TITLE:
Vehicle speed detection using AI

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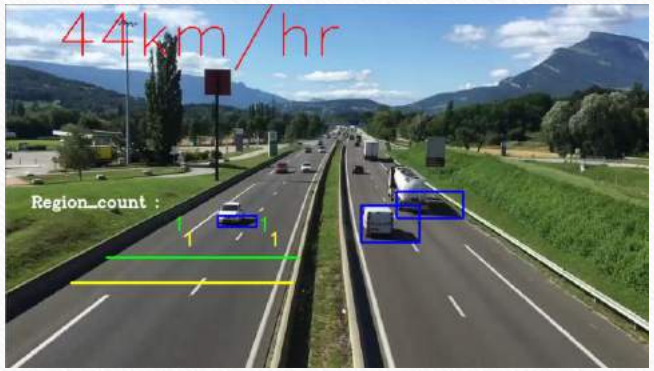


Contents

INTRODUCTION:

- Vehicle speed detection is used to estimate the velocity of the moving vehicle using image and video processing techniques. Without any camera calibrations video is captured and analyzed for speed in real time. By employing frame subtraction and masking techniques, moving vehicles are segmented out. Speed is calculated using the time taken between frames and corner detected object traversed in that frames. Finally frame masking is used to differentiate between one or more vehicles. With an average error of +/-2 km/h speed detection was achieved for different video sequences.

PROBLEM STATEMENT:

- Vehicle tracking is the process of locating a moving vehicle using a camera. Capture vehicle in video sequence from surveillance camera is demanding application to improve tracking performance. This technology is increasing the number of applications such as traffic control, traffic monitoring, traffic flow, security etc. The estimated cost using this technology will be very less. Video and image processing has been used for traffic surveillance, analysis and monitoring of traffic conditions in many cities and urban areas. Various methods for speed estimation are proposed in recent years. All approaches attempt to increase accuracy and decrease cost of hardware implementation. The aim is to build an automatic system that can accurately localise and track the speed of any vehicles that appear in aerial video frames.

MOTIVATION

We always wanted to develop an application which can be helpful to the society and which also helps us build knowledge of advanced topics,we conducted a survey regarding social problems and in which we found out accidents,traffic are growing concerns of modern mankind,we worked further on the issue and found that "growing traffic has also raised a problem to emergency vechiles".We wanted to develop and application which is madeup of existing tech and also help the traffic.keeping these factors in mind we came with the idea of vehicle speed detection and activity monitoring.

OBJECTIVES

- To build an advanced monitoring system ,which when run takes live feed from the cctv cameras installed all over the place and detects the kind of object, and also predicts the speed of the vehicle.
- To build an advanced monitoring system, which will be able to detect the emergency vehicles and pass the information regarding the location of vehicle to nearby assistance
- To build an advanced monitoring system,which will be able to monitor and analyze the vehicle behavior and predict whether the vehicle is in path of collision or might be reason of traffic obstructions.

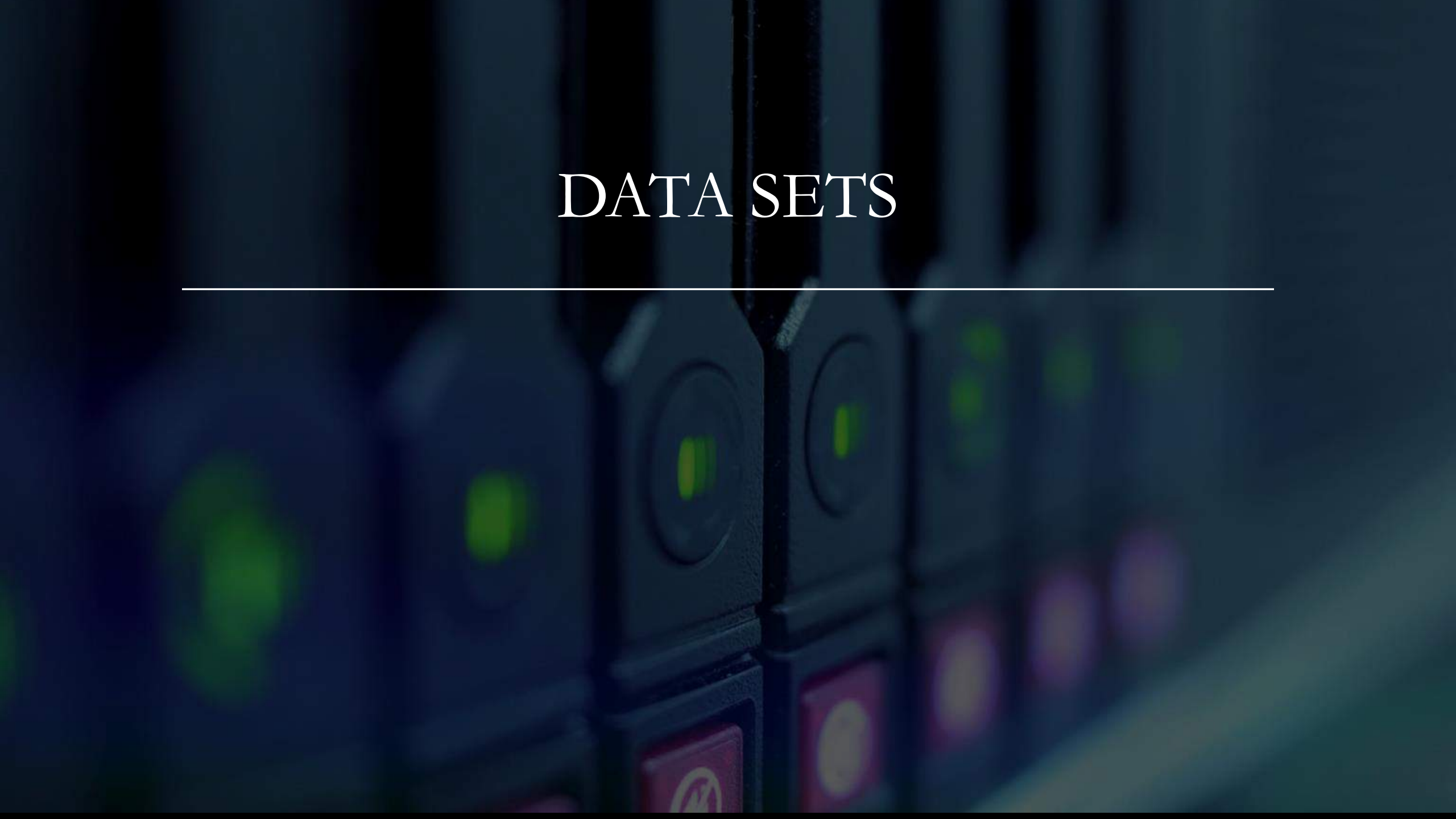
PROJECT AREA:

- Our project focuses more on the technologies of C.V(computer vision(providing eyes to the machine) and the technology of I.O.Vt(Internet of video things). These are the most recent technologies which are currently used to various applications, like automated vehicles and in the field of the robotics also. Computer vision is a field of artificial intelligence (AI) that enables computers and systems to derive meaningful information from digital images, videos and other visual inputs — and take actions or make recommendations based on that information. If AI enables computers to think, computer vision enables them to see, observe and understand.

Literature Survey

- In image processing morphological operations highly experimented in improving the appearance. To reduce the noise the MM is also applied it uses structuring element to probe the image and thereby useful information from the image can be obtained and noise can be reduced while preserving the features. This paper is on an experiment in which four morphological operations are working to reduce the noise from the gray scale image and thereby enhancing the quality of the images. In the literal , authors introduce the first step towards developing the Speed Detection Radar, where he explains a new approach in object detection technique, which is "adaptive background subtraction". Rad A. G. et al. developed a system in which they used video and image processing toolbox which calculates the speed of vehicle. It resulted in average error of speed +7km/h and -7km/h. This system could operate on images with various resolutions and different video sequences. Shedbalkar K.developed a speed estimation technique which was based on extended kalman filter for permanent magnet synchronous. System is developed in MATLAB in SIMULINK model Blockset. Leite A.V. et al. determined a way for estimation of speed in induction motor with sensor less control. Extended kalman filter was used as speed detection technique. This algorithm used reduce order state space model. Kassen N. et al. proposed a vehicle speed estimation technique which was reliable and strong. This helps the user with driving guide and lets him not to join the traffic jam. This approach is based on RF.

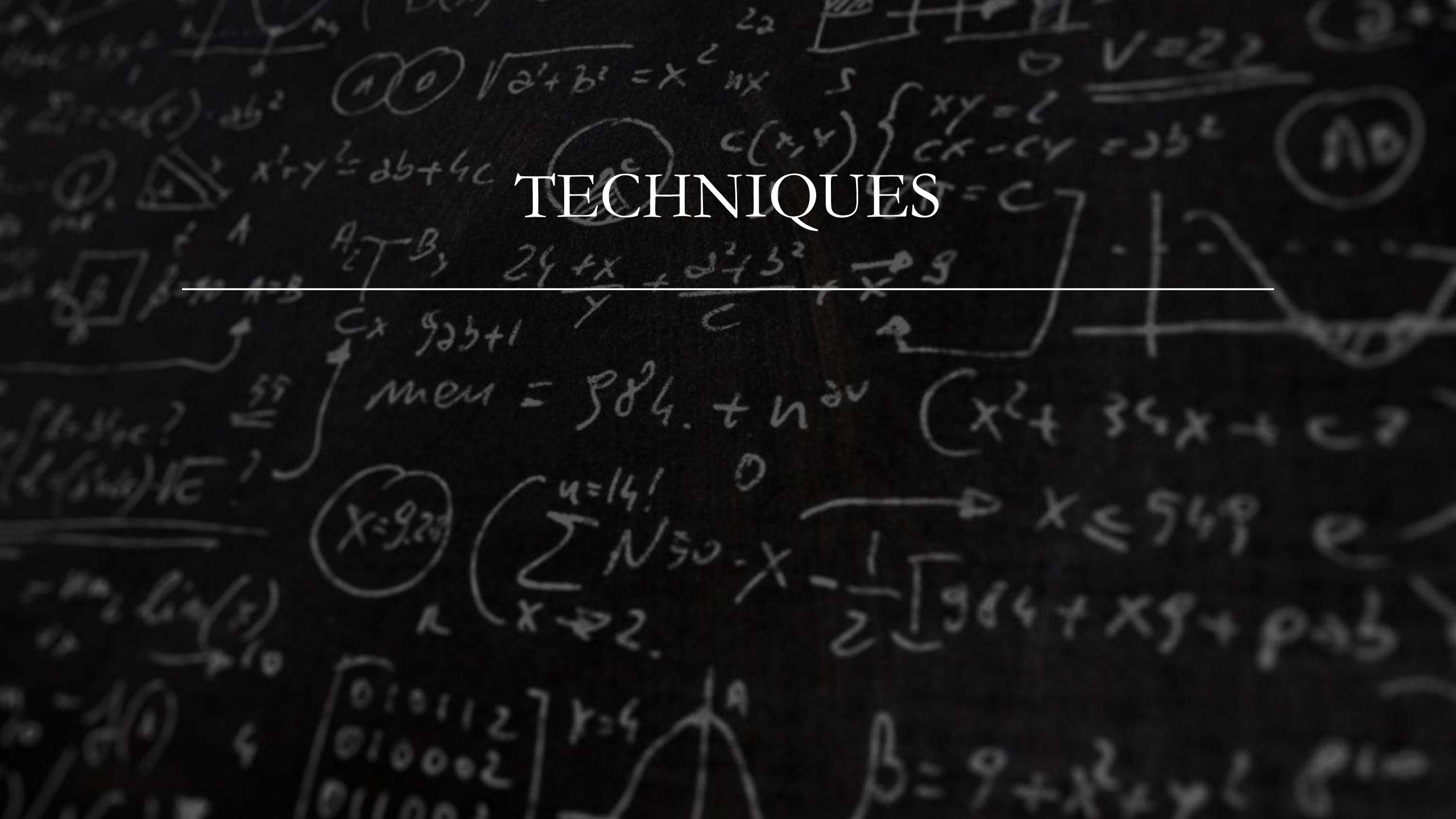
S.NO	Authors	Title	Publishing	Techniques & dataset	Pros	Cons
1	TarunKumar Dharmender Singh Kushwaha	An Efficient Approach for Detection and Speed Estimation of Moving Vehicles	10-01-2020	custom	They reduce the risk of accidents.	One of the major limitations to AI is considering ANNs as a “black box”
2	H. A.Rahim; U.U.Sheikh; A. S. M. Zain; W. N. F. W. Ariffin	Vehicle speed detection using frame differencing for smart surveillance system	10-05-2020	custom	It is easy to implement.	It was suspected of the ability of ANNs to generalize in cases where some information is missing in the data sets
3	Josep Maria Salanova Grau, Luigi Selmi	Multisource Data Framework for Road Traffic State Estimation	19-06-2018	custom	It reduces the man effort.	this requirement of hybridization to improve the performance especially in multi-scenarios is considered as a general weakness
4	Hong-bin Yu, Lin Xiao, and Li Wang	Sensors in Connected Vehicle Technology: How Sensors Play a Critical Role	03-08-2019	custom	Situational compliance. Once a driver is aware that a speed camera is installed in a certain area, they tend to behave themselves and drive the speed limit in said area.	Development of an AI-based for an efficient transportation system is very complicated, due to the creation of a mechanical intelligence along with the proper understanding the human-based information
5	Donghyeon Yoon, jeongheon Song	Determination of Vehicle Trajectory through Optimization of Vehicle Bounding Boxes using a Convolutional Neural Network	30-09-2020	custom	Random uncertainty. If a driver encounters enough speed cameras, they will be more likely to wonder (or assume) if there are such cameras anywhere they drive, especially in urban areas and school zones	the accuracy and on-time predictions are not reliable



DATA SETS

DATASETS

Datasets	Characteristics
KITTI	It is one of the most popular datasets for use in mobile robotics and autonomous driving. It consists of hours of traffic scenarios recorded with a variety of sensor modalities.
COCO	The MS COCO (Microsoft Common Objects in Context) dataset is a large-scale object detection, segmentation, key-point detection, and captioning dataset.
BRNOCOMPSPEED	The dataset contains videos around captured at six different locations. Vehicles in the videos are annotated with the precise speed measurements from optical gates using LiDAR and verified with several reference GPS tracks.



TECHNIQUES

TECHNIQUES

Datasets	Models
KITTI	NVS-MonoDepth GLPDepth STRL
COCO	GLIP DyHead Dual-Swin-L
BRNOCOMPSPEED	Transform2D Edgelets + BBScale + reg Transform3D

• Conclusion:

•We have presented a model-based vehicle tracking speed detection using AI which can work robustly under most circumstances. The system is general enough to be capable of detecting and classifying vehicles requiring only minimal scene specific knowledge.

THANK YOU