DETECTION OF LUNG CANCER TYPES USING CT SCANS

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Thesis report submitted in partial fulfillment of the requirements for the degree Master of Science in Computer Science specialization in Data Analytics and Engineering

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DECLARATION

I declare that this is my own work, and this thesis/dissertation does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other University or Institute of higher learning and to the best of my knowledge and believe it does not contain any material previously published or written by another person except where the acknowledgement is made in the text. I retain the right to use this content in whole or part in future works (such as articles or books)

Signature: Nimesha Amarasinghe Date: 23.09.2023

The above candidate has carried out research for the master's thesis under my supervision. I confirm that the declaration made above by the student is true and correct.

Name of the supervisor: Dr. Thanuja D. Ambegoda

Signature: Date: 23.09.2023

ABSTRACT

Lung cancer is a devastating global health issue that can be fatal if not detected early. To increase the chances of successful treatment and prevent the loss of lives, doctors need to identify the type, which the lung cancer belongs to. Currently, CT scans are commonly used in medical practice to detect and diagnose lung tumors. However, implementing deep learning models to identify the lung cancer types poses a significant challenge. Because acquiring many medical images for each type of lung cancer can be difficult.

The effectiveness of deep learning algorithms which were implemented for image recognition relies on the diversity of data samples. However, creating a comprehensive dataset of significant size requires a significant amount of human effort for manual labeling, which makes it a time-consuming process. The challenge of requiring a large amount of data samples for each category in traditional deep learning models was addressed in this research by implementing a prototypical network, which is a few-shot learning technique. This method requires only a few samples per category, and it was used in conjunction with a pre-trained model to extract features from lung CT scans. The accuracy of the model was analyzed based on the number of samples per category.

Overall, the results of the study demonstrate that implementing a prototypical network for lung cancer type detection is feasible. Human interpretation of medical images can vary among different medical professionals. Therefore, this approach can act as a decision support tool for medical professionals which makes it more accessible and cost-effective.

KEYWORDS: Prototypical Network, Lung Cancer, Few Shot Learning, Segmentation, VGG16

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

CAD: Computer Aided Diagnosis

CNN: Convolution Neural Network

PET: Positron Emission Tomography

DICOM: Digital Imaging and Communication in Medicine

FSL: Few-shot Learning.

MRI: Magnetic Resonance Imaging

TCIA: The Cancer Imaging Archive