Driving declinometer & vehicle weight estimation

Knowing the weight of a vehicle and the slope of the road would be beneficial for many driver assistance systems. For example, the information could be used to improve power management or plan routes based on weight restrictions.

Unfortunately, installing additional sensors to measure weight and slope directly is expensive. However, vehicles already track properties like engine power and speed that depend strongly on the unknown quantities. These could be used as input for a software "sensor" that is much cheaper than a hardware solution.

Can you accurately predict weight and slope using signals that already exist on a vehicle?

Evaluation

Predicted slope

1. Compute the absolute error for each prediction

$$e = \text{abs}(y_p - y_t)$$

where y_p is the predicted slope and y_t the actual slope (in %).

2. Each prediction earns points based on how close it is to the truth:

Error	Points
$0.000 \leq e < 0.001$	1.00
$0.001 \leq e < 0.010$	0.50
$0.010 \leq e < 0.020$	0.25
$0.020 \leq e < 0.050$	0.00
$0.050 \leq e < 0.300$	-0.25
$0.300 \leq e < \infty$	-0.50

1. Your score S is the average number of points on the test data, which yields a number between -0.5 and 1.0.

Predicted weight

1. Compute the recall for each class $i \in \{0, 1\}$ (corresponding to 38 t and 49 t)

$$R_i = \frac{TP_i}{TP_i + FN_i}$$

   where TP_i are the true positives and FN_i the false negatives.

2. Your score is the geometric mean of the two values, i.e., $W = \sqrt{R_0 R_1}$, which is a number between 0.0 and 1.0.

Combined score

The combined score for each submission is the sum of the two scores $S + W$, which yields a number between -0.5 (worst) and 2.0 (best).