Avoid a fight in venues with Nonlutte app

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DATA ASSUMPTIONS, LIMITATION & CONSTRAINTS

Assumptions

Suppose there are six discrete basic emotions (anger, fear, disgust, surprise, joy, sadness). This data set contains a total of 200,000 48 * 48 grayscale images with a total of 6 expressions.
For example: 0 = anger, 1 = disgust, 2 = fear, 3 = happy, 4 = sad, 5 = surprised, and 6 = normal.

Limitation

1. The total size of the two pictures of face matching input is less than 8MB.

2. The picture size is less than 8MB. Due to the large picture, the delay will be longer and the amount of picture information is not large. It is recommended to be less than 1MB.

3. The resolution of the picture is less than 4096 * 2160, and the face pixels in the picture are larger than 80 * 80. It is recommended to be more than 120 * 120.

In order to ensure the recognition effect, the following requirements are recommended for face pictures:

- Illumination is greater than 200lux, no reflection, strong light and shadow.
- The face is unobstructed, the whole is clear, and there is no blurring of motion.
- The side face does not exceed 30 °, the elevation angle is less than 15 °, and the deflection angle is less than 15 °. The human face in the picture remains upright.

Constraints

Constrained by many factors such as technology and cost, there are some constraints on facial expression recognition services. System-level constraint restrictions:

- Only supports JPG, PNG, JPEG, BMP format pictures.
- Each user can use 10 facial databases for free, and each facial database has a capacity of 100,000 facial features.
- The system does not save user pictures or videos.

METHODOLOGY

We are going to use SVM and Random Forest Classifier algorithms for classifying the emotions of the person into one of the binary classes (Anger / Fear). Our model converts the video into vectors of video level feature extracts and to introduce knowledge transfer a largescale emotion-centric auxiliary image set is being used to classify the emotions. This entire process in been classified into five different stages, they are

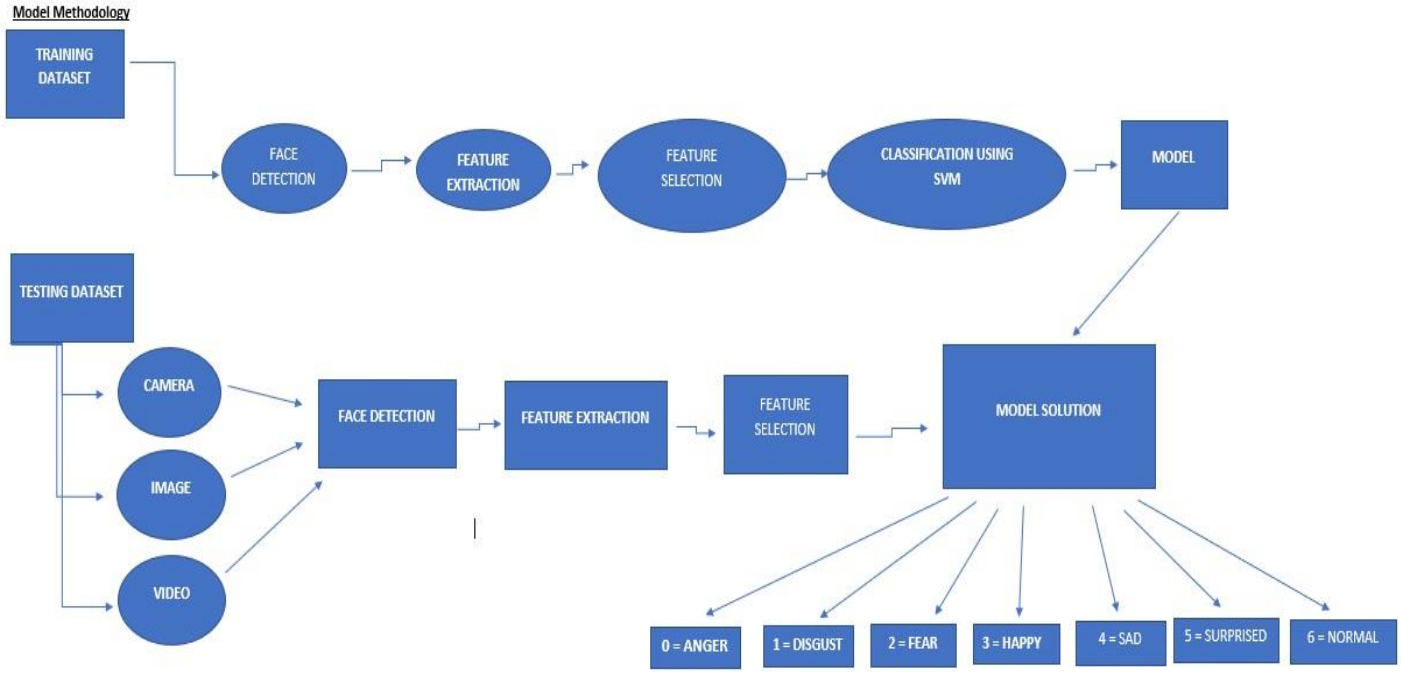
Face frontalization: We synthesize the front view of the face, once the face has been detected the system will track the face as best as it can to recognize the emotion in each frame of the video during this process the resolution is reduced to less than 4096 * 2160.

Preprocessing: Several preprocessing techniques will be applied like contrast adjustment, intensity adjustment to remove the noise and improve the image and eliminate the suppresses unwanted distortions or enhances.

Feature Extraction: Unprocessed faces has lots of amount of data in it and feature extraction is required to decrease it to smaller sets of data called features. This dimensionality reduction process efficiently represents the interesting emotions of the face in the form of a vectors. This approach is used to reduce the feature representation and complete the tasks of matching the emotions quicker.

Feature Selection: This process is concerned with choosing the subset of features of the face which are required for our model to classify the expression into different categories. Having to many features may raise the complexity of classifying and having improper features may result in improper classification.

Classification: During this process the facial expression of a person recognized is classified into binary classification as fear or anger. Accordingly, the nearby guards can be alerted.



TESTING PLAN

Introduction

The final model called Nonlutte, it's a solution that takes live video images as captured using security cameras as input to detect facial emotions using image detection technology to extract features which is then classified into one of the following; anger, disgust, fear, happy, sad, surprised and normal.

Objectives

This document describes the plan for testing the Nonlutte Emotion detection solution with the following objectives.

- Identify the mode architecture and data
- Identify the test requirements
- Describe the testing strategy
- Describe the test output
- List the deliverable elements of the test activity

Test Scope

The purpose here is to test the feasibility and acceptance of our proposed solution, as it is critical that all systems work perfectly alongside the Nonlutte solution. The test would measure the performance and interface with the following subsystems

1. Response time for registration and logon
2. Existing camera functionality and integration with the Nonlutte solution
3. Ability to classify live images correctly
4. Response time to notify appropriate security personnel

Requirements for Test

Data Integrity Testing

- Verify access to cloud storage to store image data for continuous training of the model
- Verify accuracy and consistency of live data

Function Testing

- Verify integration with existing security camera
- Verify integration with security alert mechanism

User interface testing

- The desktop user interface shall be windows 10 complaint
- The systems shall be easy to use and the target market are event center's with large crowd of people

Performance Testing

- Verify response time between detecting required expression and when security alert is activated
- Verify response time for remote login

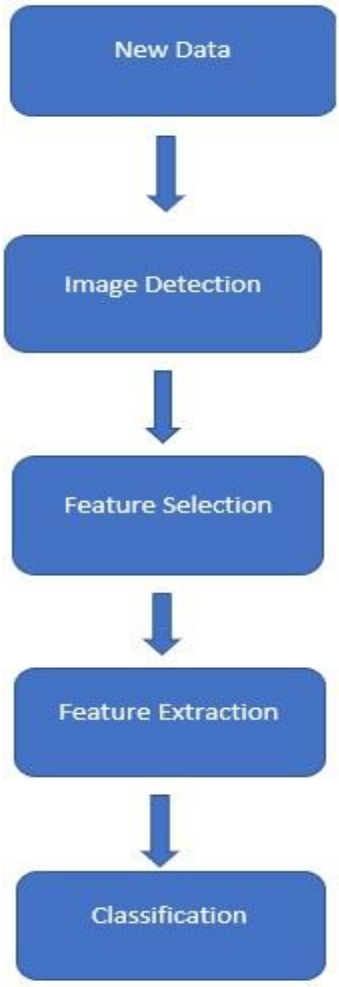
Load Testing

- Verify system response time when processing large data input

Test Strategy

The goal here is to produce a continuous learning solution of the highest possible accuracy level and in order to ensure that the model works as intended, the following strategy is adopted for testing.

- A subset of the dataset is set aside to test all possible combination of images to estimate how well the model performs
- The test data is fed into the model
- The model then detects the faces and assign a bounding box to each image
- Feature selection is performed and feature extraction pulls the features from the image required to classify emotions
- The classifier then produces the required output of a combination of Anger and Fear
- Each classified combination of Anger and Fear sends an alert to the closest security personnel indicating the location of the classified outcome.



Test Outcome Milestone

- Verify that the system alerts security personnel of the location of a possible fight based on the combination of the classified emotion.

GITHUB LINK

https://github.com/chrisvarella/visualai