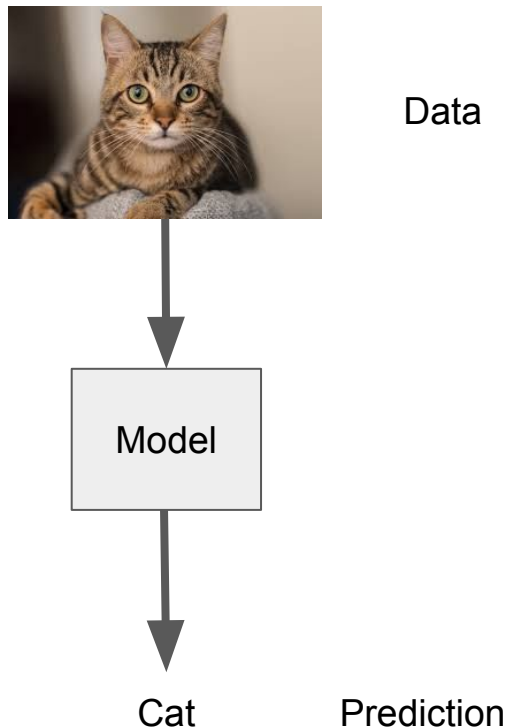


Applications in A.I.

Workshop
By Yuanqi Du

What is Artificial Intelligence?

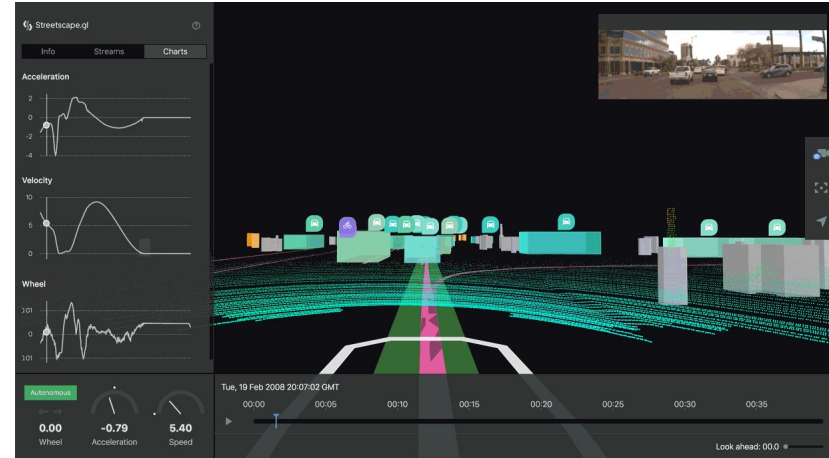
- Intelligence
- Learning
- Different approaches
 - Machine learning
 - Deep learning
 - And more...



Applications

- Computer Vision
 - Ex. Self-driving car
- Natural Language
 - Ex. Language Translation
- Generative modeling
 - Ex. Deep Fakes
- And more...

(AVS, Uber)



Look inside

- Data
 - Where is data from?
 - Cleaning
 - Pre-processing
- Task
 - Classification
 - Clustering
 - Anomaly Detection
 - And more...

Look inside

- Model
 - K Nearest Neighbors
 - Tree-based Models
 - Deep Learning
 - And more...
- Evaluation
 - How good is the model? Metrics? Accuracy?
 - Does the model generalize to all data? Overfitting? Underfitting?

Feel overwhelmed?

Don't worry. You don't need to implement any of these approaches on your own. (But you can if you want)

Open source libraries and frameworks save you!

Look inside

- Open source libraries
 - Numpy, Scipy, Pandas (data processing)
 - Scikit-learn (Machine Learning/Data Mining)
 - Tensorflow, Pytorch (Deep Learning)
 - Matplotlib (Visualizer)
 - And more...

Now, Let's see several real world applications
solved by using these library functions!

Digits Image Classification

MNIST Dataset:

Want to classify images of handwritten digits

```
from sklearn.neural_network import MLPClassifier
from sklearn.datasets import fetch_openml

X, y = fetch_openml('mnist_784', version=1, return_X_y=True)
X_train, y_train = X[:2000], y[:2000]
X_test, y_test = X[2000:3000], y[2000:3000]
model = MLPClassifier(max_iter = 10)
model.fit(X_train, y_train)
```

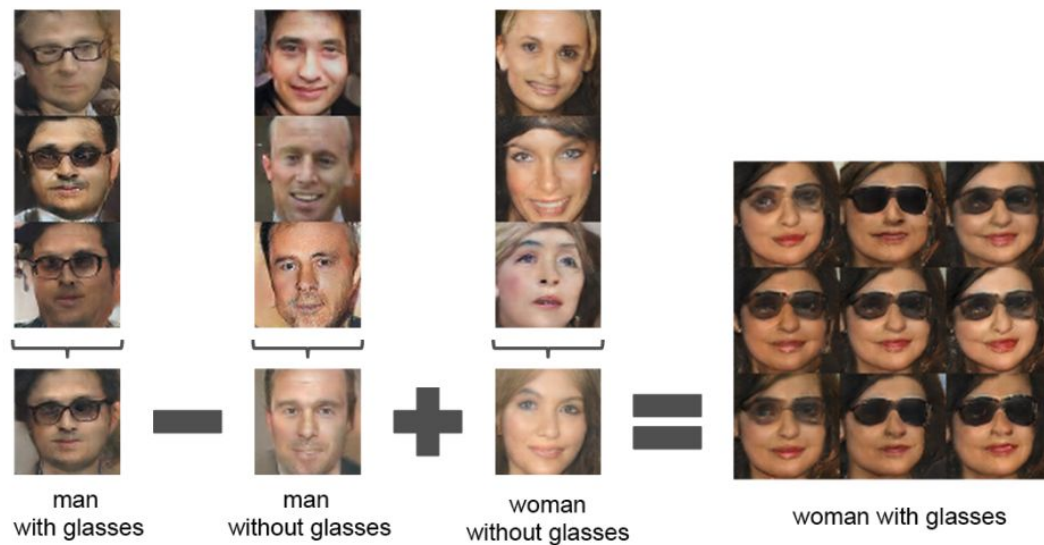

Self-driving Car

- Object Detection
- Image Segmentation
- Multi-sensor system



Generative models

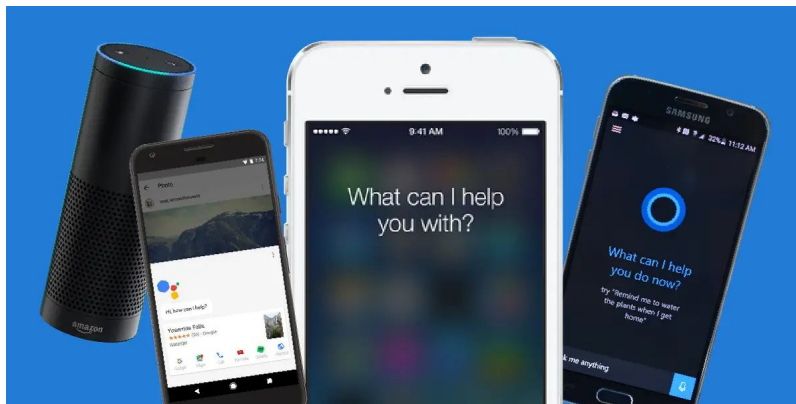
E.g. Deepfakes



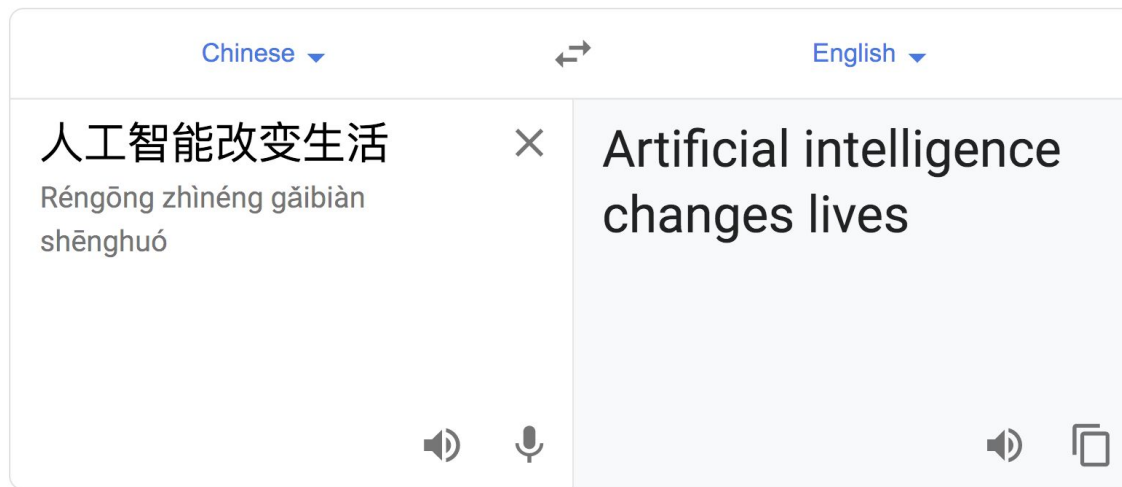
Speech Recognition

- Apple - Hi, Siri.
- Amazon - Hello, Alexa.
- Installed on more apps...

Once it detects the wake-up words, it will start to recognize your speech, and may do translation or do some operations (e.g. set up an alarm).



Machine Translation



[Open in Google Translate](#)

[Feedback](#)

Google Translate

Game Agent

Game AI agent: DeepBlue for chess, AlphaGo for go, AlphaStar for StarCraft II



AlphaStar vs human player



AlphaGo vs Go world champion

All of the above topics form the active research areas and applications

- Research fields
 - Computer Vision
 - Natural Language Processing
 - Generative Modelling
 - Reinforcement Learning
 - And more...

To be continued...

We will cover more on the ideas of how AI and Machine Learning algorithms work, and how to use the library functions on your specific task in the following workshops!