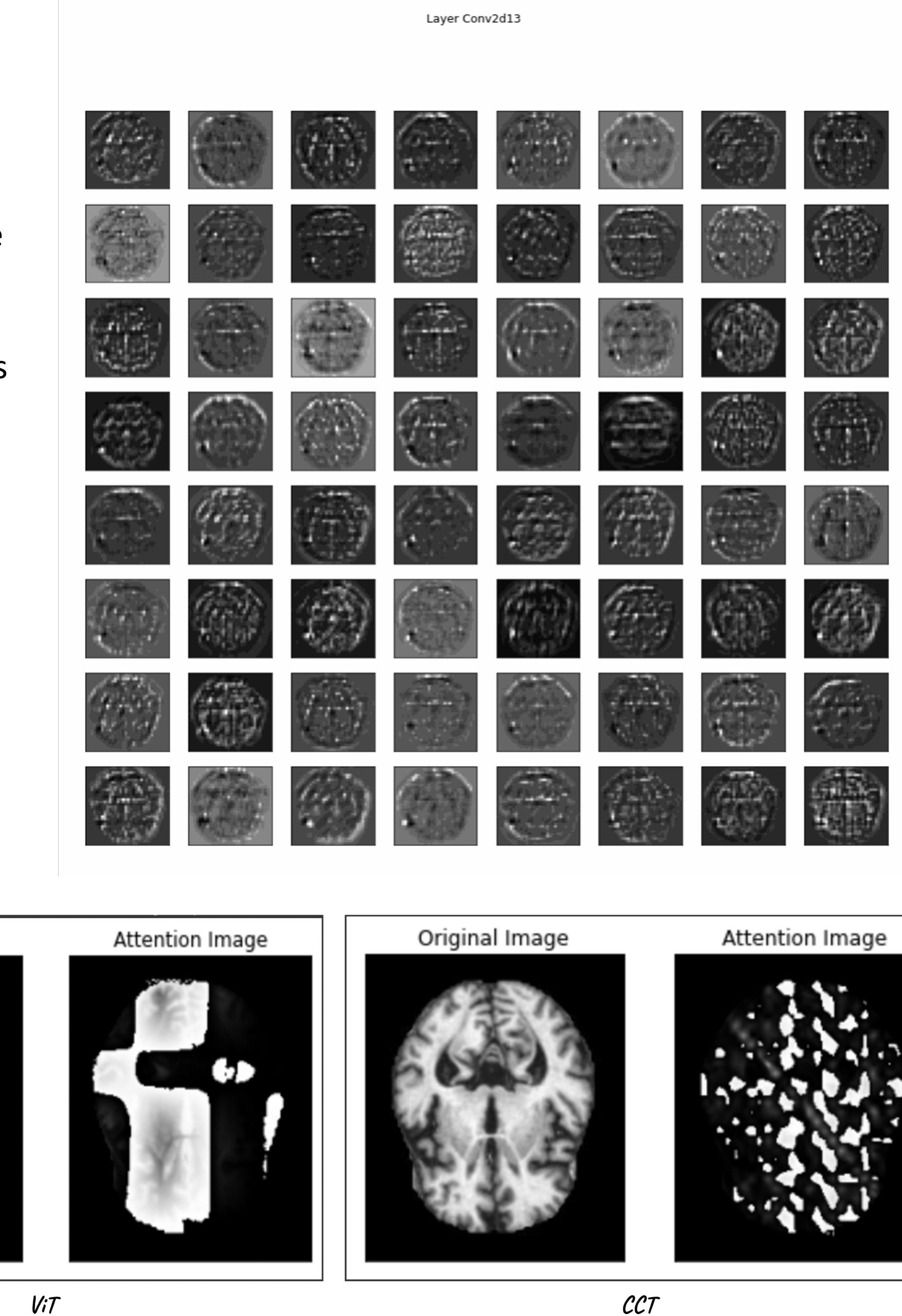
## 4. Experiments & Results

Model	Training Accuracy	Validation Accuracy	Training Loss	Validation Loss	Training Parameters
CCT	66.11%	59.19%	0.9007	1.0015	130 epochs, 64 batch size, 0.0001 learning rate
ViT	71.12%	55.9%	0.6373	0.9815	250 epochs, 32 batch size, 0.005 learning rate
VGGNet	98.32%	74.59%	0.0510	1.5493	50 epochs, 32 batch size, 0.0001 learning rate
VGGNet(pre-trained)	99.79%	69.27%	0.0670	0.9508	200 epochs, 0.0000001 learning rate
ResNet	100%	66.37%	4.2386x10e-9	3.74082	200 epochs, 0.001 learning rate
AlexNet	84.03%	63.17%	0.35	1.3373	200 epochs, 0.000001 learning rate

The above table gives **training accuracy, validation accuracy, accuracy loss and validation loss** for all 6 models.

All models use **Adam optimizer, Categorical cross-entropy for loss and categorical accuracy as metric**.

## 5. Results



The GIF to the right shows what the vgg model focuses on in the MRI image

The above image shows how the attention mechanism works and where it focuses on. It is observed that it was able to focus on some of the affected part of the brain.

## 6. Conclusion & Future Work

- Attention models require more data for better accuracy
- Currently, due to lack of data, our attention models have accuracy of 59.19% by CCT and 55.9% by ViT.
- VGGNet is giving the highest accuracy of 74.59%.
- We would like to extend this project on a larger dataset to conduct our research.

**THANK YOU**

