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Tesla’s Neural Networks

Tesla’s Cameras and Sensors

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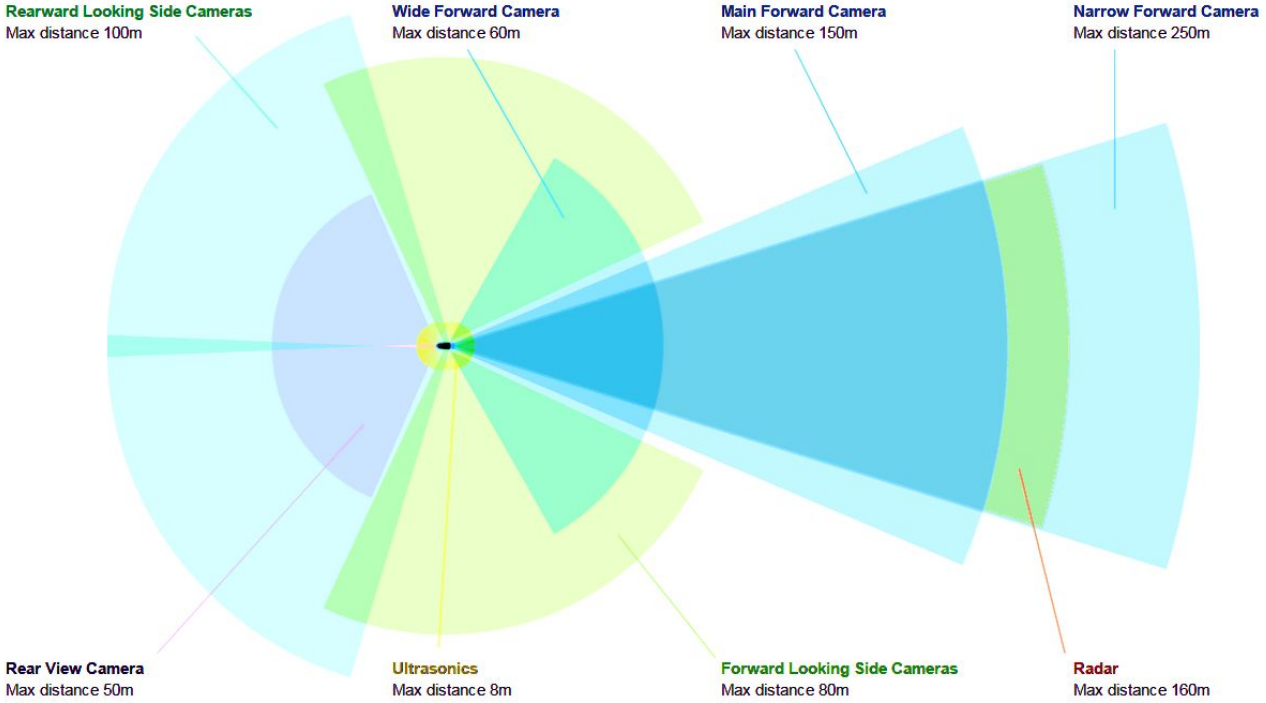

How Neural Networks work

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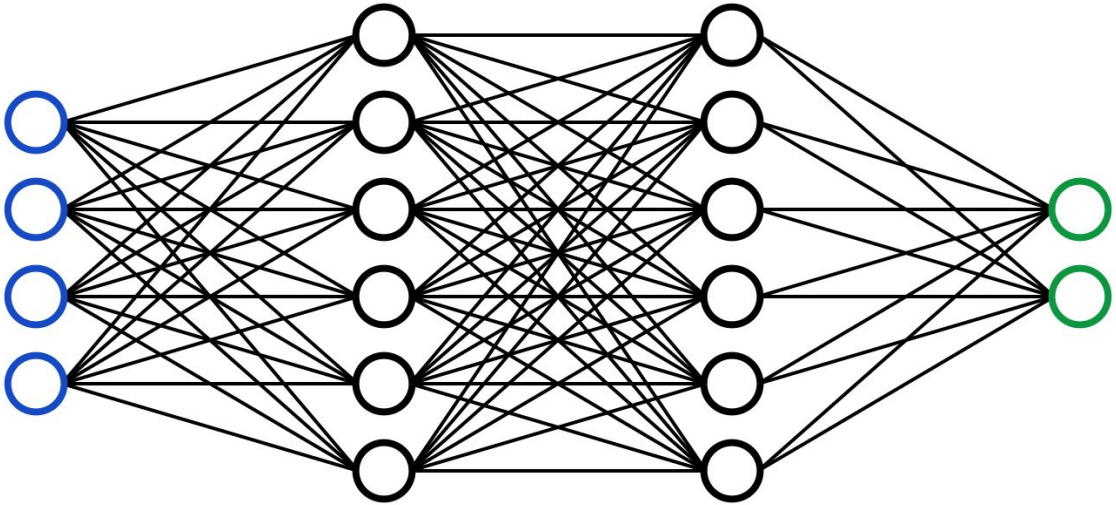

Use of the Neural Networks

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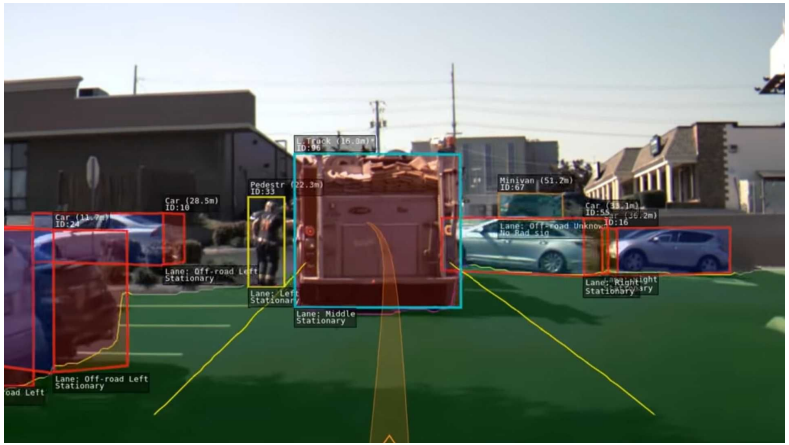
- Lane Labeling
  - Path Prediction
- Detection of
  - Cars
  - Pedestrians
  - Signs
  - Traffic lights
  - Other objects
- Fleet learning
  - Cut-ins



Convolutional Neural Networks

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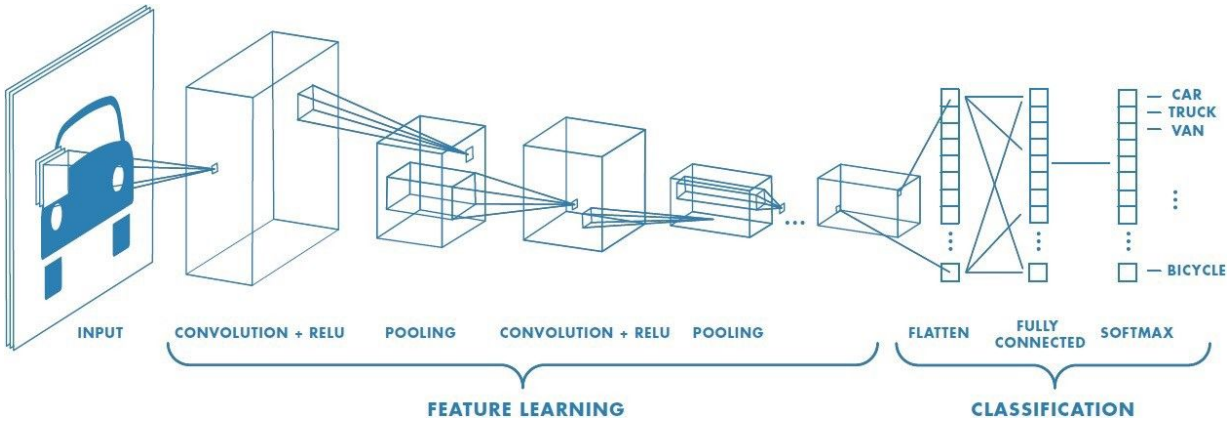

Full Self Driving Computer

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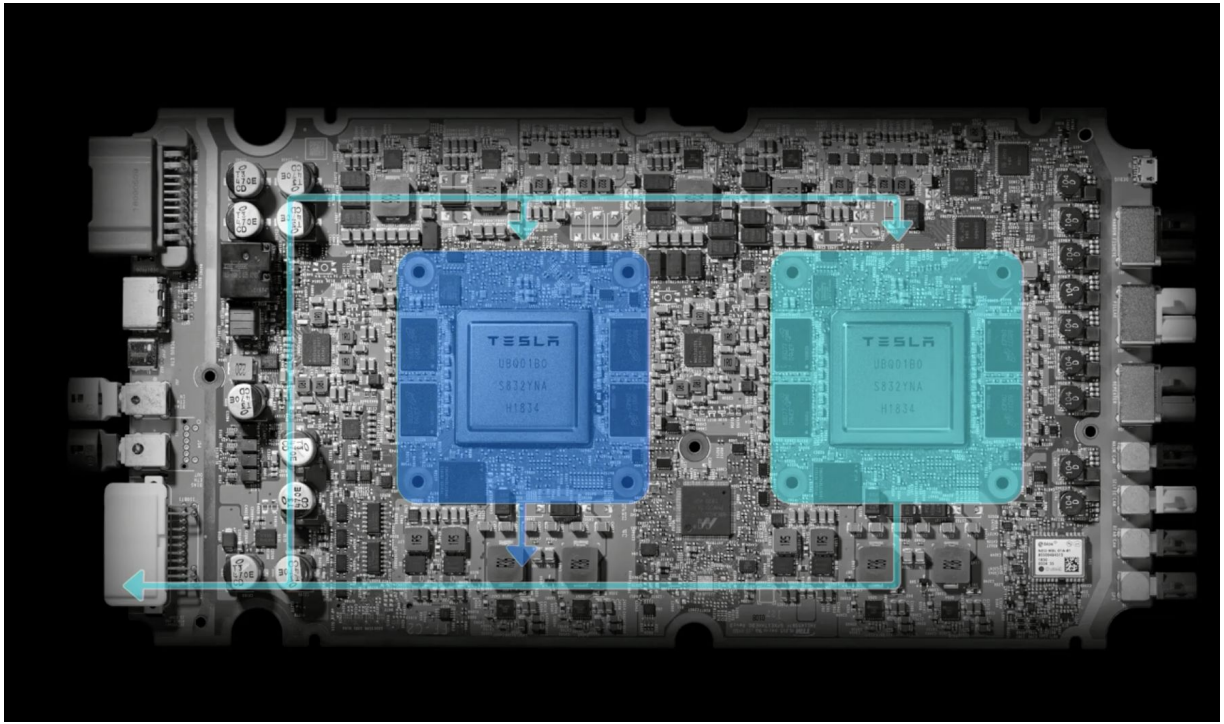

Neural Network Processor

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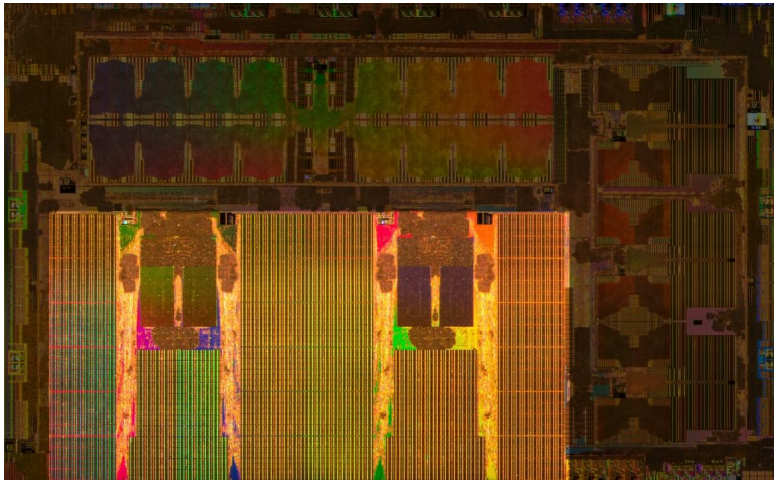
- Specific made for matrix operations
- ReLU and Pooling hardware
- 36 Tera operations at 2 GHz
- 2 Neural Network Processors
    - 72 Tera operations in total



Training Process

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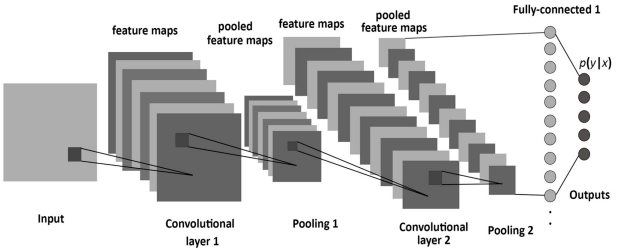
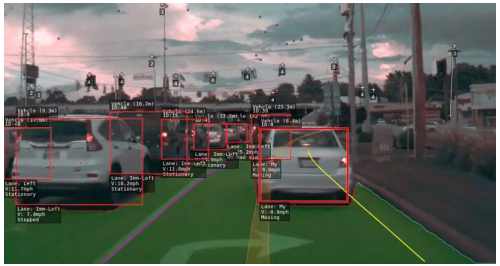
Deploy new trained neural network into car

Train the neural network

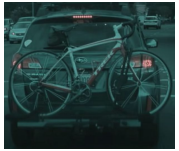


Car's view from sensors, cameras and NN output



Data input
Predictions

Improve training set
New images / situations



Label the new unknown data

Tesla’s Total Rewrite of Code

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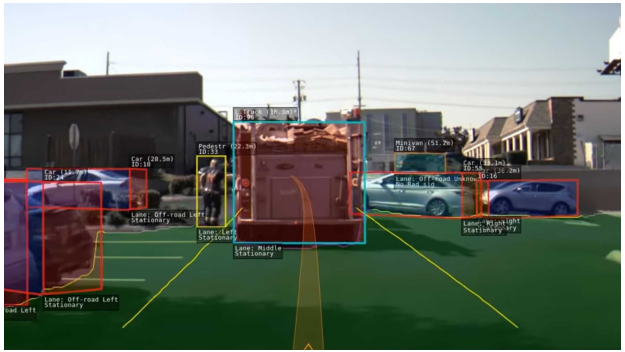
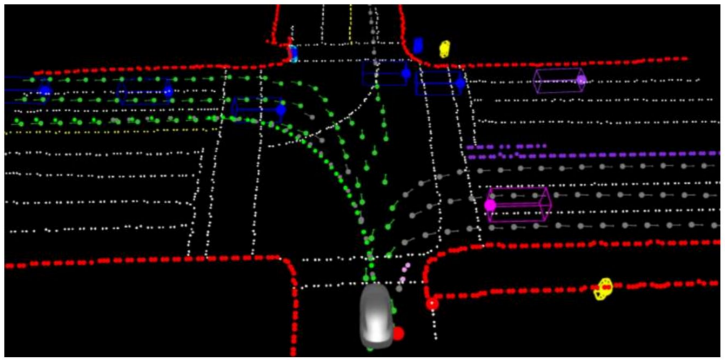
- The cars’s view before FSD vs Now
- Got stuck at local maximum
- From 2.5D to 4D





Why Tesla doesn’t use LIDAR

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LIDAR

Camera - 3D reconstruction

Full Self Driving

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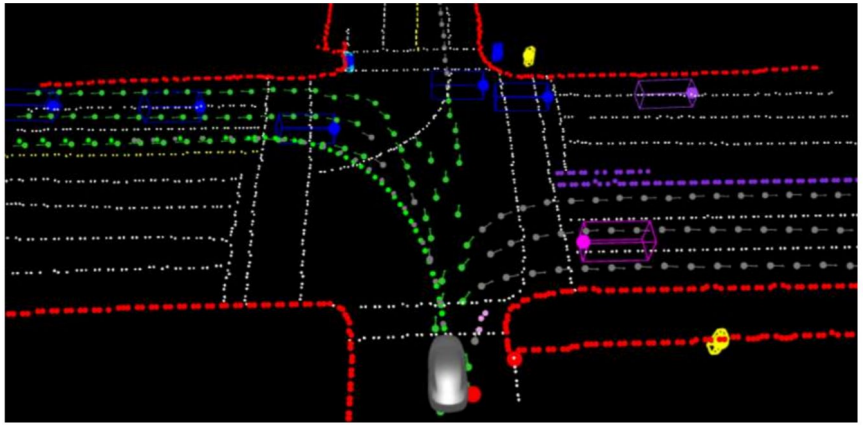

Tesla’s Shadow Mode