**MATERIALS AND METHOD USE FOR ACHIEVING BEST MODEL FOR BRAIN TUMOR PREDICTION**

To attain the optimal model for predicting brain tumours, we utilised specific materials and methods. Initially, since the dataset was already clean, we skipped the preprocessing phase. Our primary task was to convert the data into PyTorch format. This conversion marked the initial step towards training. We employed transfer learning, leveraging four pretrained models known for their excellence in image classification. Firstly, MobileNet yielded outstanding results with approximately 99% accuracy on the training data and 96% on the unseen test data. The associated training and validation losses were minimal, measuring 0.02 and 0.1, respectively. Moving on to ResNet, it also demonstrated commendable performance, achieving around 90% accuracy on training data and 80% on test data. The losses for this model remained consistently below. Similarly, EfficientNet\_B2 showcased promising results, boasting approximately 90% accuracy for training and 80% for testing. Notably, all associated losses were less than Finally, EfficientNet\_B0 performed well, achieving over 90% accuracy for both training and validation data. Additionally, I implemented RESNET50 independently, achieving impressive results with around 98% accuracy for training and 97% for testing. The associated losses were less than 0.5 for both training and testing phases.

**Summary**

1. **MobileNet:** Achieved 99% accuracy on training data and 96% on unseen (test) data, with minimal training and validation loss.
2. **ResNet and EfficientNet\_B2:** Performed well with around 90% accuracy on training data and 80% on test data, while maintaining losses below 1.
3. **EfficientNet\_B0:** Showed good performance with over 90% accuracy on both training and validation data.
4. **ResNet50:** This model achieved excellent accuracy of 98% on training data and 97% on test data, with low training and testing losses below 0.5.

| **Model Name** | **Training Loss** | **Training Accuracy** | **Testing Loss** | **Testing Accuracy** | **Time (seconds)** |
| --- | --- | --- | --- | --- | --- |
| EfficientNet\_B0 | 0.2368 | 0.9167 | 0.2461 | 0.9054 | 309.958 |
| EfficientNet\_B2 | 0.2763 | 0.9007 | 0.2685 | 0.8986 | 427.855 |
| MobileNet | 0.0263 | 0.9923 | 0.1065 | 0.9695 | 358.493 |
| RESNET50 | 0.0382 | 0.9874 | 0.0786 | 0.9755 | 576.923 |

Overall, the research found that transfer learning with pre-trained models can be effective for brain tumour prediction. While MobileNet yielded the best performance, the custom ResNet50 model also achieved impressive results, surpassing 97% accuracy on unseen data.