Unique Biometrics Using Dorsal vein

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Overview

Introduction

- Biometric authentication is a process of identifying and differentiating individuals for security purpose.
- Dorsal vein pattern is the biometrics used here for authentication purpose.
- It is implemented for identifying individuals on the basis of their vein pattern of dorsal hand.
- The goal is to establish a method with better Correct Recognition Rate (CRR), low False Acceptance Rate (FAR) and low False Rejection Rate (FRR).

Existing System

- Fingerprints, facial images, retinal images, palm print etc are the existing biometric recognition system.
- For fingerprint, physical sensor disadvantage causes deterioration in performance.
- For facial image, slight change in facial expression can restrict access.
- In case of iris recognition, the constant use of infrared light may cause harm to the iris because it is constantly being scanned with infrared light.

Proposed System

- Near Infrared (NIR) image of dorsal hand is used for image acquisition.
- Proposed system can be divided into data collection, image acquisition,model building, feature extraction, model training, learning, testing and matching.
- Finally authentication is done using Deep learning, neural networks and Support Vector Machine (SVM) classifier.
- A multi-class SVM classifier was used to classify between the persons.

System Design

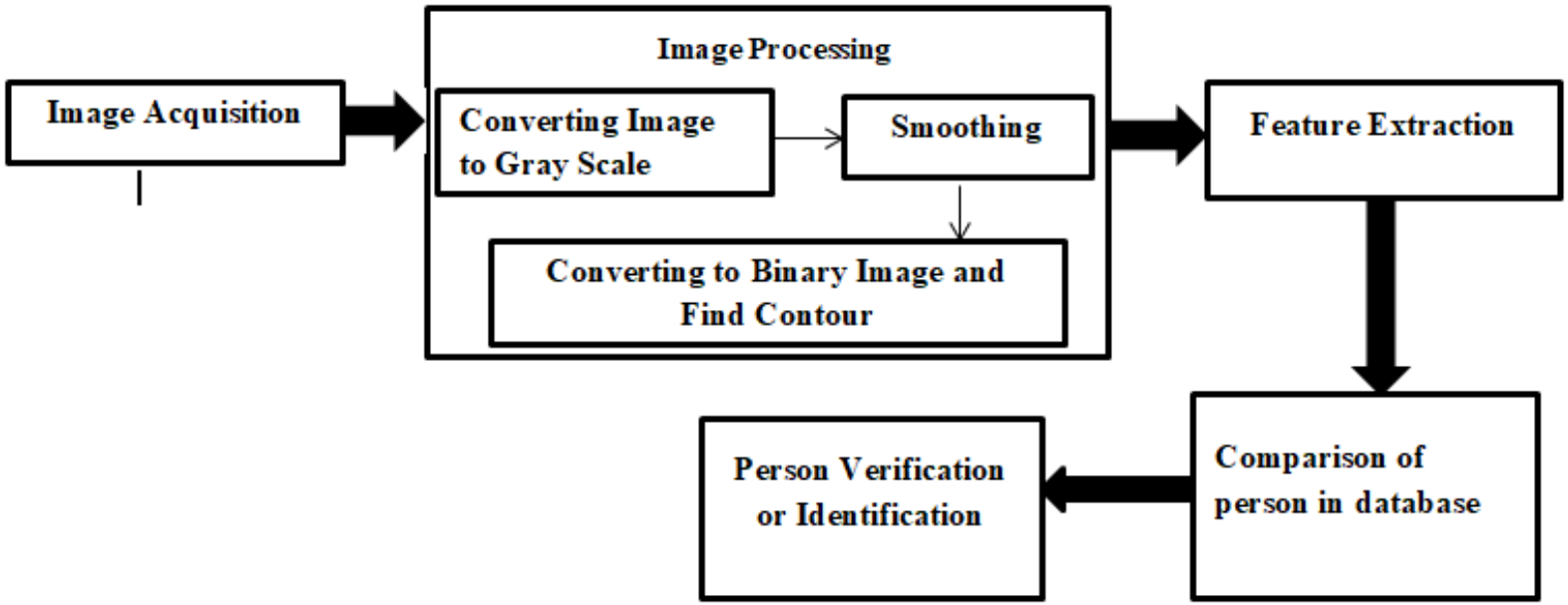


Figure: System Design

Product backlog

S.No	As a	I want to	Priority	Status
1	Member	Data Collection	Must	Not Done
2	Member	Image Acquisition	Must	Not Done
3	Member	Model Building	Must	Not Done
4	Member	Feature Extraction	Must	Not Done
5	Member	Model Training and Learning	Must	Not Done
6	Member	Model Testing and Matching	Must	Not Done

Figure: Product backlog

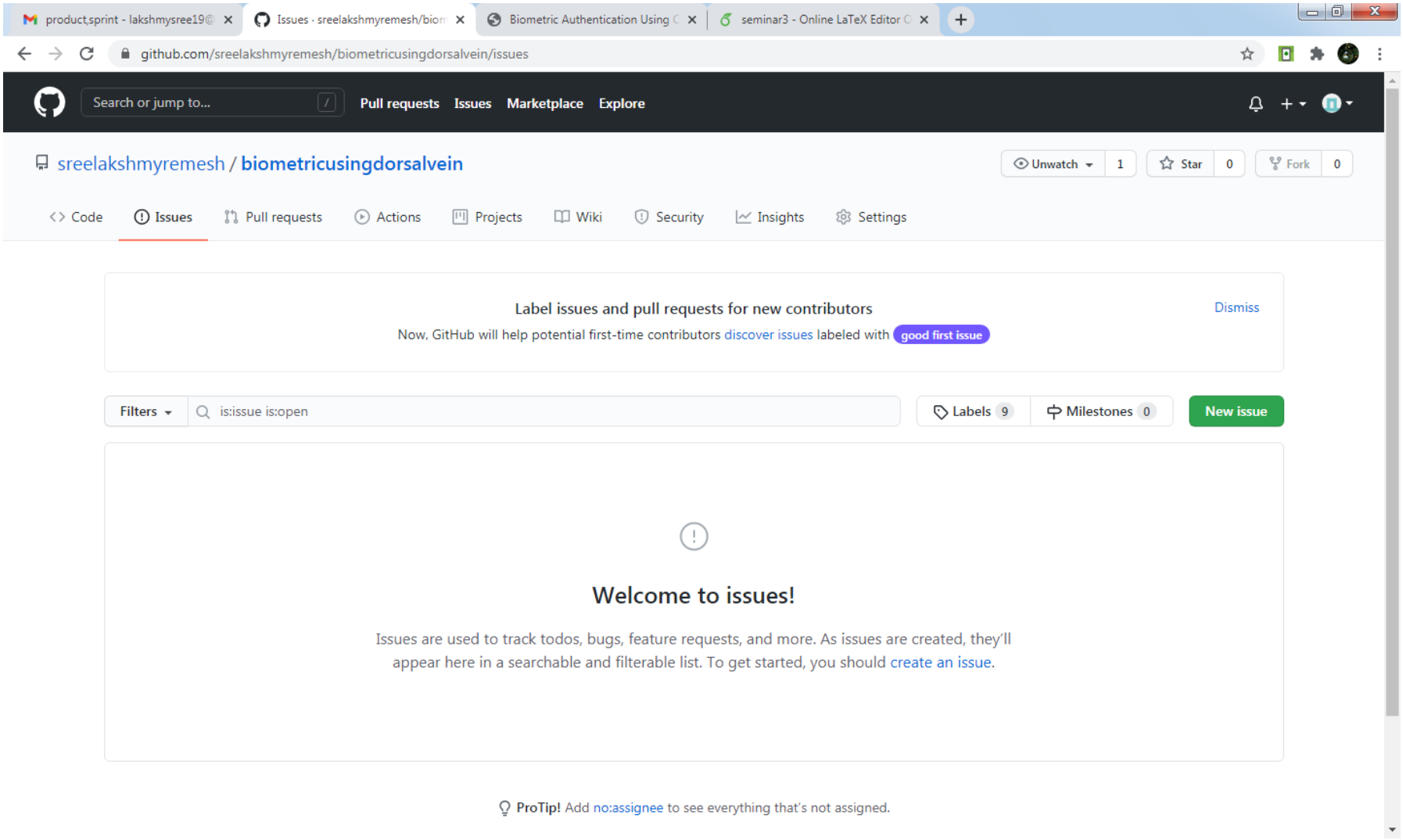
Sprint backlog

SPRINT BACKLOG

S.No	Date	What I have done since the last scrum meeting?	What will I do in the next scrum?	Are they diificulty faced?	Status
1	07-04-2021	Topic selection	Topic selection	Yes	Not done
2	08-04-2021	Topic selection	Topic discussion	No	Done
3	09-04-2021	Topic discussion	Topic discussion	Yes	Not done
4	10-04-2021	Topic discussion	Requirement Analysis	Yes	Not done
5	11-04-2021	Requirement Analysis	Image Acquisition	No	Done
6	12-04-2021	Image Acquisition	Image Acquisition	yes	Work on progress

Figure: Sprint backlog

Version Control System



Hardware and Software Specifications

- Hardware Specifications
  - Processor: Intel-core i5
  - RAM: 4GB and above
  - Harddisk: 250GB
  - Infrared Camera
- Software Specifications
  - python
  - Tensor Flow

Conclusion

- Biometric using dorsal vein pattern shows really good performances in discriminating among people for better security.
- Deserves a chance of adoption in the cases where biometric authentication is required.
- Good quality NIR images of dorsal hands will increase the accuracy of our system.

References

1. https://www.tensorflow.org/learn
2. https://www.w3schools.com/python/

Thank You