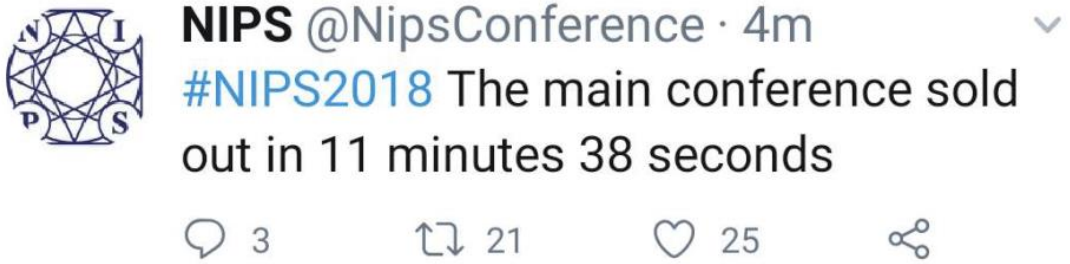
Data Science Research Trends

Yogesh Kulkarni

AI Conference or Pop Concert?



(Ref: NIPS Tickets Sell Out in Less Than 12 Minutes - Synced)

History of Deep Learning Ideas

- 1943: Neural networks (Walter Pitts and Warren McCulloch)
- 1957-62: Perceptron (Frank Rosenblatt)
- 1970-86: Backpropagation, RBM, RNN
- 1979-98: CNN, MNIST, LSTM, Bidirectional RNN
- 2006: “Deep Learning”, DBN
- 2009: ImageNet + AlexNet
- 2014: GANs
- 2016-17: AlphaGo, AlphaZero
- 2017: 2017-19: Transformers

In recent past…Imagenet..

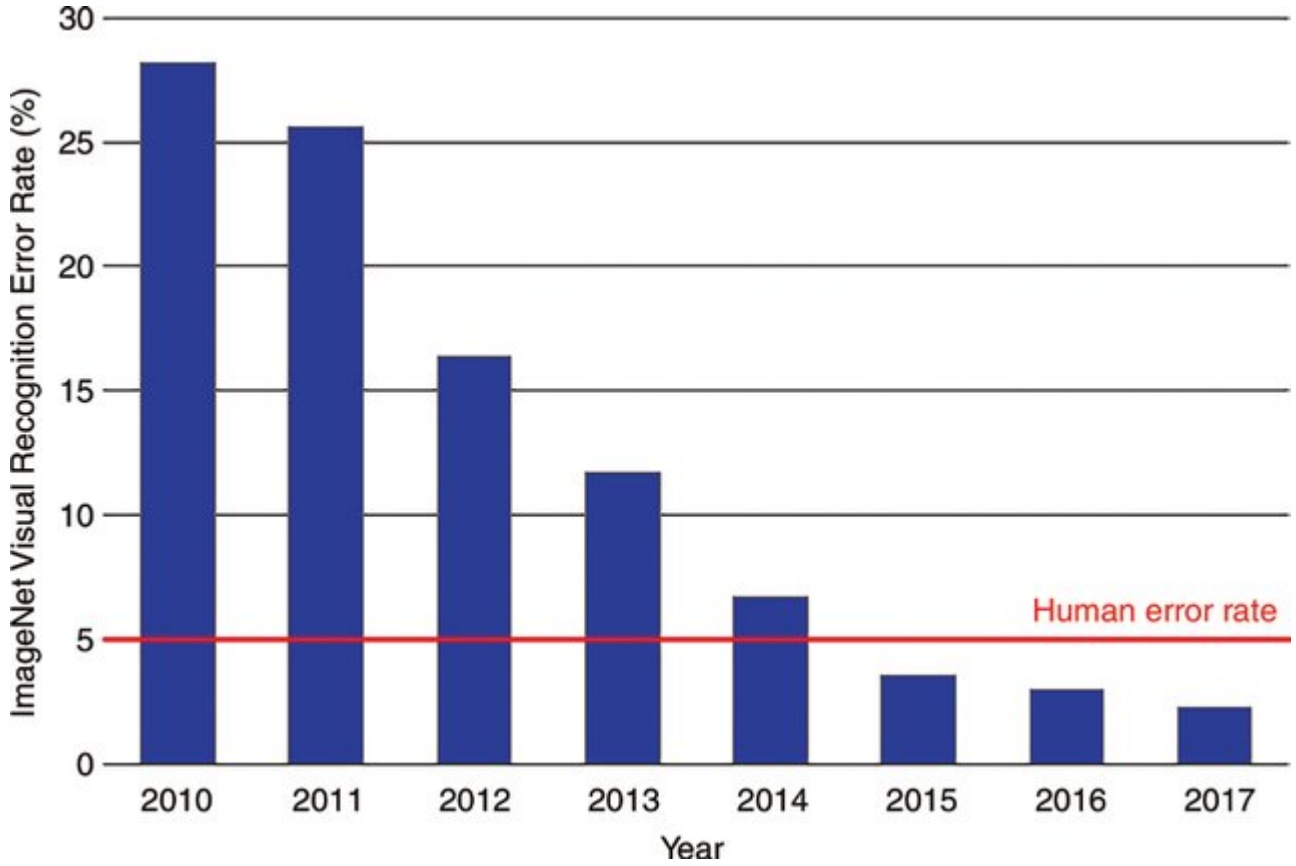


Image Captioning Challenge

A person riding a motorcycle on a dirt road.

Two dogs play in the grass.

A skateboarder does a trick on a ramp.

A dog is jumping to catch a frisbee.

A group of young people playing a game of frisbee.

Two hockey players are fighting over the puck.

A little girl in a pink hat is blowing bubbles.

A refrigerator filled with lots of food and drinks.

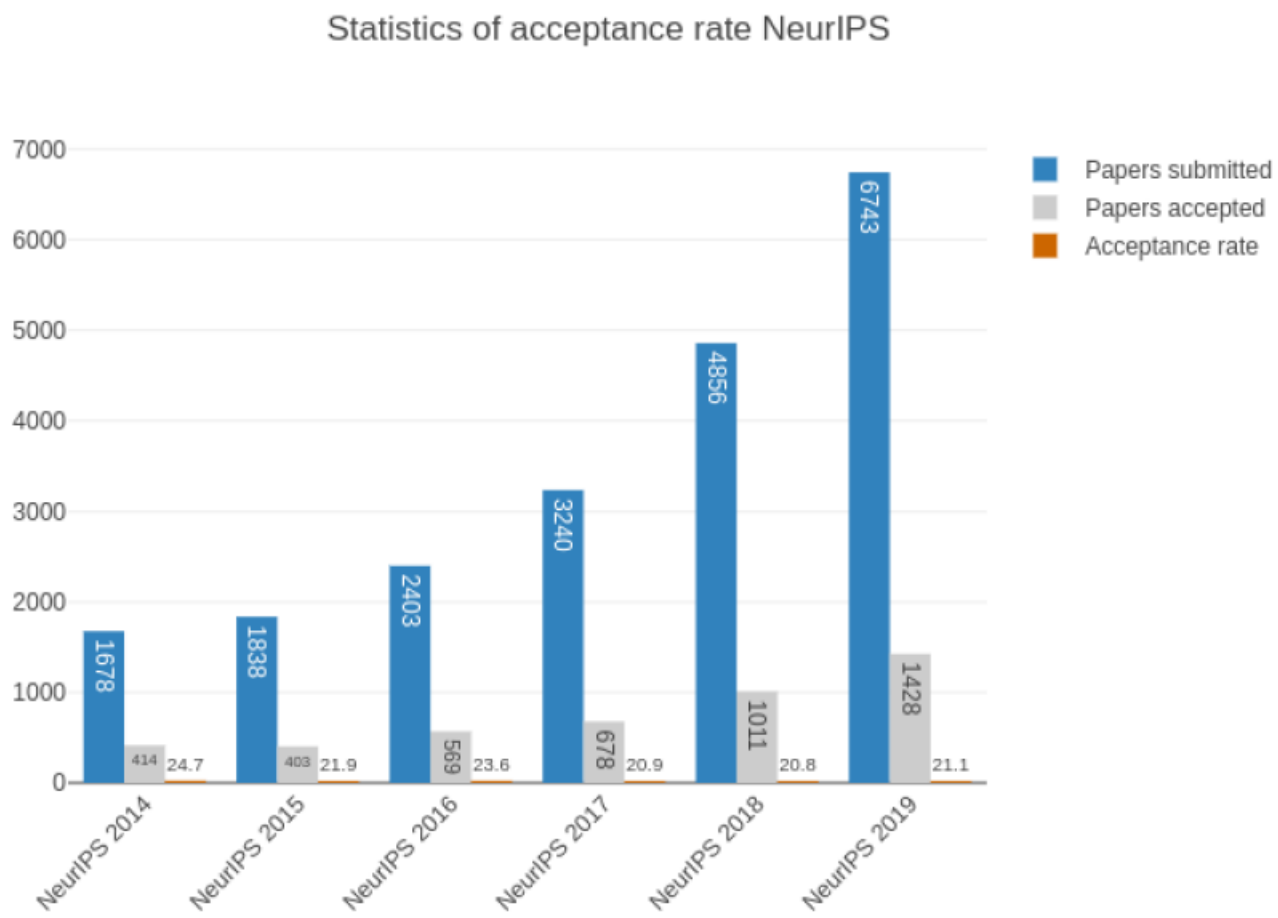
A herd of elephants walking across a dry grass field.

A close up of a cat laying on a couch.

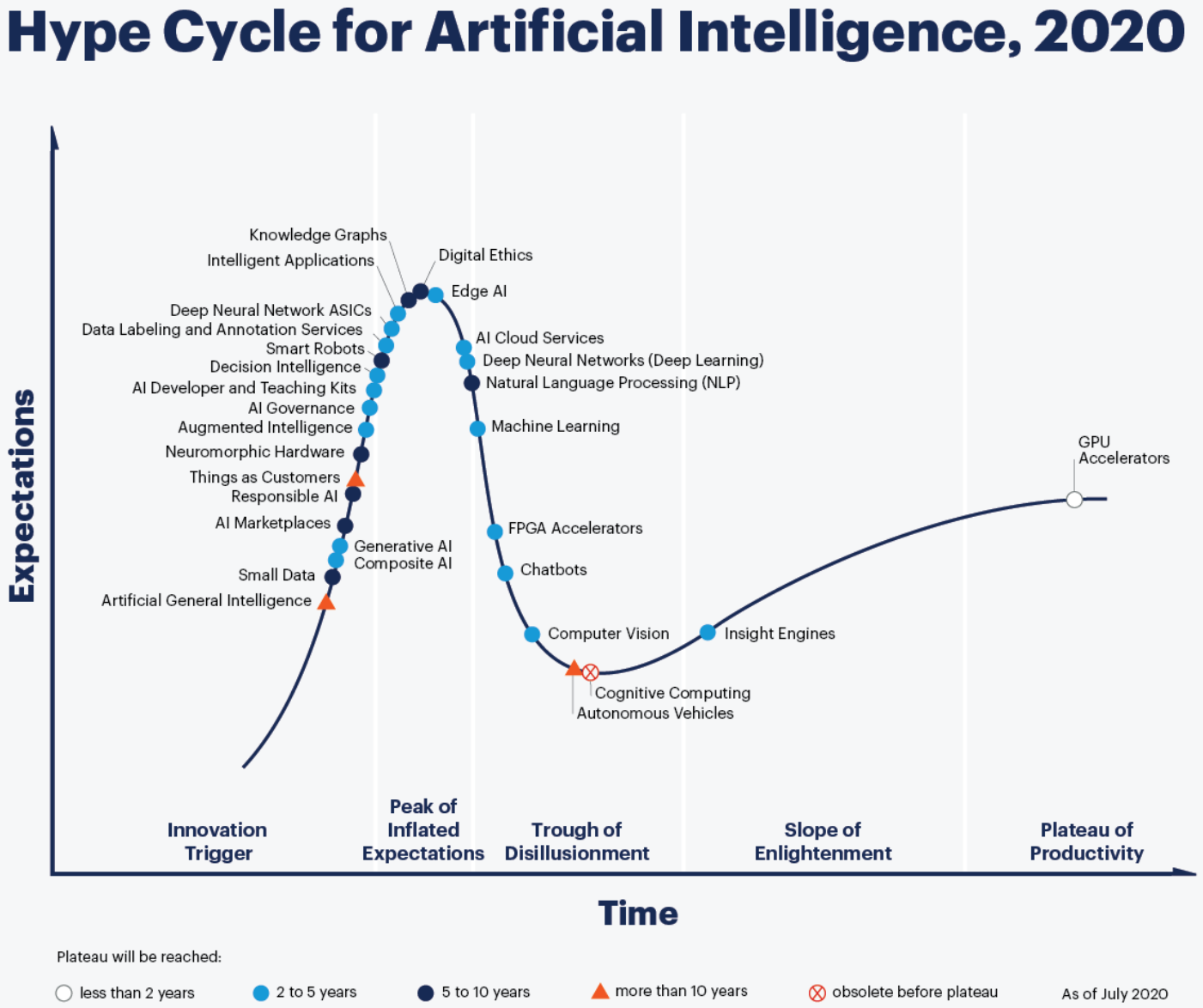
A red motorcycle parked on the side of the road.

A yellow school bus parked in a parking lot.

Research Community is growing



Gartner Predicts



gartner.com/SmarterWithGartner

Gartner

On the Rise

- Artificial General Intelligence
- Small Data
- Generative AI
- Responsible AI
- Augmented Intelligence
- AI Governance

At the Peak

- Smart Robots
- Data Labeling and Annotation Services
- Knowledge Graphs
- Edge AI
- AI Cloud Services
- Deep Neural Networks (Deep Learning)
- Natural Language Processing (NLP)

Sliding Into the Trough

- Machine Learning
- Chatbots
- Computer Vision
- Autonomous Vehicles
- Cognitive Computing

Hope for the future

- Active learning and life-long learning
- Multi-modal and multi-task learning
- Open-domain conversation
- Applications: medical, autonomous vehicles
- Algorithmic ethics
- Robotics

On the ground

- Eager execution by default (imperative programming)
- Keras integration + promotion
- Cleanup (API, etc.)
- TensorFlow.js
- TensorFlow Lite
- TensorFlow Serving

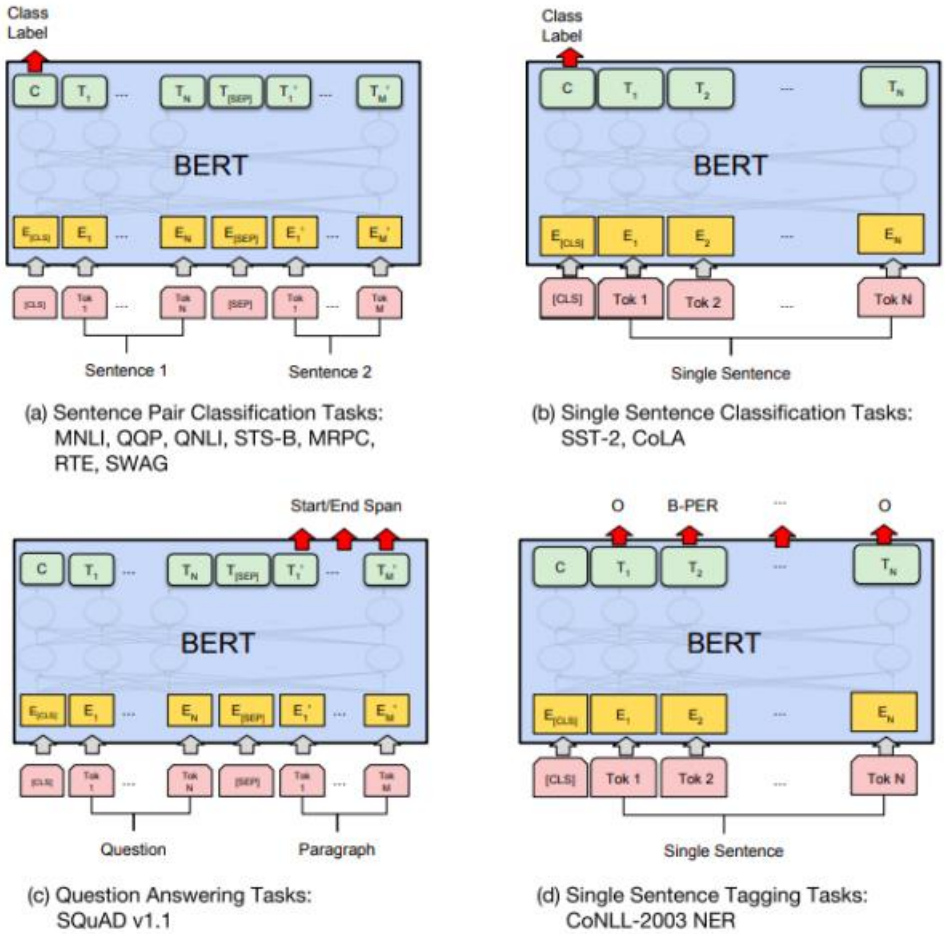
- TorchScript (graph representation)
- Quantization
- PyTorch Mobile (experimental)
- TPU support

Python 2 support ended on Jan 1, 2020.

```
>>> print "Goodbye World"
```

NLP

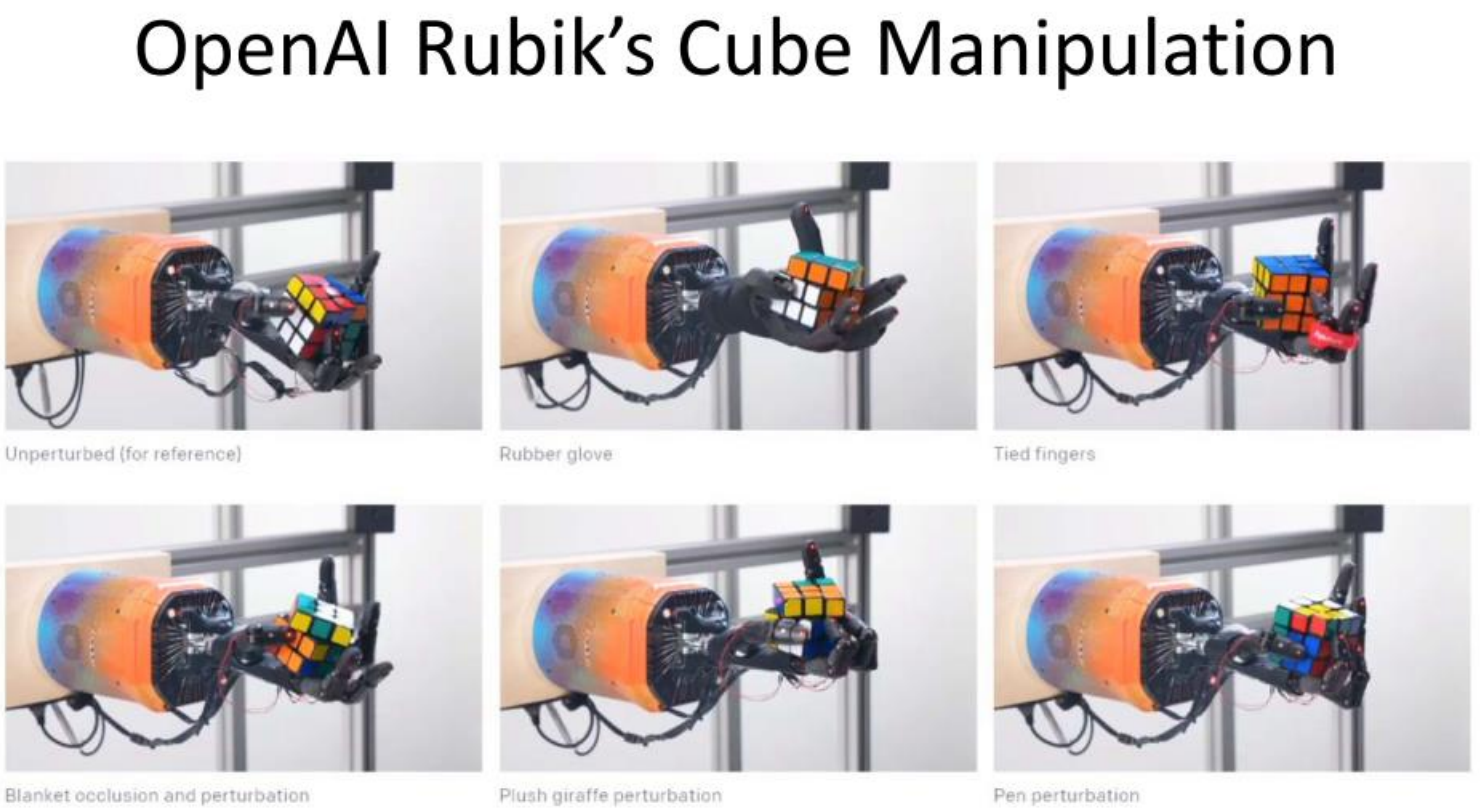
BERT Applications



Now you can use BERT:

- Create contextualized word embeddings (like ELMo)
- Sentence classification
- Sentence pair classification
- Sentence pair similarity
- Multiple choice
- Sentence tagging
- Question answering

Reinforcement Learning



Autonomous Cars

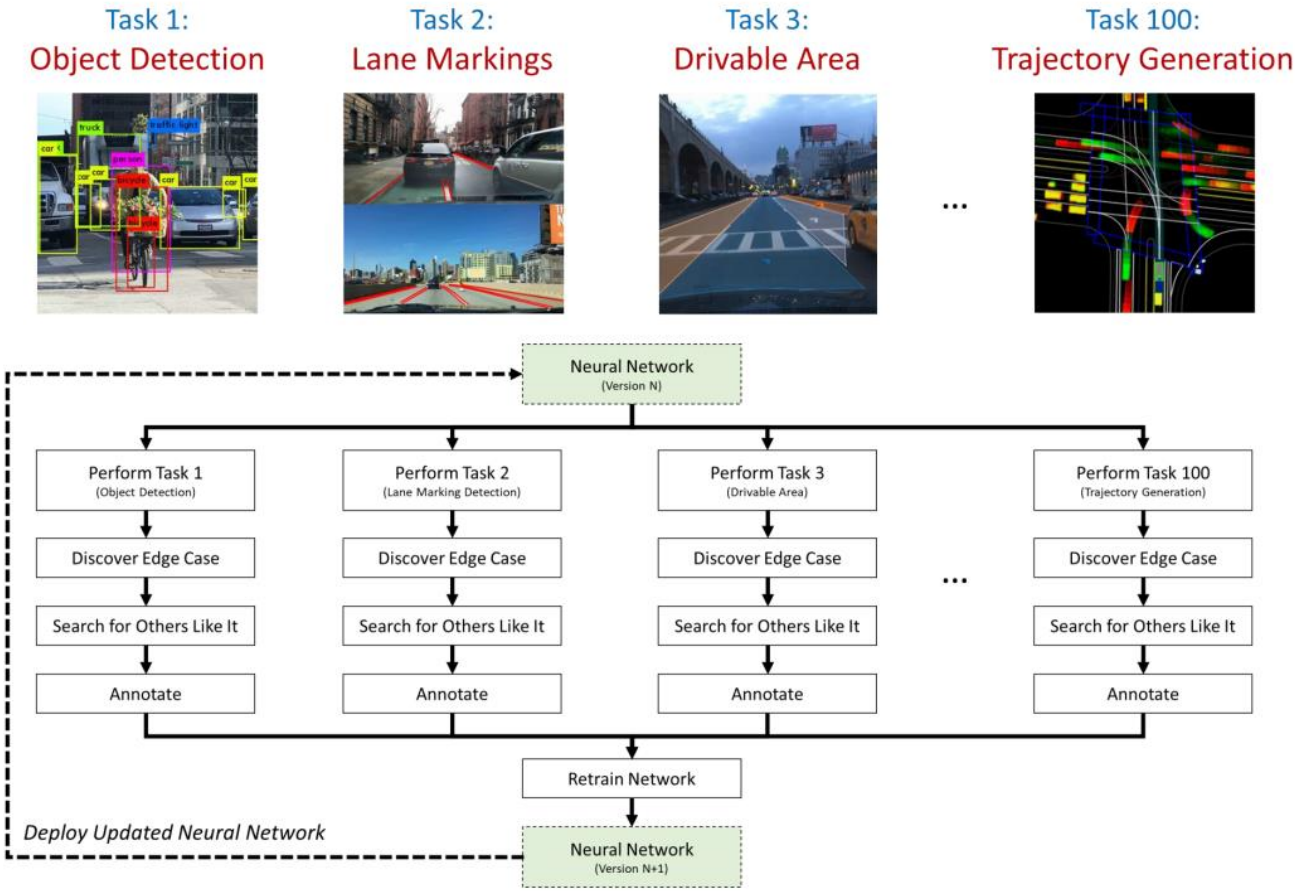
Level 2

Human is Responsible

Level 4

Machine is Responsible

Multi-Task Learning



Where to look?

- Papers with Code:
  - State of the Art, domain wise
  - Trending, Latest, Top rated ,
  - Look for stars
  - Get code!!
- Two Minute Papers Youtube

References

- Pieter Abbeel: Recent Advances and Trends in Artificial Intelligence | Keynote | ODSC East 2019
- Deep Learning: State of the Art (2020) – Lex Fridman, MIT