Liveness Detection for Face Recognition with Facial Features and Movements using Machine Learning

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1 Introduction

- Facial recognition systems are Artificial Intelligence (AI) driven solutions capable of identifying/verifying people from the individual image or video stream.
- With the rapid advancement of mobile financial applications, Facial recognition systems play an important role in the authentication process of an individual easing the process.
- However, rapid usage of these facial recognition systems has increased the spoofing attacks by proving the fake images or video streams by exploiting the vulnerabilities in the system and raised the necessity of more sophisticated machine learning models that can robust the liveness detection mechanisms.

2 Research Questions

- what are the traditional machine learning models utilized for building facial recognition systems?
- what type of data is used to train the models and how this can be improved to enhance the liveness detection?
- what is the best machine learning model for liveness detection?
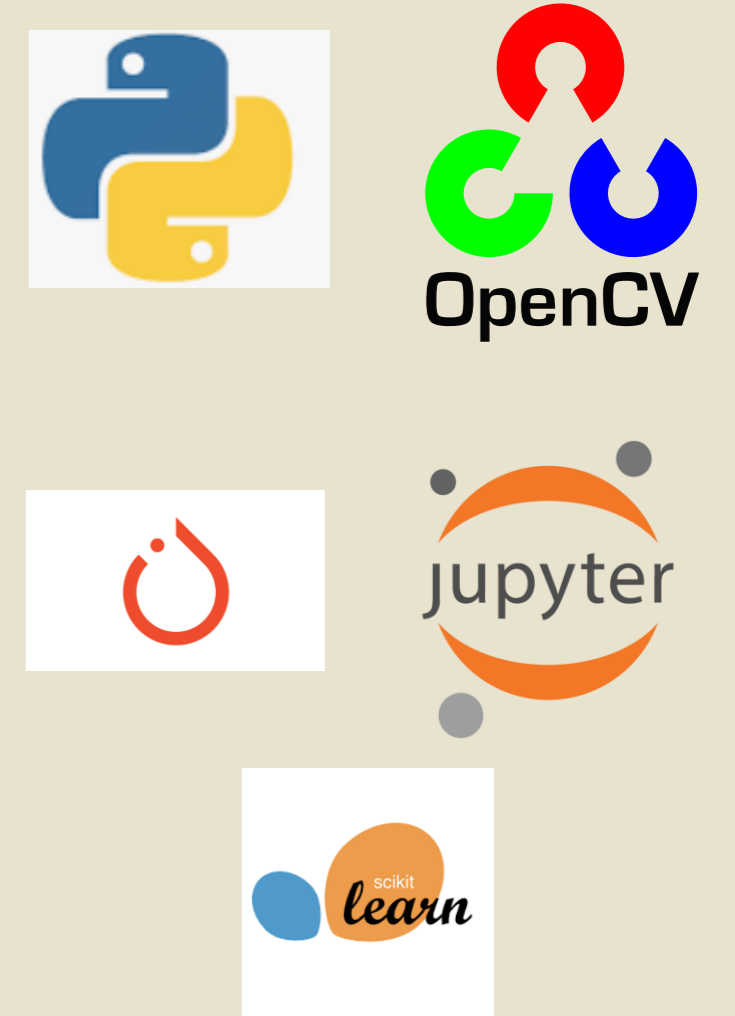
3 Literature Review

- Most of the facial recognition systems utilize the static image for authentication which can be easily spoofed and demonstrates the importance of liveness detection in facial recognition systems.
- With the advent of machine learning techniques, particularly deep learning algorithms, there exists a promising avenue to significantly enhance the accuracy and reliability of liveness detection system utilizing the video stream and adding extra verifications can improve the authenticity of traditional authentication systems.
- Deep learning architectures, such as Convolutional Neural Networks (CNNs), have demonstrated significant capabilities in identifying the patterns in facial features from video steams which is important for liveness detection in facial recognition.

4 Methodology

- The objective is to build machine learning models for facial recognition with liveness detection using Python.
- The raw data downloaded should be cleansed and made appropriate for the machine learning models before training. The overall methodology that will be adopted for the research is shown in the below image.
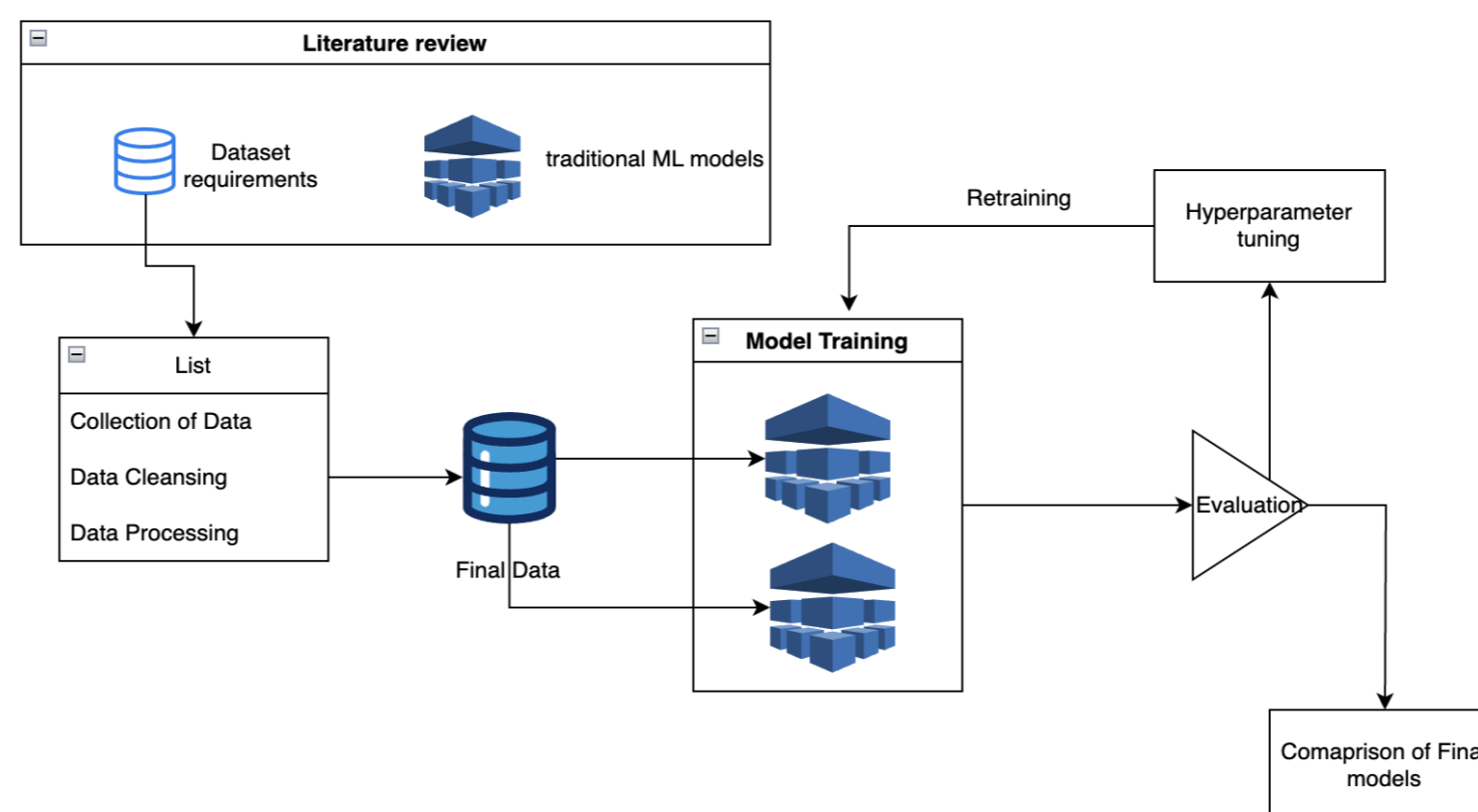
5 Technologies

6 Early Indicators and Next Steps

- Early indications from the literature review suggest that most traditional recognition systems utilize static images for model building, to enhance this, present research is going to utilize the video stream data focused on the facial features.
- Following data collection, the next important step is to identify the machine learning models that match the research requirements. These models should be able to incorporate the data collected.
- The final step is to train the models along with hyperparameter tuning to increase the efficiency of the models.

References
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