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Project ID : R24-120

1. Topic (12 words max)

Decoding Diabetes: Unconventional Indicators and Medicinal Insights for Diagnosis

2. Research group the project belongs to

Computing for Inclusive and Equitable Society (CIEC)

3. Research area the project belongs to

Bio-Medical and Health Informatics (HI)

4. If a continuation of a previous project:

Project ID	
Year	

5. Brief description of the research problem including references (200 – 500 words max) – references not included in word count.

The current state of diabetes screening lacks a comprehensive and integrated approach, despite the advancements in predictive health technologies. While individual solutions like neck curve analysis, wound prediction, and infected nail identification offer promise for early diabetes detection, their collective impact and synergies remain poorly understood. This research addresses the critical gap by delving into the interconnected potential of these predictive markers. The need for a holistic screening methodology is evident, as current practices may not capture the nuanced early signs of diabetes. The challenge lies in deciphering how neck curve analysis, wound prediction, and infected nail identification, when combined, can provide a more accurate and nuanced understanding of an individual's diabetes risk.
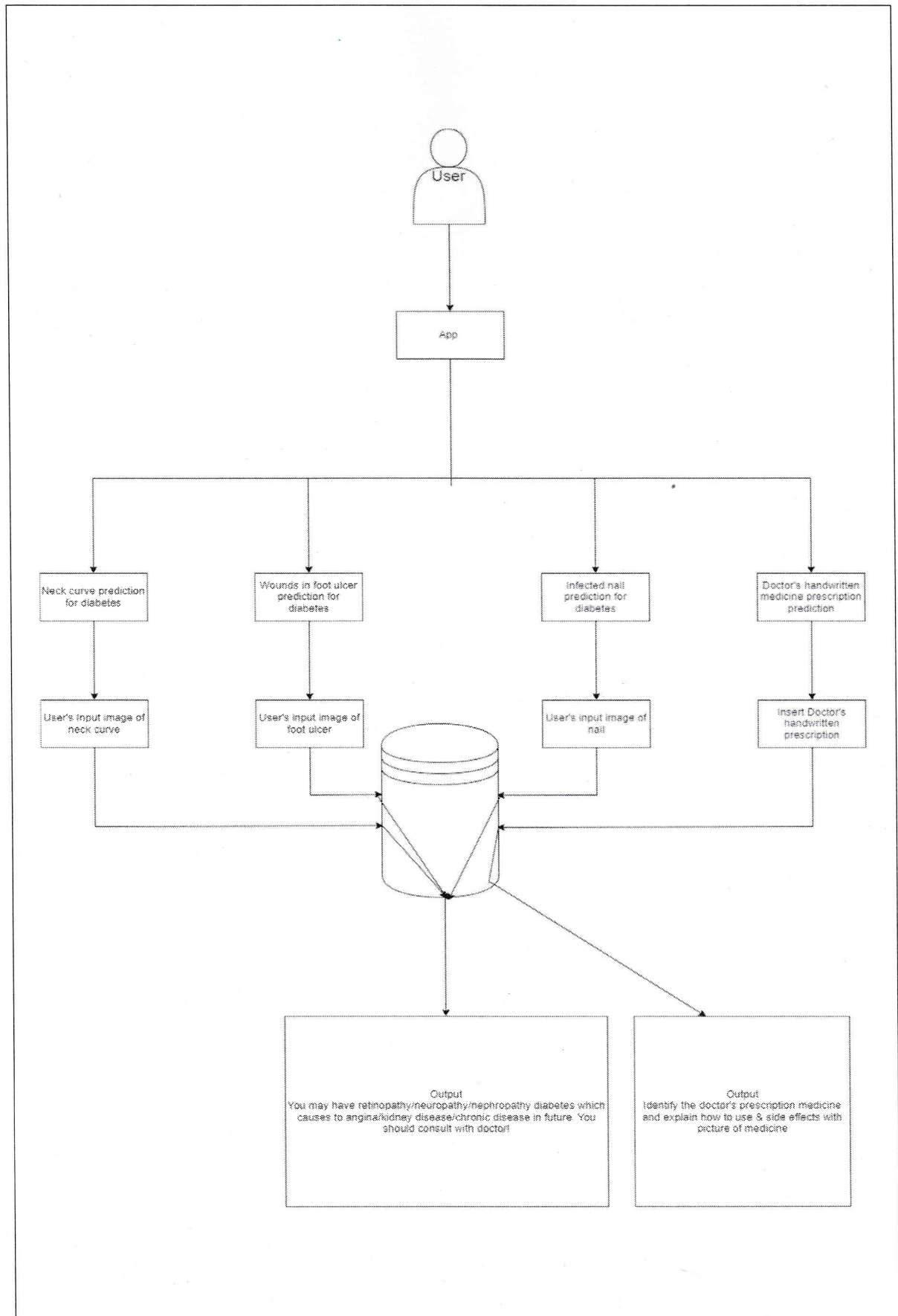
This study recognizes the importance of a cohesive screening strategy that considers the intricate relationships among these predictive markers. By investigating their collective influence, the research aims to contribute to the development of an integrated and efficient diabetes screening framework. This holistic approach not only promises to enhance early detection but also strives to improve overall diabetes management by providing a more nuanced understanding of an individual's risk factors. Ultimately, this research endeavors to bridge the existing gaps in diabetes screening, offering a comprehensive solution that considers multiple predictive markers for a more effective and informed healthcare strategy.

References :

1. Khalangot, M., Gurianov, V., Okhrimenko, N., Luzanchuk, I., & Kravchenko, V. (2016). Neck circumference as a risk factor of screen-detected diabetes mellitus: Community-based study. Diabetology & Metabolic Syndrome, 8(1). https://doi.org/10.1186/s13098-016-0129-5

2. Rich, P. (2002). Nail changes due to diabetes and other endocrinopathies. Dermatologic Therapy, 15(2), 107–110. https://doi.org/10.1046/j.1529-8019.2002.01523.x

3. Greenhalgh, D. G. (2003). Wound healing and diabetes mellitus. Clinics in Plastic Surgery, 30(1), 37–45. https://doi.org/10.1016/s0094-1298(02)00066-4

4. Okonkwo, U., & DiPietro, L. (2017). Diabetes and wound angiogenesis. International Journal of Molecular Sciences, 18(7), 1419. https://doi.org/10.3390/ijms18071419

6. Brief description of the nature of the solution including a conceptual diagram (250 words max)

The realm of diabetes screening is poised for transformative advancements with potential solutions that could redefine existing practices. Envisioning the prediction of diabetes through diverse markers, including neck curve analysis, wound prediction, and infected nail identification, opens up promising avenues for early detection and proactive management. Nevertheless, amid these individual breakthroughs, a pressing research challenge emerges—how to seamlessly integrate and harness the collective potential of these predictive markers to formulate a comprehensive screening approach. The existing gap in understanding the synergies among these predictors underscores the necessity for an exhaustive exploration into their combined impact. This research endeavors to bridge this gap by investigating the interconnected potential of neck curve analysis, wound prediction, and infected nail identification. The ultimate objective is to contribute to the evolution of a sophisticated and efficient diabetes screening strategy, not only augmenting early detection but also elevating overall diabetes management. By unraveling the synergies among these predictive markers, this research aspires to propel the field toward a more nuanced and integrated paradigm for diabetes screening, ultimately fostering more effective and informed healthcare practices.

User

App

| Neck curve prediction for diabetes | Wounds in foot ulcer prediction for diabetes | Infected nail prediction for diabetes | Doctor's handwritten medicine prescription prediction |

| User's input image of neck curve | User's input image of foot ulcer | User's input image of nail | Insert Doctor's handwritten prescription |

Output
You may have retinopathy/neuropathy/nephropathy diabetes which causes to angina/kidney disease/chronic disease in future. You should consult with doctor!

Output
Identify the doctor's prescription medicine and explain how to use & side effects with picture of medicine

7. Brief description of specialized domain expertise, knowledge, and data requirements (300 words max)

To develop predictive models based on a person's neck curve, wounds, infected nails, and medicine prescriptions for diabetes, domain expertise across multiple fields is crucial. In the case of neck curve prediction, expertise in orthopedics and endocrinology is essential to understand the relationship between neck curvature and diabetes symptoms. For wound-based diabetes prediction, knowledge in wound care, diabetes management, and dermatology is necessary to identify relevant characteristics. Similarly, identifying diabetes through infected nails requires expertise in dermatology and endocrinology to recognize the specific signs associated with diabetes. Understanding medicine prescriptions for diabetes involves expertise in pharmacology, endocrinology, and medical informatics to interpret prescription patterns. Data requirements encompass diverse datasets, including neck curve measurements, wound images, nail conditions, and comprehensive prescription records. Access to labeled datasets indicating diabetes presence or absence is vital for training accurate predictive models, requiring collaboration across medical specialties to ensure the datasets' richness and relevance.
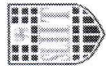
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8. Objectives and Novelty

Main Objective

Develop accurate and non-invasive diagnostic methods, leveraging indicators such as neck curve, wounds, infected nails, and medication prescriptions, to enable early identification of diabetes and enhance proactive screening protocols.

Member Name	Sub Objective	Tasks	Novelty
Sangavi G IT21069772	Based on a person's neck curve predicting whether a person has symptoms of diabetes	Gather a dataset containing images of neck curves along with corresponding annotations. Process and standardize the images. Apply a convolutional neural network (CNN) for binary classification. Evaluate and test the model's accuracy.	The system checks for signs of diabetes by looking at the shape of a person's neck in the images they upload. By identifying specific visual cues related to neck features, the system aims to determine the likelihood of diabetes based on established correlations. This non-invasive method could help with early detection and monitoring, providing a potential tool for preventive healthcare.

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Student	Topic	Description
Kajanan T IT21085062	Based on the wounds predicting diabetes and the stage of the diabetes	Assemble a dataset comprising images of diabetic wounds labeled with their respective stages. Preprocess and extract features from the images. Employ a hybrid approach using both image classification and sequential models. Assess and evaluate the model's capability to predict and categorize wound stages through validation and testing.	A classification model to identify the type of wound and a sequential model to track changes over time if multiple images are provided. By learning from training data, the model predicts whether the person has diabetes and the respective stage of the diabetes based on the wound by recognizing patterns in the images.
Methiny S IT21083228	Based on the infected nail identifying diabetes	Compile a dataset focusing on images of nails that are infected, with a specific emphasis on those related to diabetes. This dataset will contribute to the development of image processing models for the early identification of diabetes based on nail infections.	Identifying diabetes through an infected nail involves noticing changes in the way the nails look, like discoloration or thickening. People with diabetes are more prone to nail infections, and these changes can be signs of an underlying issue. Because diabetes affects the body's ability to heal, nail infections might stick around longer. Catching these signs early is essential for managing

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			diabetes effectively. This approach emphasizes the need for routine checks that include examining the nails, combining dermatological and diabetic care, and making people more aware of the connection between nail health and diabetes for timely screenings.
Venuganth A IT21102646	Identifying handwritten medical prescriptions and giving an in-depth explanation based on it	Implement an NLP-driven model for predicting prescriptions based on symptoms and patient history, improving prescription accuracy.	The system uses advanced image processing to read doctors' handwriting in prescription images uploaded by users. Considering the person's age from their profile, it provides a clear understanding of prescribed medicines and dosages, ensuring accuracy and reducing the risk of errors. This personalized approach enhances healthcare accessibility and effectiveness.

9. Supervisor checklist

a) Does the chosen research topic possess a comprehensive scope suitable for a final-year project?

Yes	X	No	

b) Does the proposed topic exhibit novelty?

Yes	X	No	

c) Do you believe they have the capability to successfully execute the proposed project?

Yes	X	No	

d) Do the proposed sub-objectives reflect the students' areas of specialization?

Yes	X	No	

e) Supervisor's Evaluation and Recommendation for the Research topic:

Accepted with minor changes.

10. Supervisor details

	Title	First Name	Last Name	Signature
Supervisor	Ms	Wishalya	Tissera	_(signature)_ 23/01/2024
Co-Supervisor	Ms	Karthiga	Rajendran	_(signature)_
External Supervisor				
Summary of external supervisor's (if any) experience and expertise				

This part is to be filled by the Topic Screening Panel members.

Acceptable: Mark/Select as necessary

Topic Assessment Accepted	
Topic Assessment Accepted with minor changes (should be followed up by the supervisor)*	
Topic Assessment to be Resubmitted with major changes*	
Topic Assessment Rejected. Topic must be changed	

* Detailed comments given below

Comments

The Review Panel Details

Member's Name	Signature

*Important:

1. According to the comments given by the panel, make the necessary modifications and get the approval by the **Supervisor** or the **Same Panel**.

2. If the project topic is rejected, identify a new topic, and request the RP Team for a new topic assessment.

3. The form approved by the panel must be attached to the **Project Charter Form**.