



Grip Measurement



Grip Measurement Overview

FOCUS

Addfor has patented a procedure to estimate the road grip based on the analysis of the image of the road in front of the car, collecting data through the Grip Measurement Device (GMD) and correlated with the images of the road in front of the car collected by the smartphone, using the software called Visual Grip Estimator (VGE).

HOW WE DO IT

Our algorithm, trained with signal processing and AI techniques, is able to classify 5 types of road conditions and recognize the related grip.

Grip Measurement Device - GMD

GMD is a device to measure the status and level of grip of the road.

It is applied to normal cars and can be used in normal driving on open traffic roads in normal movement.



Grip Measurement Device - GMD

Data Collection

Collection of time series data through GMD Measurements

Collection of grip estimation data through ABS Braking Measurements



Classification Labels

5 Road Conditions



Dry Good



Snow/Ice



Dry Bad



Wet Good

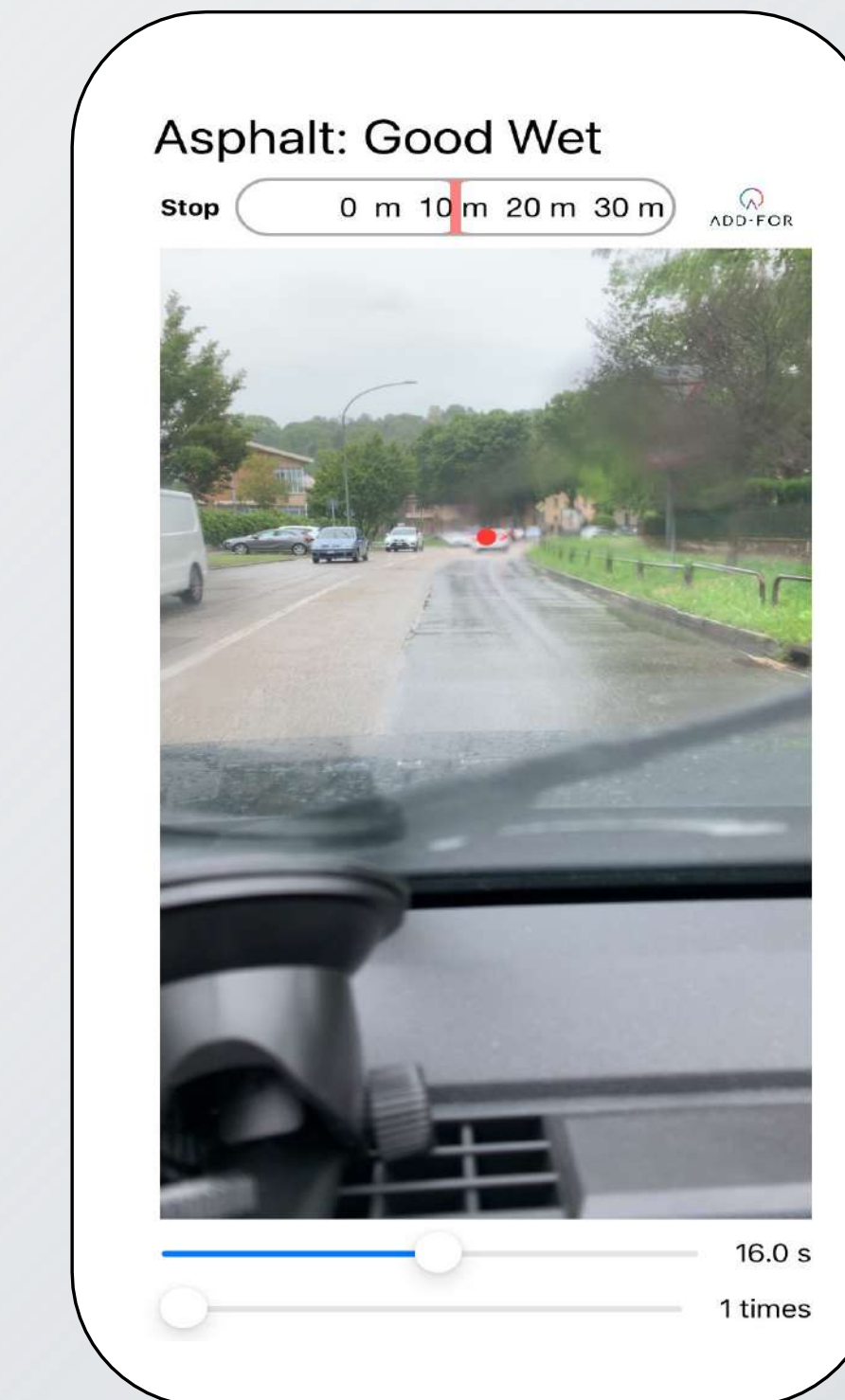
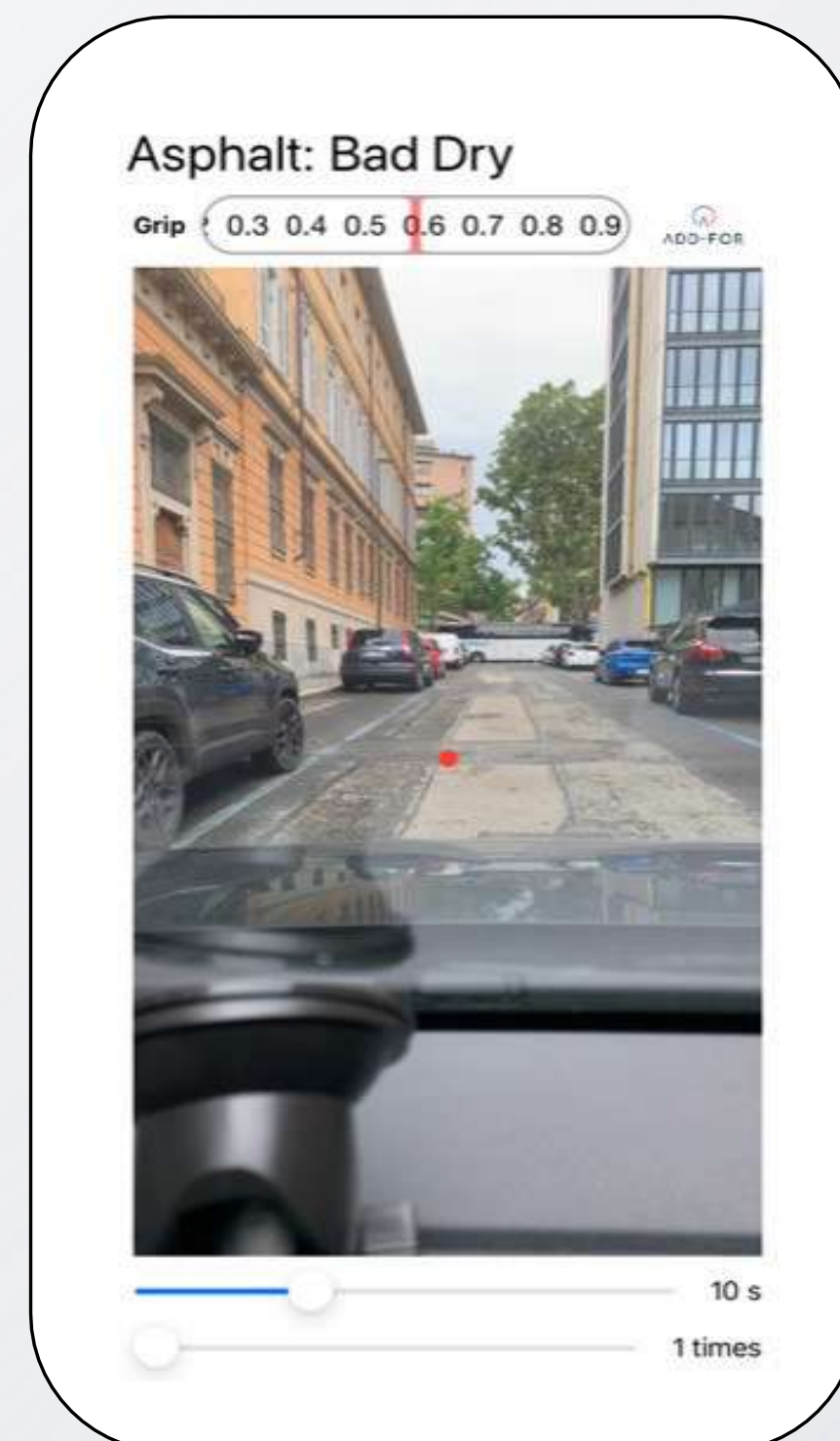


Wet Bad

Visual Grip Estimator- VGE

Software trained with the puntual data from the GMD and matched with the image captured from the camera, recognize the road conditions in front of the car (good or damaged asphalt, dry, wet, snow, ice) and estimate a grip index and related emergency braking stopping distance.

It works with any suitable camera, both local or cloud analysis.

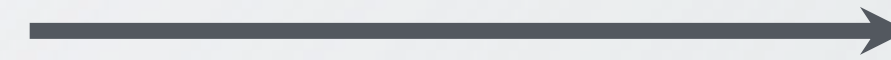


Visual Grip Estimator- VGE

Result

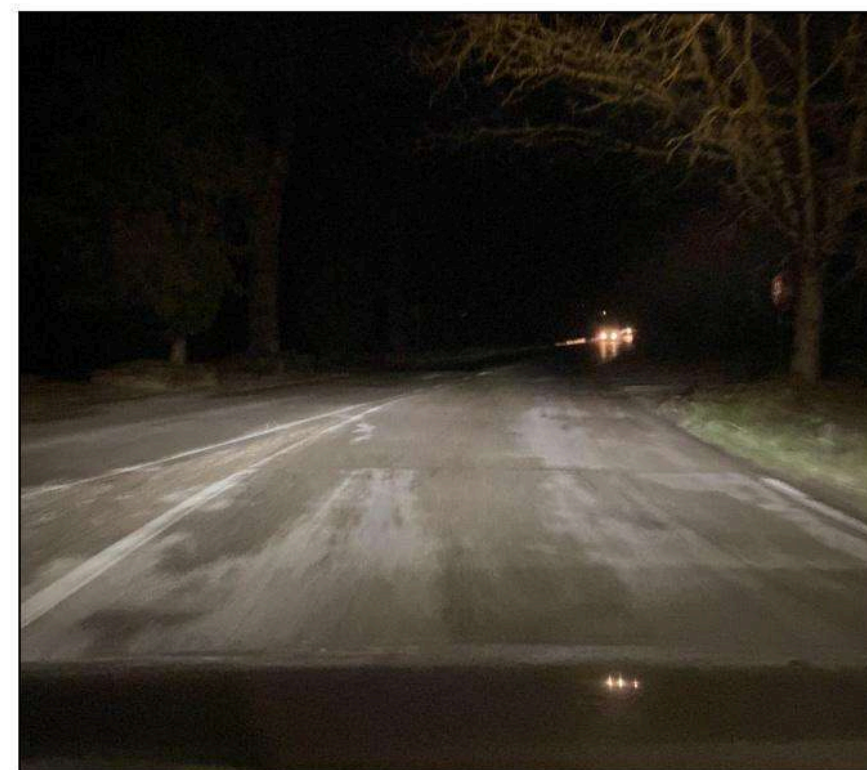
VGE has been trained and validated using over 400,000 images, it shows an accuracy of 96% in daylight and 88% in night conditions.

Dataset processed automatically
selecting the best relevant
features for classification

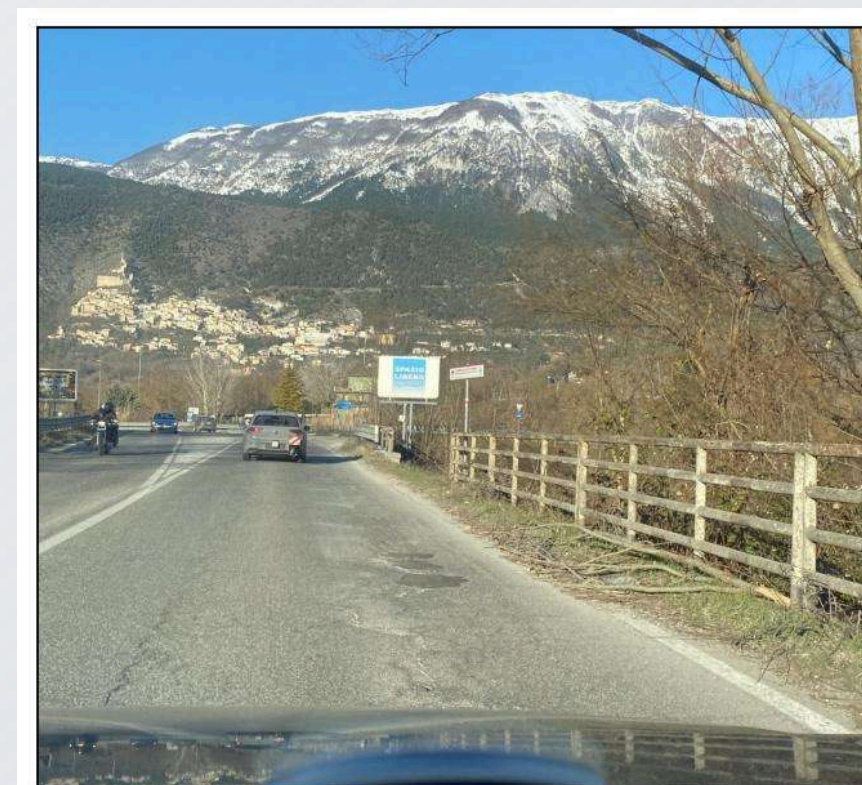


Grip value in output

- | | |
|------------|------|
| • DRY GOOD | 0,97 |
| • DRY BAD | 0,88 |
| • WET GOOD | 0,69 |
| • WET BAD | 0,31 |
| • ICE/SNOW | 0,10 |



Bad Wet
Friction: 0.50

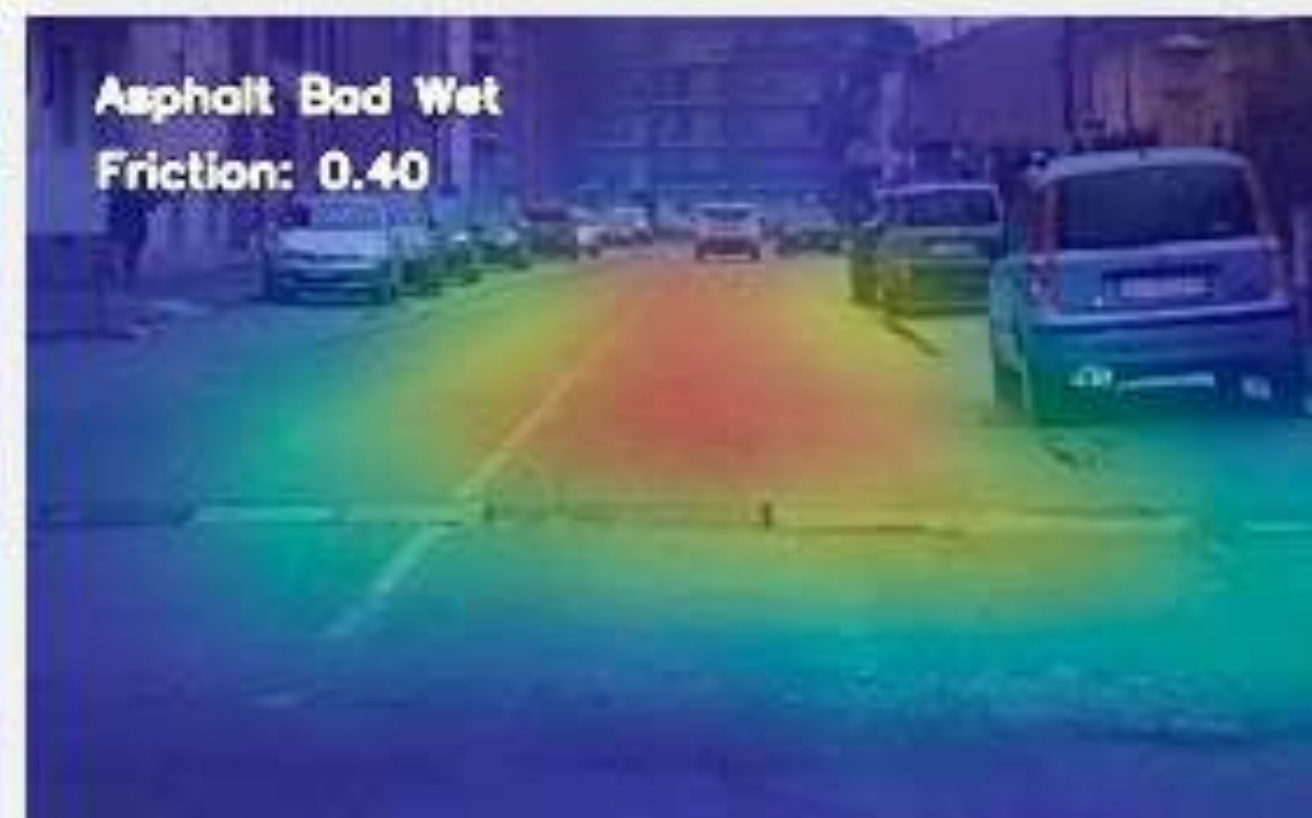


Bad Dry
Friction: 0.81

Visual Grip Estimator- VGE

Result

AI explainability techniques were used to verify which areas of the image the network uses to predict grip.





Thank you