Team
Developers

EXCEED 2.0

Kalinga Institute of Industrial Technology
Patia, Bhubaneshwar
Odisha, India

INTRODUCTION:

We are a group of focused individuals from KIIT University. The topic chosen by us is **Image analysis for speed calculation**.

OVERVIEW:

Monitoring the speed is a necessary thing to ensure the safety of everyone throughout the journey. It is necessary for both pilot and the control room to monitor the speed as the control room also need to ensure that the vehicle is being driven at the right speed to avoid any kind of accidents. Getting accurate speed by using image analysis when the camera is on the loco itself will help to ensure the safety.

SOME SIMILAR METHODS:

A similar method can be that a camera is mounted somewhere else like at a railway station or running checkpoints to measure the speed of a train passing by, using image analysis. But this kind of method has some drawbacks like having no cameras in certain region.

This kind of problems can be solved if the camera is mounted on the loco.

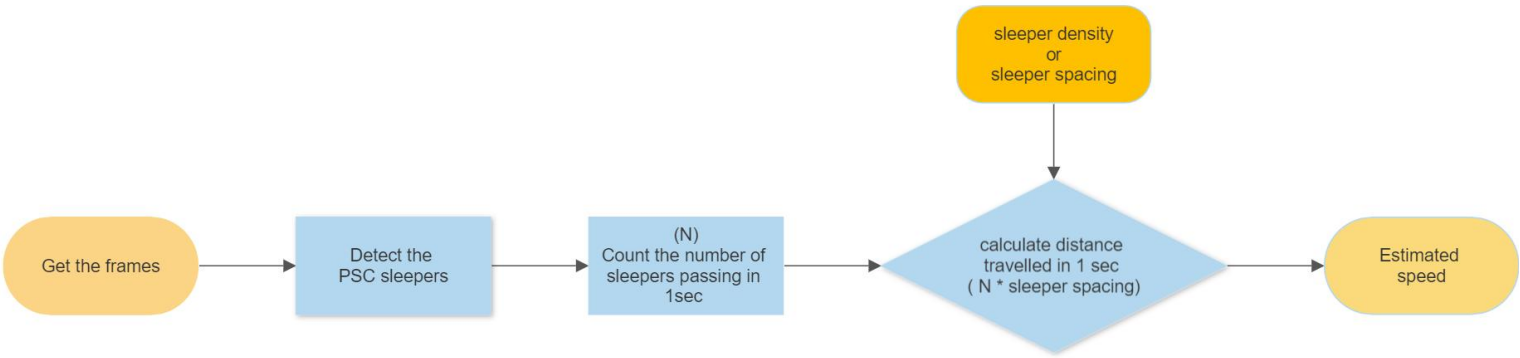
SOLUTION 1:

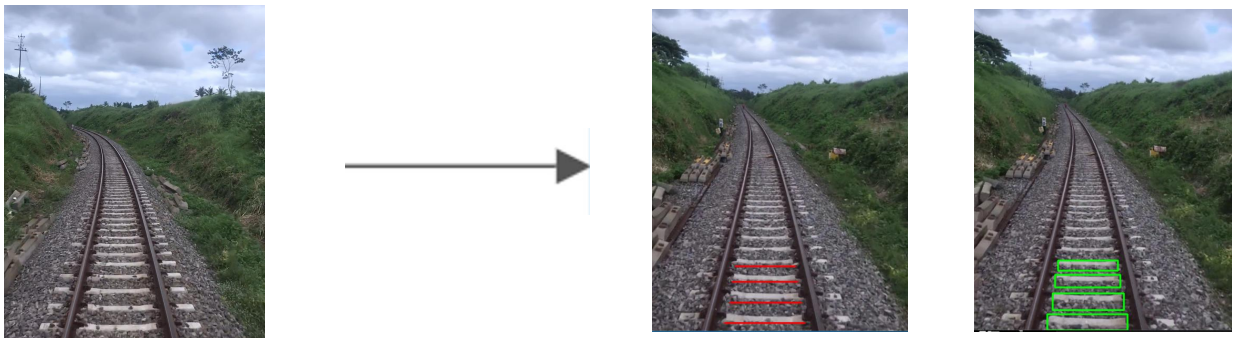
One possible way to calculate the speed using image analysis is that, first we will detect the PSC sleepers on railway track in the video frames. And then we will use the sleeper density and number of sleepers passed in 1 second to calculate the distance travelled in 1second and hence the speed.

	Routes						
Traffic Density in GMT	A	B	C	D-Spl	D	E-Spl	E
More than 20	1660	1660	1660	1660	1660	1660	1660
10-20	1660	1660	1660	1660	1540	1660	1540
Under 10	1660	1540	1540	1540	1540	1540	1540
Loop lines	1340	1340	1340	1340	1340	1340	1340
Pvt. siding	1340	1340	1340	1340	1340	1340	1340

NOTE : Number of sleepers per km.

Image source : irpwm-i2 (pg 68)





Example:

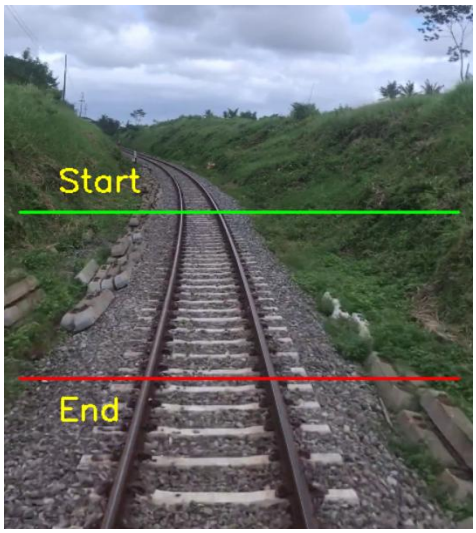
Let the number of PSC sleepers passing in 1 sec = N = 4
And the sleeper density be 1660 per Km
Top width of sleeper = 0.15m

∴ *distance between two sleepers* = 0.602 + 0.15 = 0.752m
(*or sleeper spacing*)

Distance travelled in 1 second = number of PSC sleepers passing in 1 sec × Sleeper spacing
= 4 × 0.752 = 3.008 m

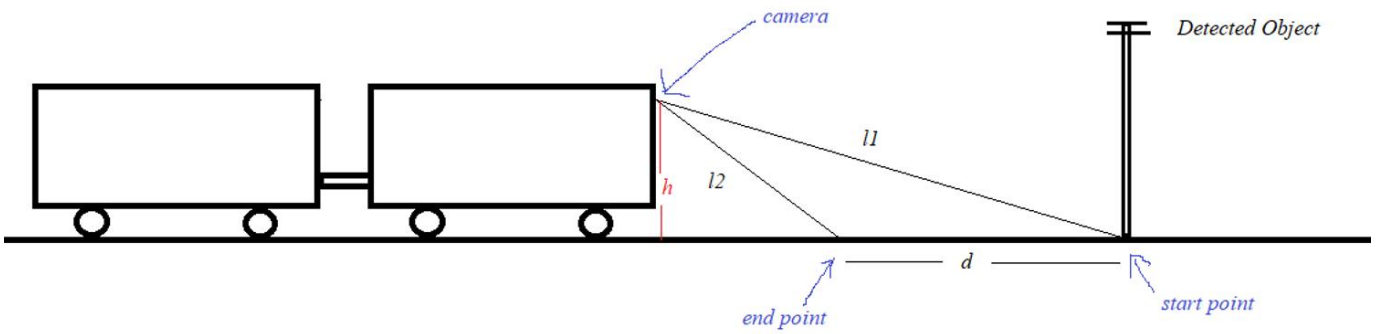
∴ *speed* = 3.008 m/s
= 10.8 km/h

SOLUTION 2:



Another possible way to calculate the speed is that, first we will define a region in the frame with start as the farthest point and end as the nearest point (*distance between start and end point is d*).

Then we will try to detect any object of significant size and which is stationary with respect to outside of train. We will calculate the time taken by that object to move from start point to end point. By this we can get the speed of that object with respect to the train, and since the object is stationary to outside world, its speed with respect to the train will be the speed of the train.



To get "*d*" we need to know camera angle and its height from the ground.

EXAMPLE:

If the distance (*d*) is 10 meters.
And time taken by the object (*t*) is 4 seconds.

∴ speed = d / t = 10/4
= 2.5 m/s
= 9 km/h

We hope that our hard work, dedication and all the efforts will contribute to the safety of many.