Project ID: 601

Junior Division

Computational Biology and Bioinformatics

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Gr. 6

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Heart Failure Prediction Using ML Algorithms

Objective: Heart Failure is among the leading causes of death. Recent research has indicated that early diagnosis of Heart Failure is difficult to achieve.

Description of the program: Current methods are expensive, detrimental to general human health, or lack sensitivity in certain cases. This project serves to highlight the use of a certain machine-learning model algorithm. Research was done to learn about chamber size and shape, blood flow velocities, systolic and diastolic function, contractility, wall motion abnormalities and ejection fraction, valve function, and presence of chamber thrombus. We hypothesized a way to evaluate the relationship between risk factors causing cardiovascular diseases and their importance with explainable machine learning models. There were several machine learning algorithms used for heart disease prediction, including logistic regression, decision trees, random forests, support vector machines (SVM), and artificial neural networks.

Result: The major purpose of this paper is to give clinicians a tool to help them diagnose heart problems early on. As a result, it will be easier to treat patients effectively and avoid serious repercussions.

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Junior Division

Computational Biology and Bioinformatics

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Early Detection of Scalp and Facial Diseases Using Selfies and Artificial Intelligence

AWARDS:

Grand Award – Junior Division Life Sciences
CSEF Qualified
Thermo Fisher Scientific Junior Innovators Challenge Nominee

Skin conditions such as acne and Alopecia areata are common in teenagers and may lead to severe health complications if not detected early on. Early diagnosis requires regular monitoring, which may be inefficient and impractical with human detection due to lighting and camera angle variations. Therefore, there is a need to develop an automated system to monitor skin conditions and prevent complications.

This research proposes SnapScan, a mobile app that utilizes computer vision and selfies to monitor skin conditions and detect early signs of Alopecia areata and acne. The app compares recent selfies with earlier ones to detect changes in the skin condition. The app provides users personalized monitoring options, including choosing the sensitivity threshold based on family history and preference.

The system's model was trained using the VGG-19 as the base model and achieved a validation accuracy of 97.1%. SnapScan accurately differentiated between Alopecia areata, acne, and normal skin. The app's high accuracy and personalized monitoring options make it an accessible and effective tool for detecting and monitoring skin conditions.

In conclusion, SnapScan potentially contributes to better skin health for individuals by detecting skin conditions early, thus enabling early treatment and preventing complications. SnapScan's use of selfies and computer vision makes skin condition monitoring easier, more efficient, and accessible, with potential implications in clinical settings.