BRAIN TUMOUR SEGMENTATION

MULTIMODAL APPROACH TO TUMOR DETECTION IN NEUROIMAGING

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CONTENT

INTRODUCTION

- In the intricate realm of the human brain, the occurrence of cancerous growths, termed brain tumors, poses a grave threat to the intricate harmony of brain tissue.

- Medical imaging, particularly through Magnetic Resonance Imaging (MRI), serves as a pivotal tool in detecting and understanding brain tumors.

- Deep Transfer Learning emerges as a breakthrough, promising to enhance the precision and efficiency of brain tumor classification from MRI scans.

PROBLEM STATEMENT

There exists a pressing need for an advanced and automated diagnostic approach to classify brain tumors from MRI scans, overcoming the limitations of manual interpretation, ensuring swift and accurate identification, and ultimately contributing to timely and effective treatment strategies.

RESEARCH OBJECTIVES:

- Our primary aim is to investigate the transformative potential of Deep Transfer Learning in accurately classifying brain tumors.
- Conduct a detailed comparison of advanced deep transfer learning architectures, namely EfficientNetV2B0, InceptionV3, ResNet50, and DenseNet121.
- To improve the classification of brain tumor MRI images, we have used the feature concatenation model fusion technique.
- Our focus lies in elevating diagnostic precision and efficiency, aiming for a holistic understanding and accurate identification of brain tumors.

PROPOSED METHODOLOGY:

#1

Our methodology involves a meticulous comparison of four cutting-edge deep transfer learning models, leveraging their unique strengths in brain tumor classification.

#2

Our approach seamlessly integrates both classification and segmentation processes, offering a comprehensive understanding of brain tumor characteristics.

#3

The features learned by these models during the initial training are valuable and can capture general patterns in images.

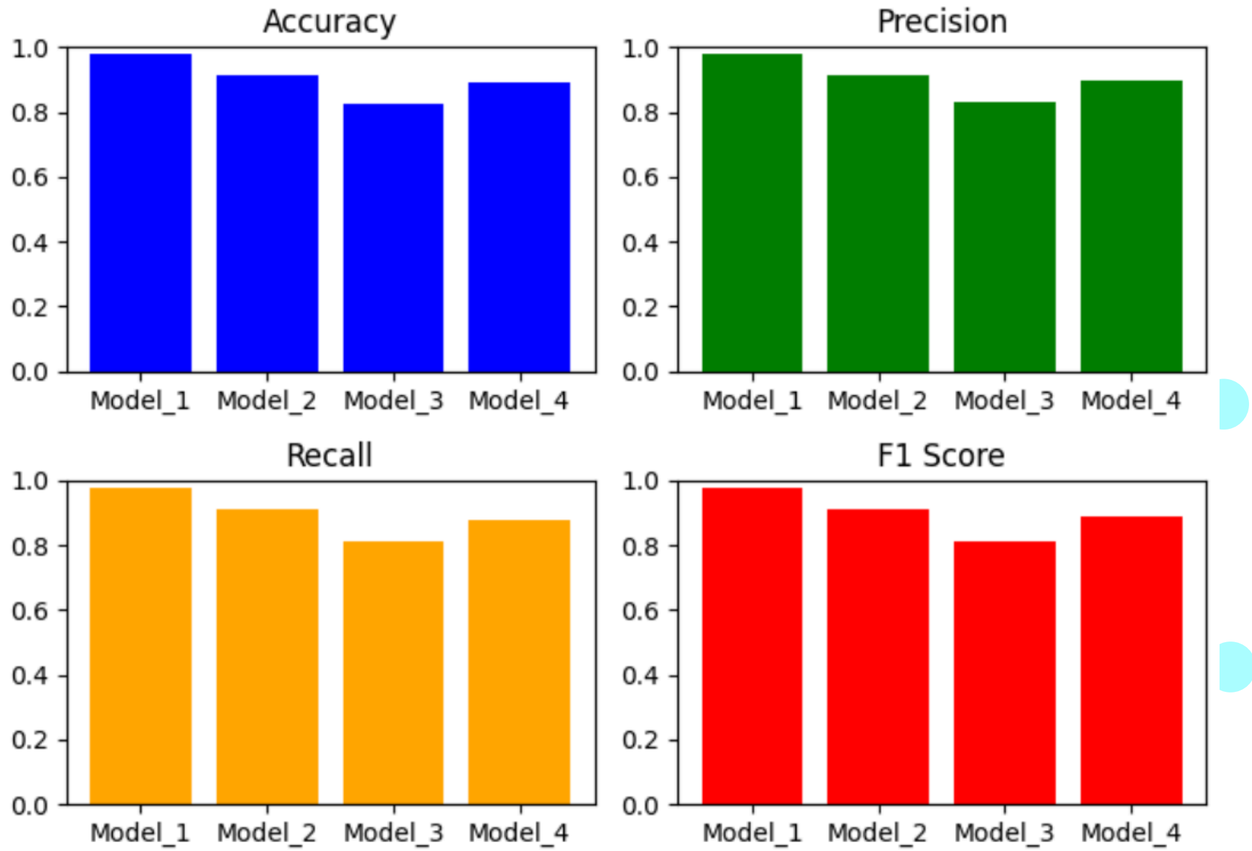
Performance Analysis

#1

Following extensive training and testing, our results include a comprehensive comparative analysis of model performance, revealing insights into the effectiveness of each architecture.

#2

Models are evaluated based on key metrics, including accuracy, precision, recall, and F1-score, providing a comprehensive assessment of their diagnostic capabilities.



Result

- To improve the classification of brain tumor MRI images, we used the feature concatenation model fusion technique. Specifically, after assembling and training the model on our dataset, we concatenated the layers of EfficientNetB0 and InceptionV3.

- Our model evaluation produced some outstanding performance metrics:

  Accuracy: 99.47%
  Precision: 99.47%
  Recall: 99.47%
  F1 score: 99.42%

FUTURE ENHANCEMENTS:

- Looking ahead, we envision developing a user-friendly diagnostic application for accessible and prompt brain tumor classification results.
- Continuous model optimization will be a key focus, ensuring adaptability to evolving datasets and technological advancements.
- Future iterations of the application will focus on real-time image processing, enabling swift and efficient brain tumor diagnosis.
- The application's ongoing relevance and efficacy will be guaranteed by constant improvement based on user experiences and changing medical requirements.
- Our plan involves integrating the application with telemedicine platforms, facilitating remote consultations and expanding access to specialized diagnostic services.

CONCLUSION:

- By incorporating architectures like EfficientNetV2B0, InceptionV3, ResNet50, and DenseNet121, we've demonstrated the potential for a unified model, enhancing diagnostic accuracy in the complex task of brain tumor categorization.

- EfficientNetV2B0 emerged as the top performer among the four models, surpassing InceptionV3, ResNet50, and DenseNet121. With an accuracy of approximately 97%, it not only excelled in overall accuracy but also demonstrated outstanding precision, recall, and F1-score metrics. EfficientNetV2B0's exceptional performance positions it as a leader in medical image analysis, suggesting broader applications.

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Thank You!