Using Computer Vision on Crowdsourced Streetview Data to Register Safety Performance Indicators for Motorcyclists
Background – Motorcycle helmet use

• Motorcycle helmets can lower the risk of fatal injuries of riders by 42% and reduce the risk of injury by 69% in case of a crash

• In high-income countries, helmet use on motorcycles is close to 100%
  - France: 98%
  - Denmark: 98%
  - Germany: 99%

• But what about LMIC countries?
  • Where motorcycles are the main mode of transportation?


Some previous work

- Previous research in Myanmar and Nepal
  - Nepal hand counted.
Human counted
Computer vision counted
Some previous work

- Previous research in Myanmar and Nepal
  - Nepal hand counted.
  - Myanmar computer vision

Results from Myanmar
But the world is big...
Images from Bangkok

- On-the-road perspective
- Anonymization of faces and license plates
- Images differ in resolution and overall quality
- Different lighting, angles and orientations of motorcyclist
Assessing helmet use in Bangkok

Main road infrastructure (OpenStreetMap data)

Image locations on Mapillary

Motorcycles detected on Mapillary images with YOLO
Assessing helmet use in Bangkok

- We annotated 2600 images for their helmet use.
- We trained the algorithm on 2000 images and tested on 600 images (with a total of 1631) bikes.
- For the detection of active motorcycles, we achieve:
  - A precision of 91%
    (i.e. when an active motorcycle is detected, the detection is correct in 91% of cases)
  - A recall of 51%
    (i.e. only about half of active motorcycles present in the data are detected by the algorithm)
Assessing helmet use in Bangkok
Assessing helmet use in Bangkok
Room for improvement
Room for improvement
Room for improvement
Assessing helmet use in Bangkok

• We annotated 2600 images for their helmet use.
• We trained the algorithm on 2000 images and tested on 600 images (with a total of 1631) bikes.
• For the detection of active motorcycles, we achieve:
  • A precision of 91%
    (i.e. when an active motorcycle is detected, the detection is correct in 91% of cases)
  • A recall of 51%
    (i.e. only about half of active motorcycles present in the data are detected by the algorithm)
• Helmet use in the Test data is 67.8%, due to the missing detections, the algorithm produces a relatively inaccurate helmet use estimate of 53.1%
Scaling beyond Bangkok

Bangkok

Jakarta
In conclusion and the future

- It is a cheap and scale able solution to register safety performance indicators in LMIC.
- Already seeing performance increase with more data and better data cleaning.
- In the progress of scaling this to multiple cities and countries.

➢ Most important: Always use a helmet when travelling on a motorcycle! (and bike)
Merci!

Felix Siebert
DTU
felix@dtu.dk

Christoffer Riis
DTU
chrrii@dtu.dk

Frederik Hüttel
DTU
fbohy@dtu.dk