Understanding AI and Deep Learning: A Challenge for Public Policy
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Webinar Summary

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Machine learning definition

- Deep learning is a kind of machine learning that is a field under Artificial Intelligence (AI)
- A common misconception: AI is not that the computer can think nor that the computer possesses the general meaning of intelligence
- Cited the definitions by Tom M. Mitchell and Andrew Ng
- Machine learning is giving a defined task to the computer and deriving experience out from the given data
- There are clear measurements to evaluate the performance of the model

Supervised learning

- Already has the input and output then uses mathematical methods to fit the output into a function
- General mode: transforming the input into a mathematical function that it fits the output
- Cost-function: evaluate the performance of the model
- Optimization algorithm: optimize the parameters

Neuronal networks

- A representation of mathematical equations
- Explained the example of perceptron:
- Backpropagation: an example of neuronal network that may requires billions of operations

Deep learning

- A kind of neuronal network
    - Traditional deep learning: find out the importance of the sequences of words
- Unsupervised learning
- Long Short Term Memory: find out the importance of the sequences of words as well as the order of words
- Bert:
    - Developed by Google, currently used by Google search engine
    - Find out the importance of sequences of the words, the order of the words as well as the position of word in the text
    - the algorithms outperform human in some areas: e.g. natural language understanding
- AI is not creative but more than routine
- Example of using AI to make creative media: alter a picture with an algorithm based on YouTube videos

Problem

- The models are big and costly

- Blackbox operation: difficult to understand the equation
- Theoretical not proved: if it works, it works
- Needs good hardware
- Require weeks of training time
- Has the problem of overfitting: the model works perfectly in the training data but works badly with other data
- Low reproducibility: expensive to retrain a model that a model would not be verified by reproducing

Political data science

- Manage data-access:
    - It is related to political issue of privacy, especially when there are different privacy concepts
    - Who can get quality of data? e.g. latest data
- Bounds of pattern recognition: many things keep changing that the data may not be reliable at different time span
- Accountability: the more complex the model is, the more difficult it is to say who is responsible
    - Example: a medical mistake of an AI medical application which uses YouTube videos as the data
- Bias in the algorithms: AI cannot identify causalities but uses correlations instead
    - E.g. face recognition for criminals: focus on skin colours
- The more machine learning is integrated into the daily lives, the more political it is
- There is a demand for political scientists who can understand algorithms
- These political data science issues must not be solved by engineers as these are not technical issues
- Future research pathway: find out the limitations of AI