**Research Paper Summary**

**Citation:** S. Chen and R. Chen, "Vision-Based Distance Estimation for Multiple Vehicles Using Single Optical Camera," 2011 Second International Conference on Innovations in Bio-inspired Computing and Applications, 2011, pp. 9-12, doi: 10.1109/IBICA.2011.7.

**Title: Vision-Based Distance Estimation for Multiple Vehicles Using Single Optical**

**Camera Feature**

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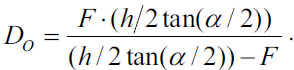
**Link to paper:** [**https://github.com/albud187/ELG5163\_project/blob/main/literature%20review/finished\_reading/Vision-Based\_Distance\_Estimation\_for\_Multiple\_Vehicles\_Using\_Single\_Optical\_Camera.pdf**](https://github.com/albud187/ELG5163_project/blob/main/literature%20review/finished_reading/Vision-Based_Distance_Estimation_for_Multiple_Vehicles_Using_Single_Optical_Camera.pdf)

Section 1 - Overall Idea

* detect the multiple vehicles’ distances based on a single optical camera.
* the size of license plate is fixed and regular, the working principle of the proposed algorithm is to use the width of the license plate as the known information, and then derives a distance-pixel relation equation.

Section 2 – Methodology

* Object distance can be determined by using the focal length and the angle of view of a camera using this formula:



Where *h* is the object’s image size.

* By using above equation, a training phase determines the relation equation between the license plate pixel size and vehicle distance. From experimentation, a dense type relation equation, where the training vehicle is arranged at every 3 meters from 5 meters to 50 meters, is determined as the best relation equation with the lowest average error rate (1.91%). The relation equation is:

where x and y are the width of license plate pixel size and the estimated vehicle distance respectively.

Section 3 - Applications

* This paper is a basic application of measuring distance from license plate size, but does not differentiate between multiple license plates.
* Can use paper as a theoretical reference, but does not provide any novel idea to determine distance. The paper simply uses an exponential formula to convert pixel size to distance from known data points. (Anyone with a measuring tape and MS Excel could do that).

Section 4 - Future Development

* Application of algorithm to differentiate license plates is required to separate multiple vehicles.

Section 5 - Questions

* What was the point of part II?

Section 6 - Anything Else

* NA