

SMART MOVE

SMART Monitoring Of Violation Events:

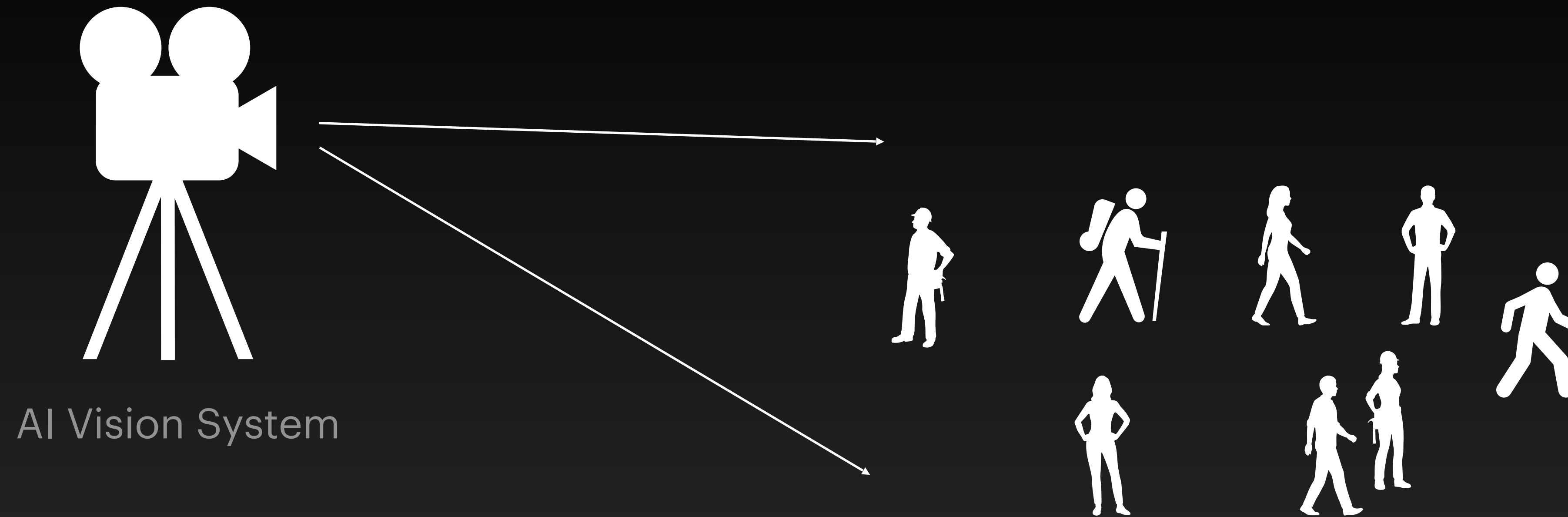
Utilising Artificially Intelligent Vision Systems
To Identify Potential COVID-19 Social Distancing Breaches

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Disclaimer : My Artefact is top of base work of Adrian. I would like to extend my thanks to Adrian Rosebrock for providing information and packages to set-up the environment, base work credit goes to Adrian Rosebrock www.pyimagesearch.com. thanks to Cory O'Brien for volunteering in video capture for this experiment.

Problem:



Contagious disease control, pandemic or any viral infection, distance between peoples are safety measure but identifying safe distance violated peoples in public place are biggest challenge.

“Social distancing measures can help to reduce transmission and enable health systems to cope.”

WHO Director-General

16 March 2020

Overview

- The artefact of this thesis presents an additional technical solution to address the challenges of enforcing social distancing in an open area using single camera.
- It enables live tracking without the use of any sensors, mobile applications or the use of Bluetooth signal.
- It does not require the collection of detailed personal information.

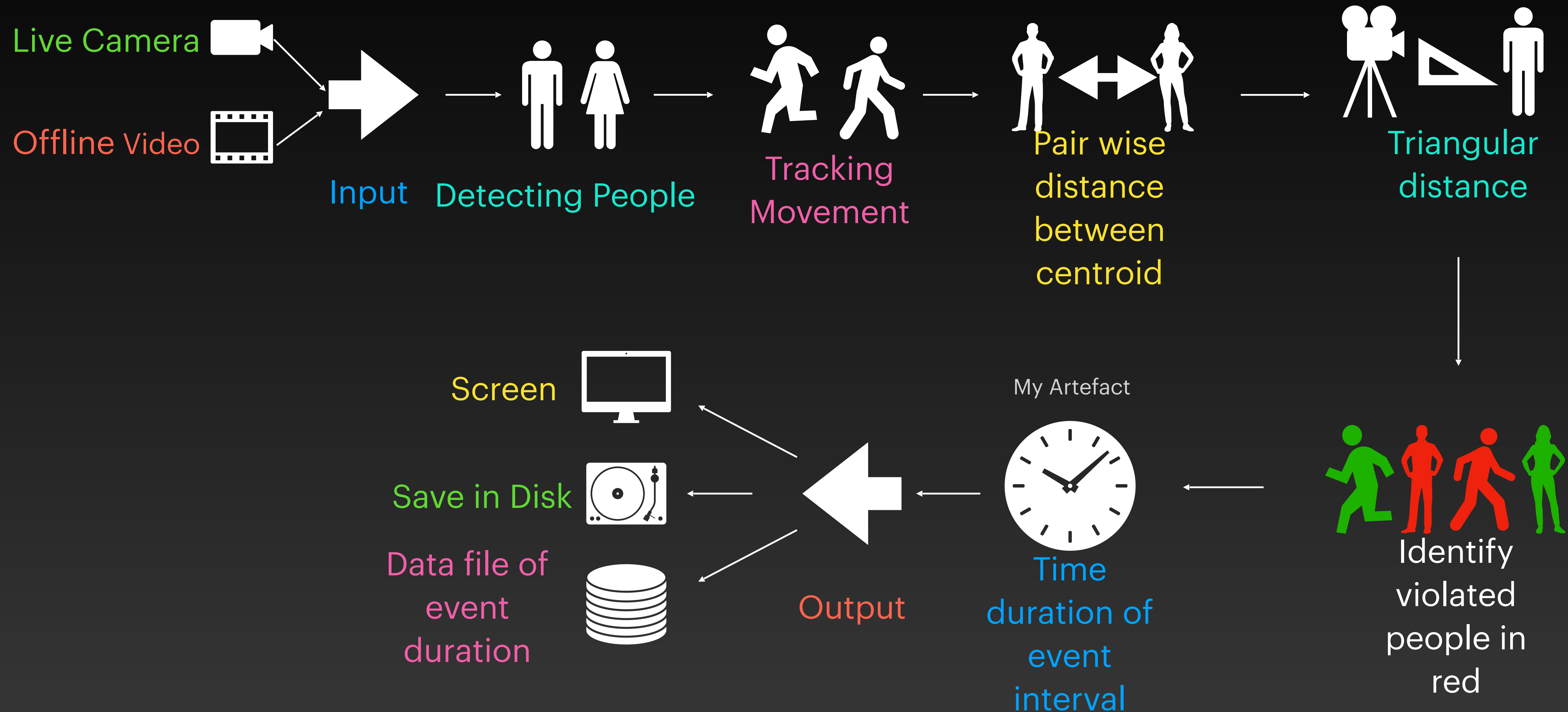
Research Question:

Can artificially intelligent image processing be combined with deep learning to identify potential social distancing violations within a defined frequented area?

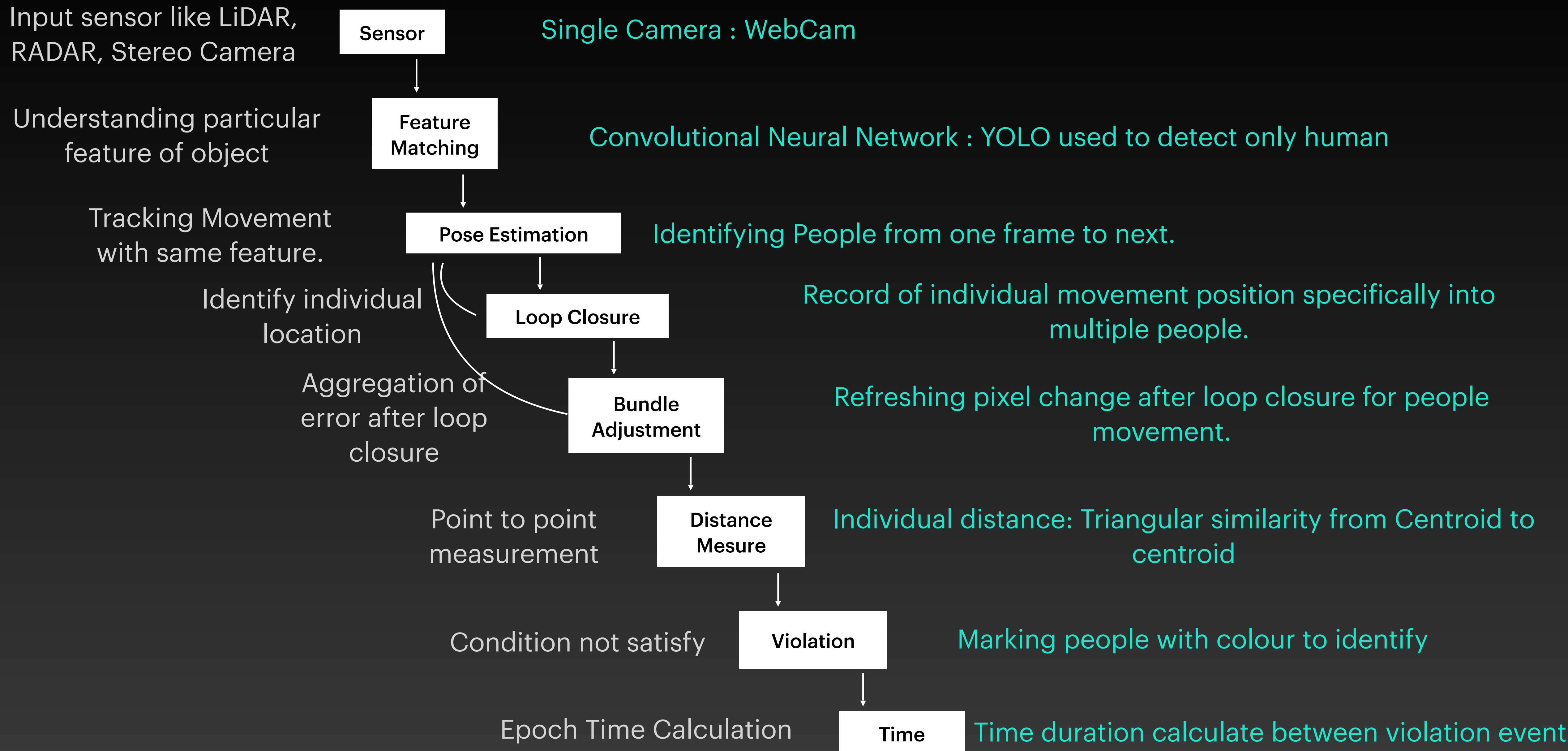
Aim:

- To develop a practical and simple method to identify social distancing breaches;
- Calculate violation event interval duration using a single camera.

Autonomous Vision System



Building the Solution with CNN



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Example A

Input



Output



Example B

Input

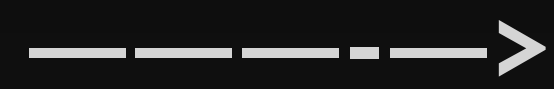


Output

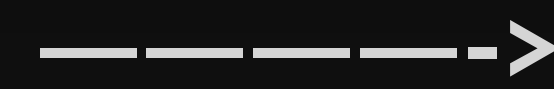


Demonstration

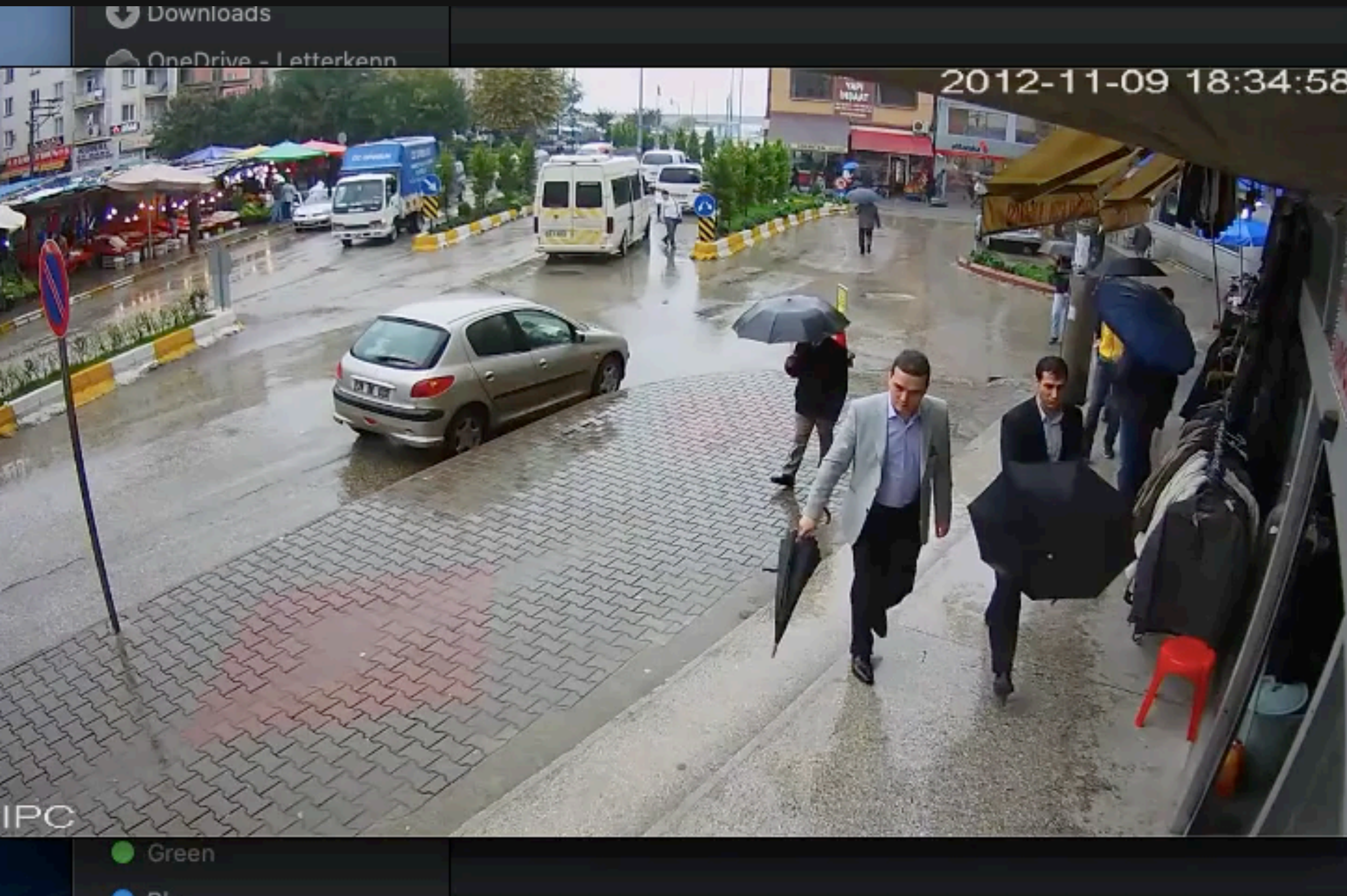
Input



AI_Vision



Output



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Social Distance Breach Data Generated from Video Analysis

Violation Event	interval duration(second)
1	2
2	188
3	1
4	10
5	9

Potential Applications of Analysis Outputs

- Establish Patterns of violation event frequency in a specific public place.
- Create Alerts to highlight higher risk social distancing breach locations based on a quantified ranking system.
- Discover a quantitative benchmark that indicates people's adherence to guidelines and social distancing conscientiousness

**Increasing Violation
Intervals**

=

**Increased Compliance
& Conscientious**

System Demonstration



Conclusion

- Single camera based intelligent vision system is successfully identifying social distancing violations
- Automatically calculates distance between individuals in public places to determine adherence to social distance guidelines
- Automatically calculates time duration of social distance violation event intervals
- Potential to generate novel datasets for investigation and alternate applications
- Create Alerts to highlight higher risk social distancing breach locations based on a quantified ranking system.
- Reduced privacy concerns in comparison to standard COVID Tracker Apps

System Advantages

- Single camera
- Advanced Convolutional Neural Network instead of SVM, etc.
- Works for multiple people at the same time
- No dependency like 'COVID Tracker app'.
- Time count of event in camera.
- Generate data automatically.
- Potential use via drone or existing camera systems.

Future work

- Testing with GPU instead of using CPU
- Test on a wider area
- Implement capacity to recognise individuals who have left and returned to camera field of vision
- Identify and highlight repeat social distancing violation offenders