Abstract

College Name: Shah and Anchor Kutchhi Engineering College

Team Details

Name	Member/Leader	Year (Second/Third/Final)
Unnati Shah	Leader	Third
Amisha Patil	Member	Third
Aditi Tandel	Member	Third
Samiksha Warang	Member	Third

Problem Selection: Crowd Counting Challenge

Kindly elaborate on your understanding of the problem chosen. *(Max 250 words)*

a. *Understanding of the Problem*
It is not feasible to monitor all the people manually. It is also impossible for a human operator to sit in front of the CCTV all the time. The complexity increases as the size of the crowd increases. So, we have to use an algorithm to count the number of people in a shopping mall and evaluate the accuracy based on the output.

b. *Most Challenging aspect of the problem*
Crowd counting faces many challenges that restricts the counting accuracy of a model. This are the unique challenges in an image while crowd counting:
- When two or more people come close to each other and merge, it is hard to recognize individual people. Thus, crowd-counting accuracy is decreased.
- If there is nonuniform arrangement of people that are close to each other, it makes recognition and counting tasks more challenging.
- Irregular distribution of people in an image or video leads to varying density distribution.
- Due to different camera angles, tilt, and the up–down movement of the camera position accuracy is greatly affected because of varying perspectives.

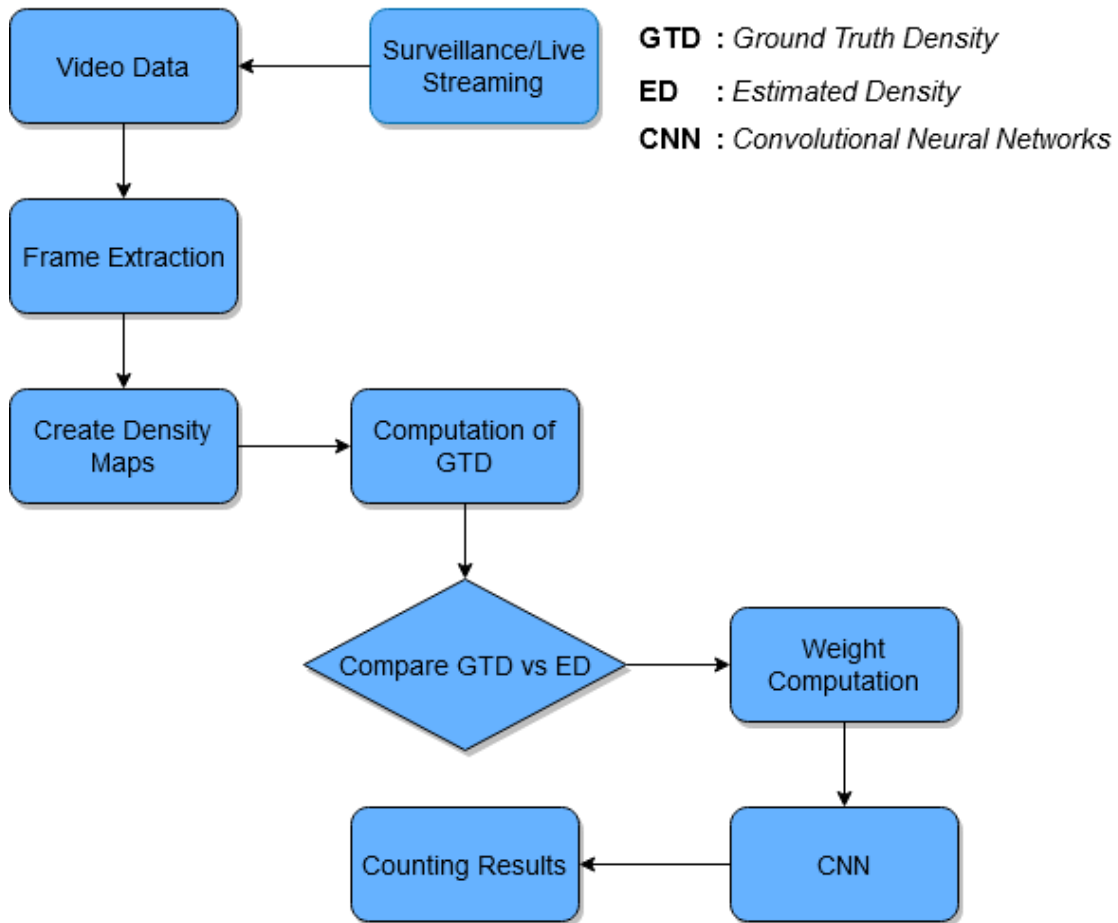c. *Reason for Choosing this problem*
Considering the team's research interest in the domain of Computer Vision and the willingness to understand the ML/DL algorithms used to perform image analysis and object detection, this was the best suited topic. Also, amid the COVID-19 pandemic it has become a necessity to control crowd gathering and main distancing. This problem would help us to measure the number of people who are in close proximity to each other.

Kindly share how do you plan to approach the problem chosen? *(Max 300 words)*

a. *Approach*

Our model will first predict the density map for a given image. The pixel value will be 0 if no person is present. A certain predefined value will be assigned if that pixel corresponds to a person. So, calculating the total pixel values corresponding to a person will give us the count of people in that image.

b. *Approach Diagram*

c. *Platform/Coding Language/Framework*

Platform: JupyterLab
Coding Language: Python
Framework: PyTorch

d. *Dataset*

- Live streaming data through webcam.
- The mall dataset that was collected from a publicly accessible webcam for crowd counting and profiling research.
  Ground truth: Over 60,000 pedestrians were labelled in 2000 video frames. They annotated the data exhaustively by labelling the head position of every pedestrian in all frames.
  Video length: 2000 frames, Frame size: 640x480, Frame rate: < 2 Hz.

e. *External Tools*

N.A

f. *Fortnightly targets*
- Research about the various crowd counting techniques.
- Get familiarized with the existing algorithms.
- Implement the algorithm on the dataset and compare the expected vs predicted accuracy.
- Try to improve the accuracy of the model.
- Build a working solution with the best possible accuracy.

Why do you think your team will be able to implement a winning solution? *(Max 300 words)*

a. *Previous Projects Undertaken*

Unnati Shah
- Image Classification with CNNs using Keras
- Sentiment Analysis with Deep Learning using BERT
- Facial Expression Recognition

Amisha Patil
- Smart Irrigation System using IOT
- Mapping borders for Water Conservation
- Alzheimer's disease prediction app for Smart India Hackathon

Aditi Tandel
- Basic Sentiment Analysis using TensorFlow
- Predicting house prices using Regression

Samiksha Warang
- Smart Irrigation System using IOT
- Water Conservation App using Flutter (Ongoing)
- Tracking borders of Map using AutoCAD

b. *Team Strengths*
- Good Analytical skills
- Clear and shared goal
- Interdependent
- Creative and innovative
- Highly organized and well-focused
- Ability to come up with diverse solutions
- Co-operative and communicative

c. *Team Achievements*

Achieved 3rd prize for building a Smart Irrigation System using IOT.

d. *Personal Motivations*
- Unnati Shah: The category of this project coincides with my core areas of interest, which I consider critical in procuring academic excellence for my future studies. It will help me polish my skill set and advance my knowledge in the area of Computer Vision.
- Amisha Patil: This project provides me an opportunity to test my problem-solving skills as well as expand my knowledge in a new branch of computer science.

- Aditi Tandel: This project will help me gain experience and keep improving myself in accuracy and efficiency which will help me improvise myself and make better decisions academically and professionally.
- Samiksha Warang: This project will help me explore various AI techniques and learn about neural networks more deeply.