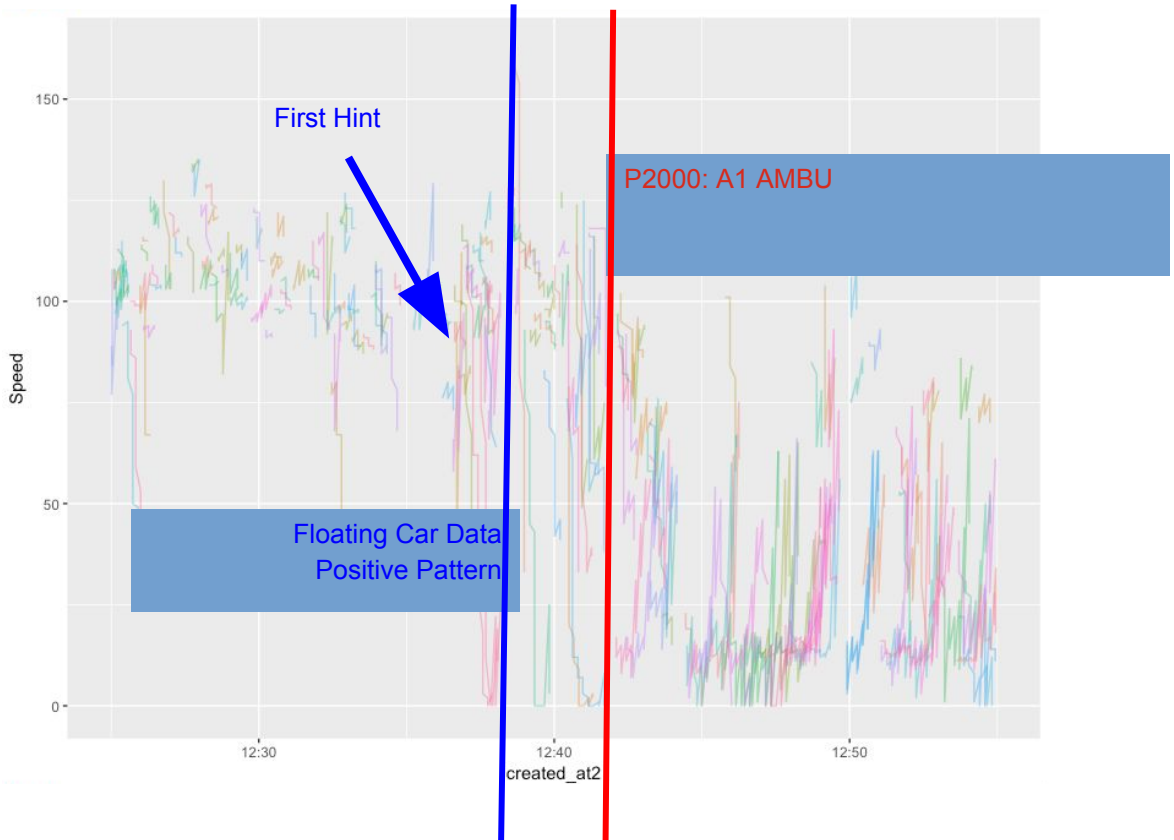
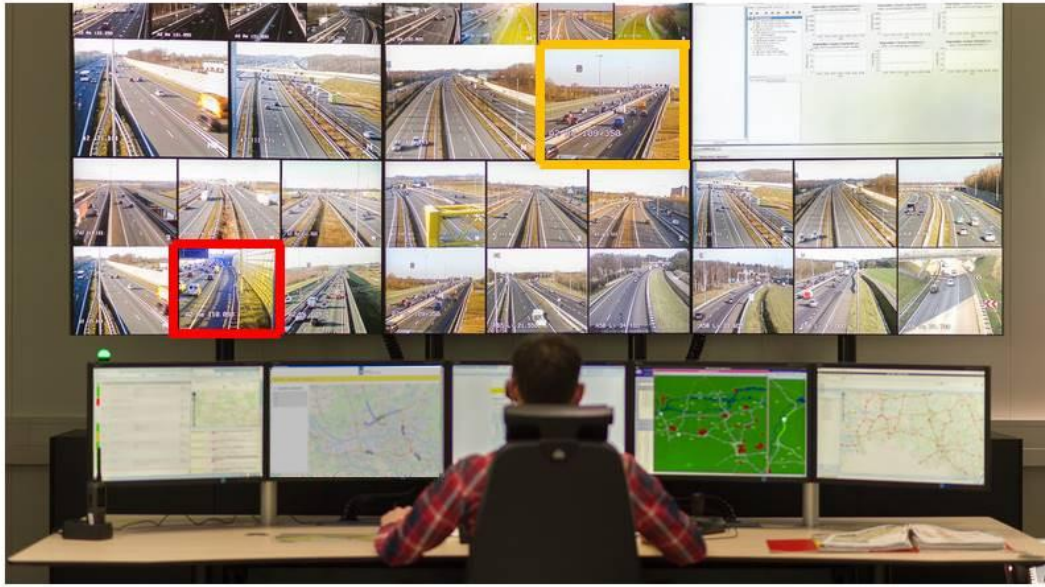
Rijkswaterstaat datalab

RWS DATA SCIENCE

Floating car data

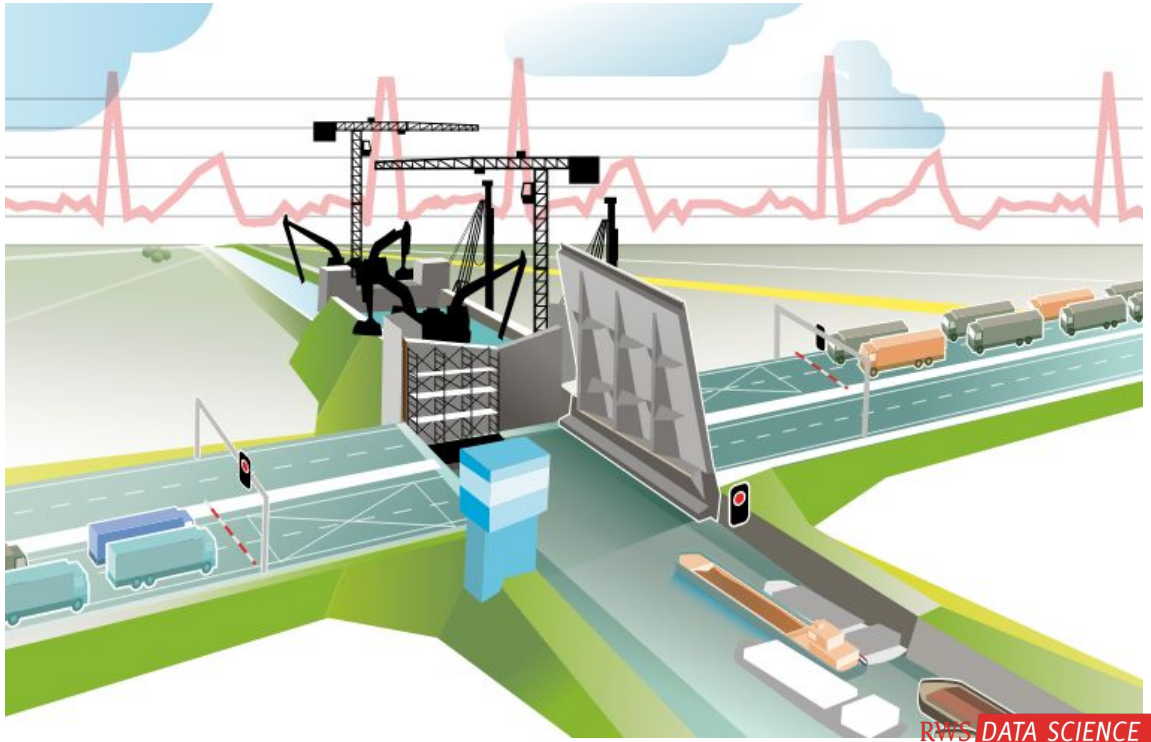


Traffic cameras



Aerial and satellite images

Sensor Data



Streetview images

Image analysis program

Deep learning

$$data + labels \subset R^n \times R^k$$

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$$network: \ R^n \times R^m \to R^k$$
$$network(x, a) = y$$

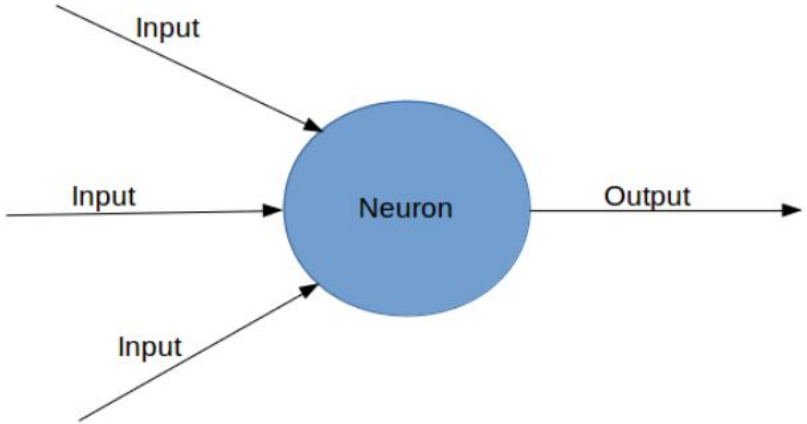
$$fout: \ R^k \times R^k \to R$$
$$fout(y', y) = r$$

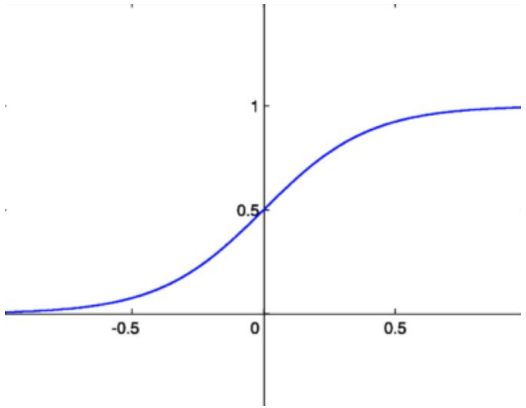
The ‘learning’ in deeplearning

$$a_0 = a_0$$

$$a_{i+1} = a_i - lr \cdot \sum_{(x,y') \in data \times labels} \nabla_a fout(network(x, a_i), y')$$

The neuron

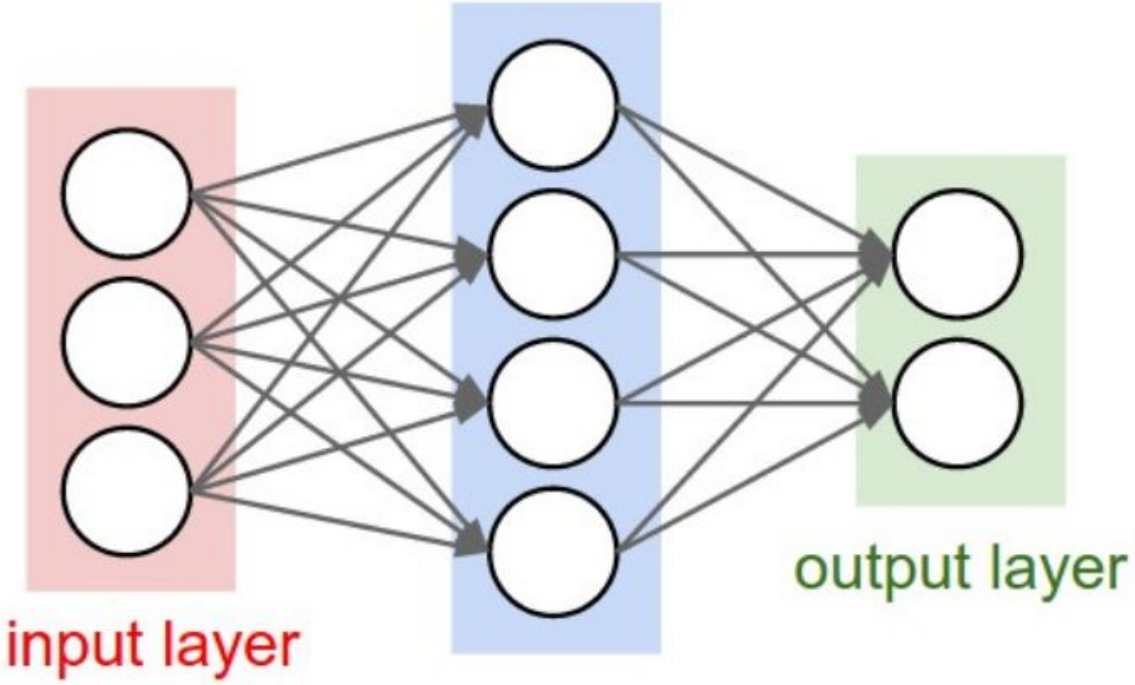




$$y = a_1 \cdot x_1 + a_2 \cdot x_2 + a_3 \cdot x_3$$

$$\sigma(y) = \frac{1}{1 + e^{-y}}$$

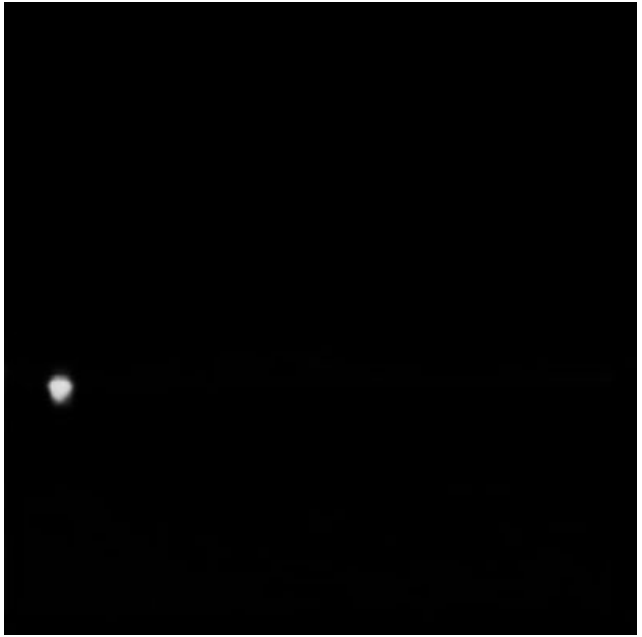
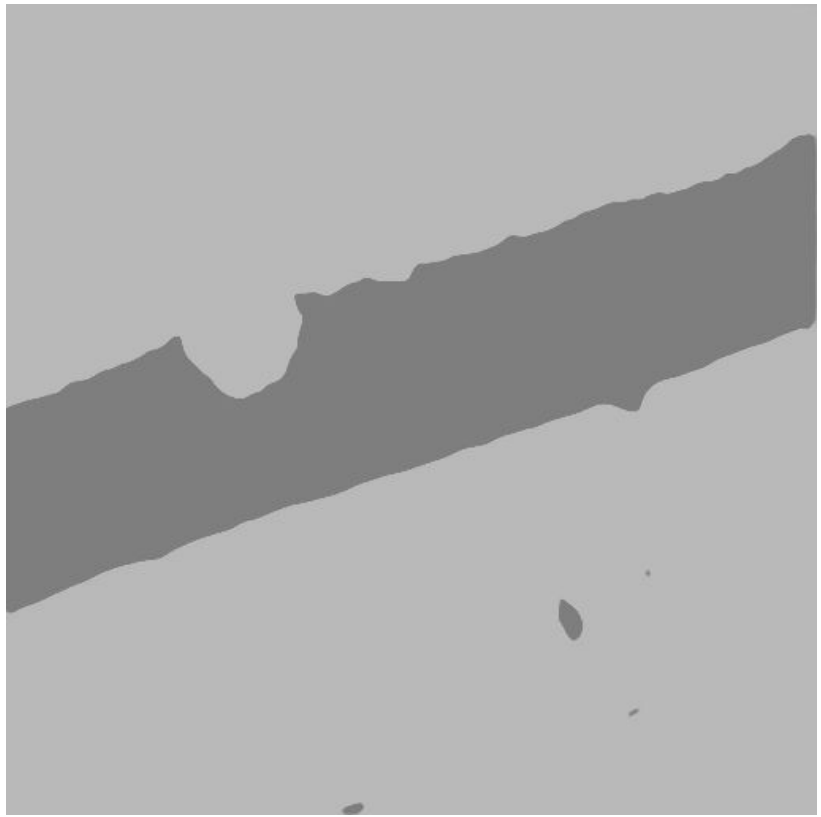
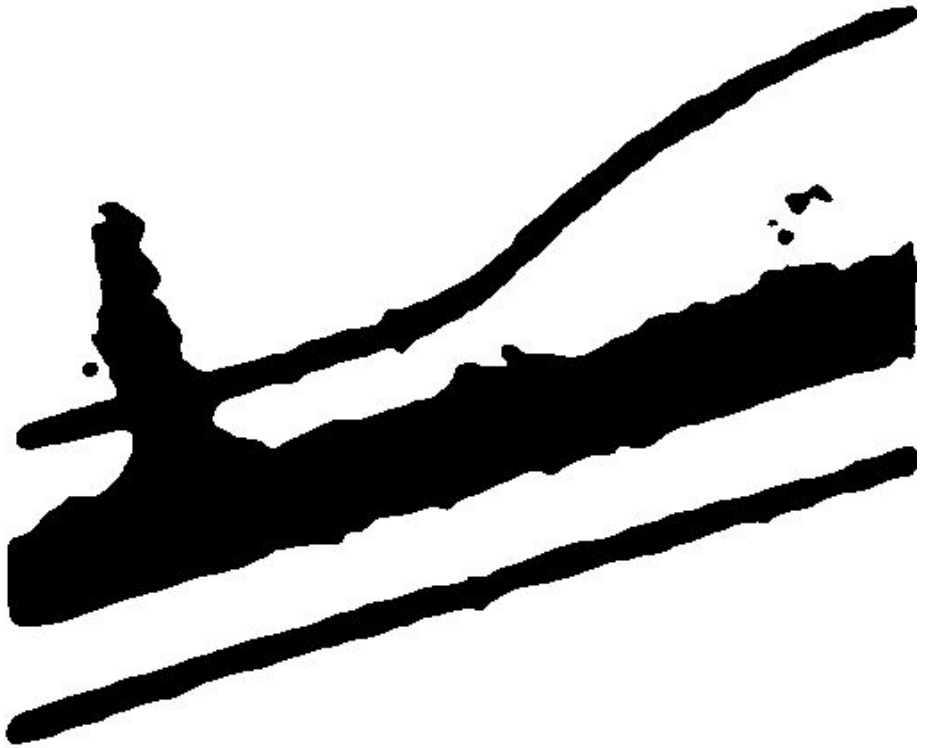
Neural networks



$$y = \sigma(B\sigma(Ax))$$

Classification

Detection



Automatic map generation