Department of Electrical and Computer Engineering
North South University

Senior Design Project

Machine Learning Based Comparative Analysis for Celiac Disease Prediction

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APPROVAL

The research project entitled "**Machine Learning Based Comparative Analysis for Celiac Disease Prediction**" by **Faija Islam Oishe (ID#1821720042)** and **Fardin Bin Islam (ID#1721588642)** is approved in partial fulfillment of the requirement of the Degree of Bachelor of Science in Computer Science and Engineering on September and has been accepted as satisfactory.

Supervisor's Signature

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Chairman's Signature

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DECLARATION

This is to certify that this Project is our original work. No part of this work has been submitted elsewhere partially or fully for the award of any other degree or diploma. Any material reproduced in this project has been properly acknowledged.

Students' name & Signature

1. **Faija Islam Oishe**

2. **Fardin Bin Islam**

ACKNOWLEDGMENT

First of all, we wish to express our gratitude to the Almighty for giving us the strength to perform our responsibilities and complete the report.

The capstone project program is very helpful to bridge the gap between theoretical knowledge and real-life experience as part of the Bachelor of Science (BSc) program. This report has been designed to create a practical experience through a theoretical understanding.

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ABSTRACT

Celiac disease is a safe-framework condition that mostly affects the small intestine but can also affect the skeleton. Histological analysis of duodenal biopsies obtained through upper digestive endoscopy is used to make the diagnosis. During immunological tests, a blood sample is taken to see if the body has made antibodies. Histology requires endoscopy, which is invasive and takes a long time. In recent years, several algorithms have been developed to process images obtained from capsule endoscopy, a non-invasive endoscopy procedure that yields high-quality, magnified images of the small bowel mucosa. Using these images, a diagnosis can be made quickly. These algorithms make use of neural convolutions (CNN, or convolutional neural networks) as well as artificial intelligence (AI). Additionally, when disease is anticipated, vital information is sent to patients prior to the illness' onset. Using the information withdrawal procedure, previously overlooked data can be removed to eliminate a significant amount of celiac disease-related data. A system that can accurately predict a patient's risk of developing celiac disease is the goal of this study. The method was developed using an open-access dataset on celiac disease prediction. The dataset has numerous significant values, despite its small size. We took a gander at the information and made a couple AI models. The decision tree classifier, the random forest classifier, logistic regression, the K-nearest neighbor classifier, and the convolutional neural network were utilized in the prediction process. The degree of improvement in celiac disease may also be helpful. A gluten-free diet is the main treatment for stopping the autoimmune process and improving the villi in the small intestine. The fact that the algorithm uses two modified filters to properly analyze the texture of the intestine wall is novel. For the logistic regression model, it attained an accuracy of 94%; for the random forest, 83%; for the decision tree model, 76%; for the K-nearest neighbor, 81%; and for the convolutional neural network, 99%. It is demonstrated, by means of the appropriate flyers, that the appropriate diagnostic can be obtained through image processing without the need for a complex machine learning algorithm.