**Notes Paper Vehicle Counting and Speed Measurement Using Headlight Detection**

* Only works in low light
* Use headlights
* Find the headlights in the Video and track their movement (normalized cross-correlation and area-centroid-difference)
* Speed calculated via distances (eucl.)/pin-hole

*->IMPORTANCE OF VIDEO PRE\_PROCESSING*

* image binary conversion = picture to array
* **blob detection** methods are aimed at detecting regions in a [digital image](https://en.wikipedia.org/wiki/Digital_image) that differ in properties, such as brightness or color, compared to surrounding regions
* After the headlight gets found it has to get paired with the second headlight of the same vehicle.
  + area-centroid-difference: for one detected headlight must be the second headlight in the defined area (kind of defined threshold)
  + normalized cross-correlation: assumption, that the headlights are vertically symmetrical
    - with this method motorcycles can be detected
* use only black and white binary conversion for differentiating between dark and headlights
* I DONT REALLY GET why they match the headlights, shouldn't you just be able to find “one” headlight and follow it? Maybe this is only for counting the vehicles, not for speed
* You have to know a lot about the position of the CCTV, height, distance, etc. to floor.
* Best performing approaches: normalized cross-correlation for detecting and counting cars, pin-hole model performed the best speed estimation -> combination of normalized cross-correlation and pin-hole model is the best one

**Thoughts:**

* We probably have to bias our results into some direction to get best results
* We need MUCH more as the paper covers, since we need a lane detection to understand if we could drive faster
  + with the methods from above we could detect if there are large speed differences between cars -> this could lead to more insights (no speed limit)
* TBH: if we have sound (like in the youtube example of the doc, i would maybe use the sound of cars as model input
* We only track the leftmost lane of the direction of cars moving

WHATS THE REAL USE CASE? Question