**PROSPRED REPORT/DOCUMENTATION**

NAME: DOKU-AMPONSAH NANA YAA ADOMAA

DATE: 29TH MAY, 2024.

**TITLE: PREDICTING PROSTATE CANCER IMAGE CLINICAL SIGNIFICANCE USING DEEP LEARNING MODEL WITH RESNET ARCHITECTURE**

**ABSTRACT**

**INTRODUCTION**

Prostate cancer is one of the most common types of cancer among men worldwide, and early detection and accurate diagnosis are crucial for effective treatment and improved patient outcomes. Traditional diagnostic methods, such as prostate-specific antigen (PSA) testing and digital rectal examination (DRE), have limitations in terms of sensitivity and specificity, leading to potential overdiagnosis and overtreatment.

Medical imaging techniques, such as magnetic resonance imaging (MRI), have emerged as valuable tools for prostate cancer diagnosis and staging. However, the interpretation of these images can be subjective and prone to inter-observer variability, highlighting the need for objective and automated methods for image analysis and classification.

In recent years, deep learning techniques, particularly convolutional neural networks (CNNs), have revolutionized the field of medical image analysis. CNNs have demonstrated remarkable performance in various tasks, including image classification, segmentation, and detection, by automatically learning relevant features from the input data.

In this project, we aim to develop a deep learning model based on 3D convolutional neural networks for the classification of prostate cancer images as clinically significant or clinically insignificant. By leveraging the power of deep learning and the rich information contained in 3D medical images, we aim to provide an accurate and objective tool to aid radiologists and clinicians in the diagnosis and management of prostate cancer.

The proposed model utilizes a ResNet architecture, which has been widely adopted in various computer vision tasks due to its ability to mitigate the vanishing gradient problem and facilitate more effective training of deep neural networks. The model is trained on a dataset of 3D prostate MRI images, where each image consists of three different modalities (T2-weighted, apparent diffusion coefficient, and diffusion-weighted) concatenated along the channel dimension.

The objectives of this project are:

1. To develop and train a deep learning model capable of classifying 3D prostate MRI images as clinically significant or clinically insignificant with high accuracy.

2. To evaluate the performance of the proposed model using appropriate metrics and compare it with existing methods or human expert performance.

3. To explore the potential of deep learning techniques in improving the diagnosis and management of prostate cancer, ultimately leading to better patient outcomes.

The remainder of this report will provide details on the dataset, methodology, experimental setup, results, and discussion, including potential future directions and limitations of the proposed approach.

**METHODOLOGY**

1. Dataset of MRI images is obtained from cancer imaging archive.
2. Each participant folder contains 3 subfolders containing either DWI 2D images, T2 2D images or ADC 2D images.
3. 2D images found in each subfolder converted to 3D volume image.

**RESULTS**

**CHALLENGES AND RECOMMENDATIONS**

**CONCLUSION**

**REFERENCES**