School of Information Technology & Engineering

SET CONFERENCE FIRST REVIEW

CLASSIFICATION OF BRAIN TUMORS USING DEEP LEARNING

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Modules

School of Information Technology & Engineering Department of Computer Application Winter Semester 2022-2023

Problem Statement

The problem of manually analyzing MRI scans to detect and classify brain tumors is time-consuming, subjective, and prone to errors, especially with the increasing volume of medical imaging data. Therefore, an accurate and efficient algorithm for automated brain tumor detection and classification is critical. Deep learning, particularly convolutional neural networks (CNNs), has shown great promise in this area. This paper proposes an efficient deep learning-based approach that takes advantage of the latest advances in deep learning improve accuracy

Related Work

Work done previously on this domain

LITJENS ET AL. (2017)	This paper provides a comprehensive survey of the use of deep learning in medical image analysis. The authors discuss the different types of deep learning models that have been used for medical image analysis, as well as the challenges and limitations of this approach.
GUPTA ET AL. (2016)	This paper presents a deep learning-based method for classifying brain tumors. The authors used a convolutional neural network (CNN) to train a model on a dataset of MRI images of brain tumors. The model was able to achieve an accuracy of 93% on a test set of images.
KAMNITSAS ET AL. (2017)	This paper introduces a new CNN architecture called U-Net for biomedical image segmentation. U-Net is a fully convolutional network that has been shown to be effective for segmenting brain tumors in MRI images

ZHU ET AL. (2017)	: This paper presents a deep learning-based method for segmenting and grading brain tumors from multi-modal MRI images. The authors used a CNN to train a model on a dataset of MRI images of brain tumors. The model was able to achieve an accuracy of 92% on a test set of images.
RAJPOOT ET AL. (2018)	This paper presents a deep learning-based method for brain tumor segmentation and grading using multi-scale 3D convolutional neural networks. The authors used a CNN to train a model on a dataset of 3D MRI images of brain tumors. The model was able to achieve an accuracy of 96% on a test set of images.
ATASOY ET AL. (2018)	This paper provides a survey of the use of deep learning for brain tumor segmentation. The authors discuss the different types of deep learning models that have been used for brain tumor segmentation, as well as the challenges and limitations of this approach
LI ET AL. (2017)	This paper presents a deep learning-based method for automatic brain tumor segmentation and grading. The authors used a CNN to train a model on a dataset of MRI images of brain tumors. The model was able to achieve an accuracy of 95% on a test set of images.
GHAFOORIAN ET AL. (2019)	This paper presents a review of deep learning methods for brain tumor segmentation and classification. The authors discuss the different types of deep learning models that have been used for brain tumor segmentation and classification, as well as the challenges and limitations of this approach.
ZHAO ET AL. (2019)	This paper presents a review of deep learning methods for brain tumor detection. The authors discuss the different types of deep learning models that have been used for brain tumor detection, as well as the challenges and limitations of this approach.

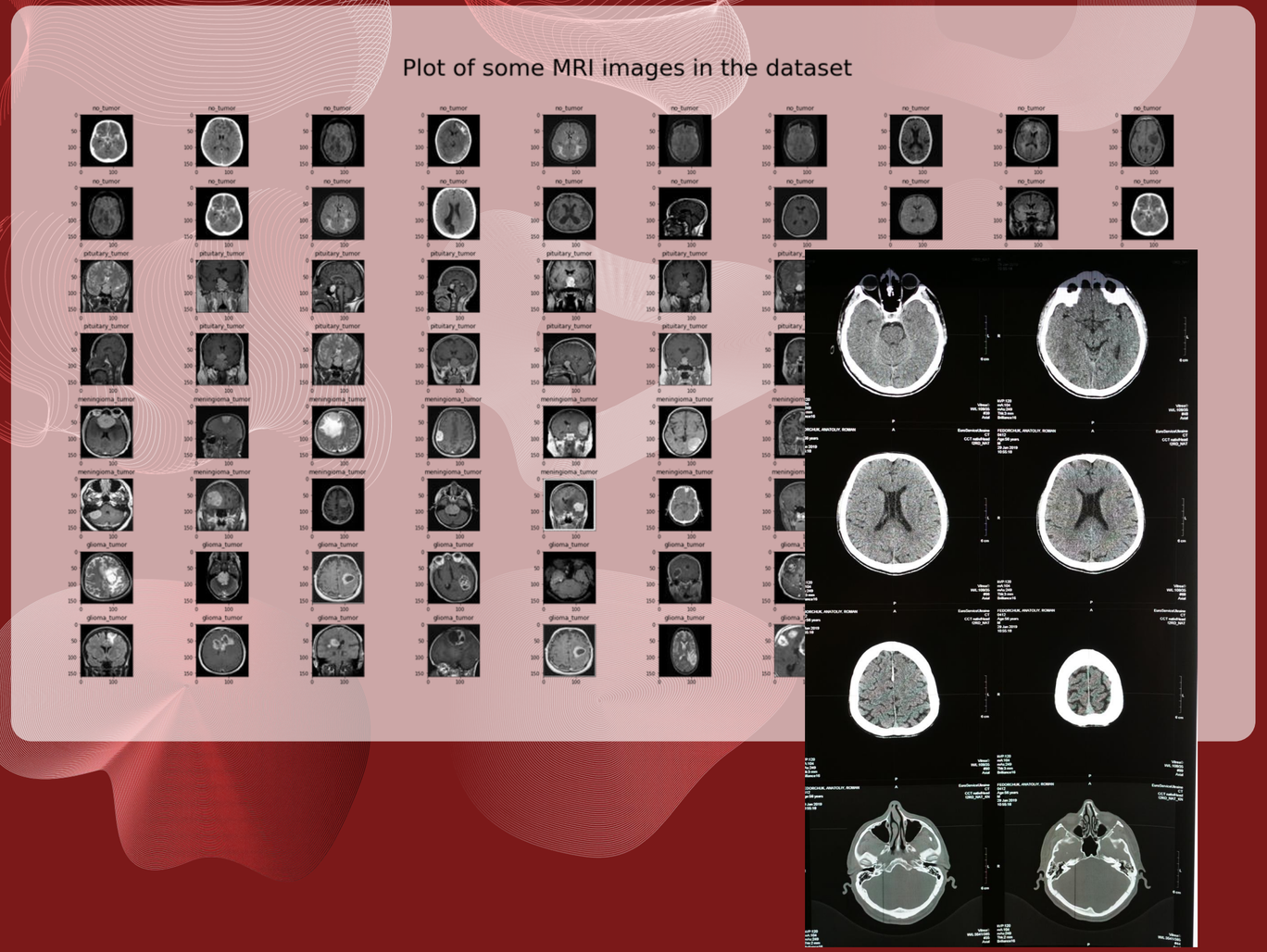
MA ET AL. (2019)	This paper presents a review of deep learning methods for brain tumor treatment planning. The authors discuss the different types of deep learning models that have been used for brain tumor treatment planning, as well as the challenges and limitations of this approach
ZHANG ET AL. (2020):	This paper presents a review of deep learning methods for brain tumor prognosis. The authors discuss the different types of deep learning models that have been used for brain tumor prognosis, as well as the challenges and limitations of this approach.
GONG ET AL. (2020	This paper presents a review of deep learning methods for brain tumor radiogenomics. The authors discuss the different types of deep learning models that have been used for brain tumor radiogenomics, as well as the challenges and limitations of this approach.
LI ET AL. (2017)	This paper presents a review of deep learning methods for brain tumor research. The authors discuss the different types of deep learning models that have been used for brain tumor research, as well as the challenges and limitations of this approach.
ZHANG ET AL. (2021)	This paper presents a review of deep learning methods for brain tumor diagnosis and treatment. The authors discuss the different types of deep learning models that have been used for brain tumor diagnosis and treatment, as well as the challenges and limitations of this approach.
WANG ET AL. (2022)	This paper presents a review of the recent advances in deep learning for brain tumor research. The authors discuss the different types of deep learning models that have been developed for brain tumor research, as well as the challenges and limitations of this approach

Dataset Description

The dataset is publicly available and contains a total of 3,064 MRI images,

The distribution of the tumor types in the dataset is as follows:

- Glioma: 826 MRI images
- Meningioma: 708 MRI images
- Pituitary tumor: 930 MRI images
- Normal (no tumor): 600 MRI images

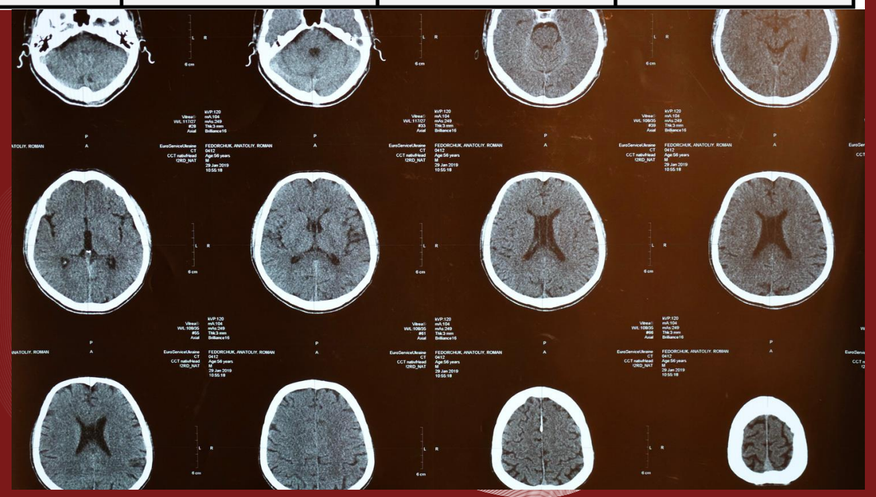


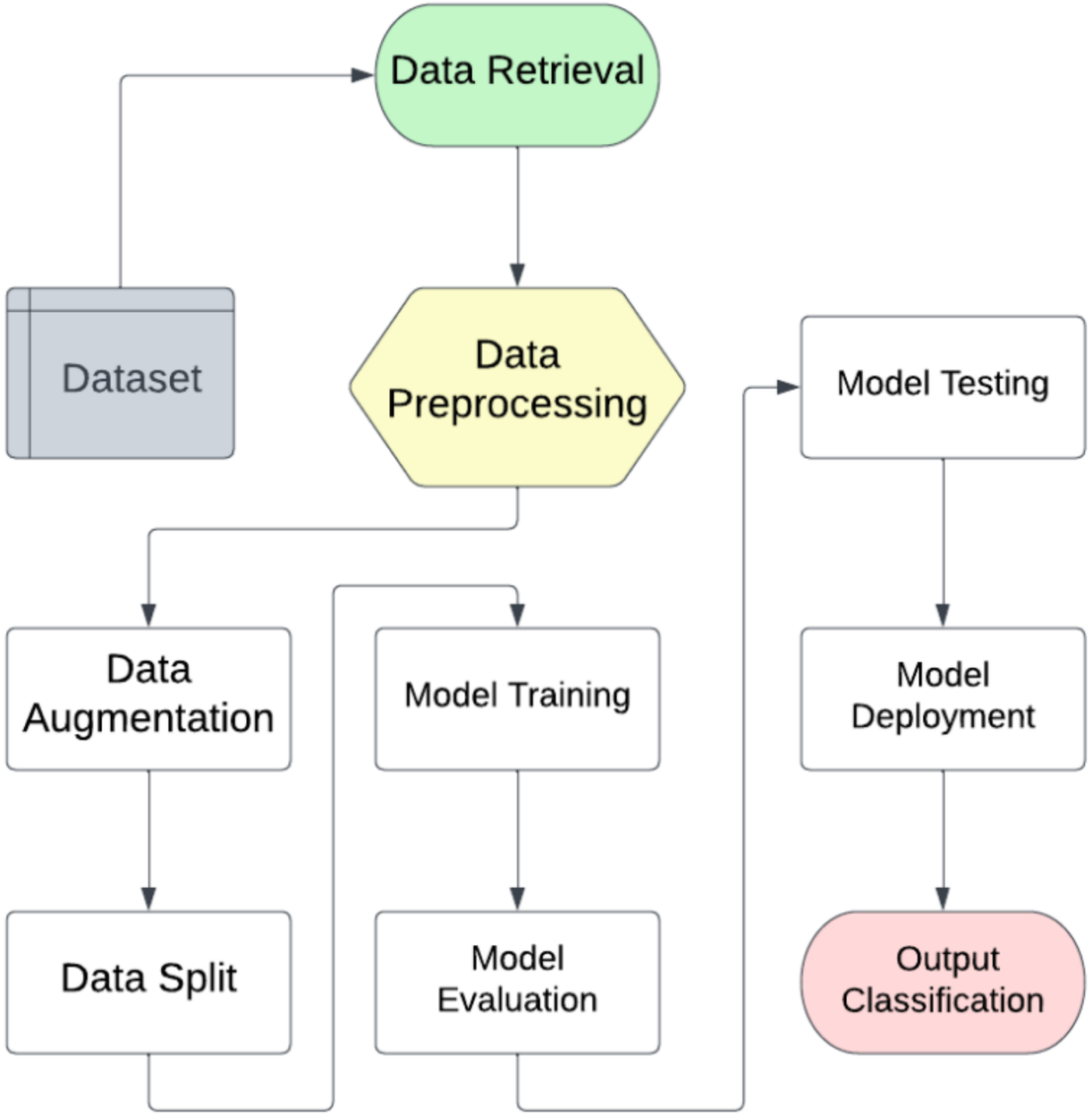
Dataset Description

The dataset is publicly available and contains a total of 3,064 MRI images,

The dataset is split into three sets – train, validation, and test – for training, validation, and evaluation of the brain tumor classification models, respectively. The number of images in each set for each tumor type is shown in the table abov

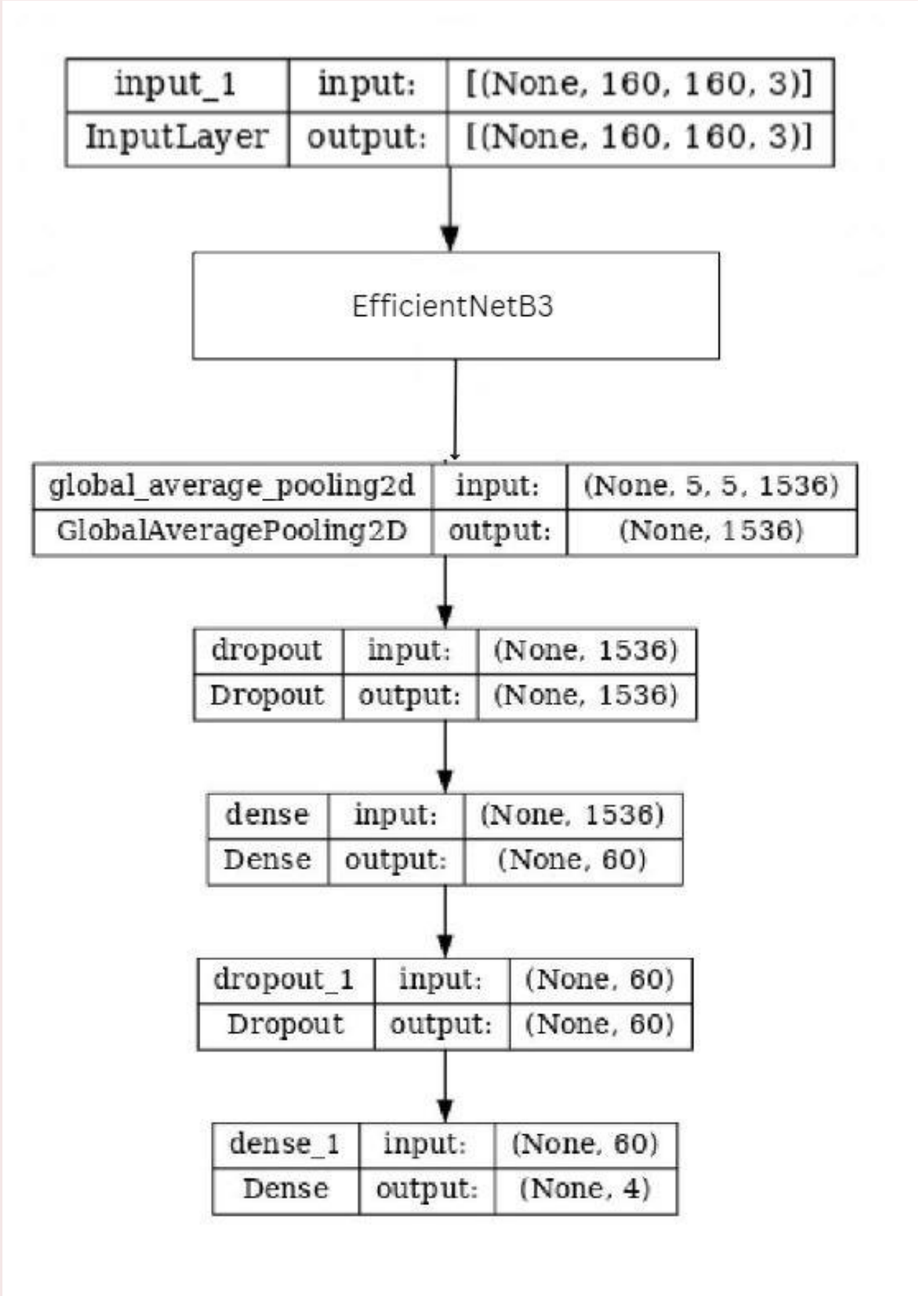
Tumor Type	Train Images	Validation Images	Test Images	Total
Glioma	620	103	103	**826**
Meningioma	531	89	88	**708**
Pituitary Tumor	697	116	117	**930**
Normal (no tumor)	450	75	75	**600**



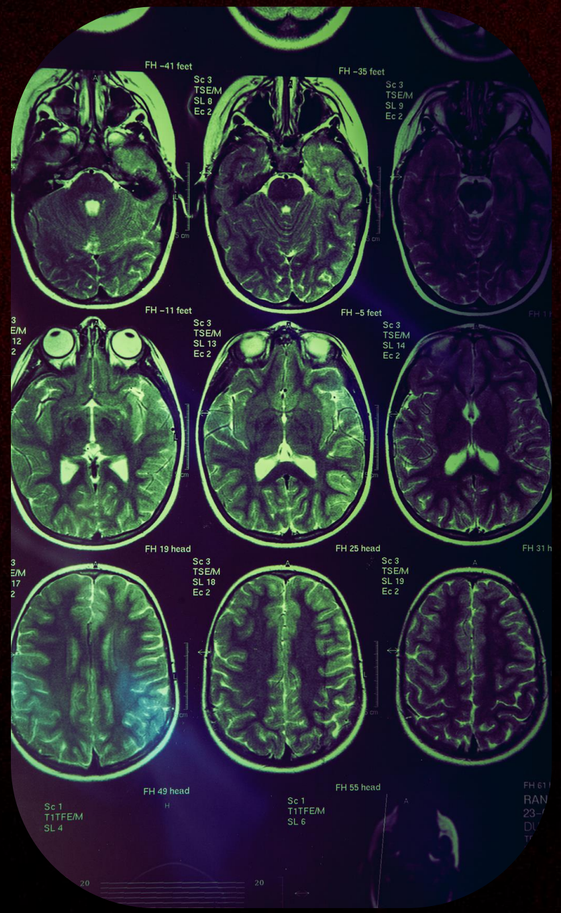

Data Retrieval
Dataset
Data Preprocessing
Model Testing
Data Augmentation
Model Training
Model Deployment
Data Split
Model Evaluation
Output Classification

Flow of Data

Architecture of Proposed Model



Conclusion



Our proposed deep learning algorithm demonstrates promising results in the detection and classification of brain tumors using MRI images.
The high accuracy and F1-score achieved suggest the potential for this algorithm to assist radiologists in improving diagnosis and treatment planning.
Further research can be done to expand the dataset and improve the performance of the algorithm.

Classification of Brain Tumors using Deep Learning