LAST FEW SLIDES OF WEEK 2

REGULATIONS and its relationship with innovation
Common psychology in technology: regulation is inverse to innovation - empirically false
[scholarship dedicated to policy?]
IT companies are considered under shop (not companies) - worker rights are not covered

2008 to today, same package is being offered to tier 3 college students
Hiring rates have declined sharply: hiring only being done to replace those fired
-no new jobs being created

CASE OF **GOOGLE ETHICS COUNCIL**
Digital era - too much control/influence on society - people call for strong regulations
IT gets out of it via promises of "self-regulation"
Conversation is brought up again when AI comes out
Google instates Ethics Council
Some players of Ethics Council write a paper: Dangers of Stochastic Parrots
Google fires entire Council

Exploitation is not a moral choice, it is a mathematical choice
-requirement of a company; maximise profits
-impossible to self-regulate such a body

Microsoft also has an ethics council
-came under fire for selling AI tools to border security forces

Ethics washing
-prevent regulation by "self-regulation"
-other examples: green-washing, pink-washing, etc.

HOW DOES AI MAKE MONEY
(more detailed discussion in PS644)

TECHNO SOLUTIONISM and REIFICATION
Societal problems are not solved by trying to rush through them using technology
-e.g.: fixing patriarchy through pressure cooker
Technology makes things faster but does not change the original power dynamic
Techno solutionism: that you can fix societal issues using technology

Reification: Process that makes out of a non-computable/addressable object a computable/addressable one. - creating a reality by creating categories

AI as SCAPEGOAT

Policy: the decision to use or not use the technology

Problems can't always be blamed on features of the technology, humans are to be held accountable

WEEK 3-4: Coding+ML

MACHINE LEARNING:

- Algorithms that improve by using data (even linear regression)
- Data: Unprocessed information
- Information: Processed data
- Pipeline of Supervised Machine Learning:
  - Training Data: Teach the black box
  - Validation Data: Check the learning
  - Testing Data: Use the blackbox on unknown data
- Data comes from lots of human labour

FEATURES:

- Useful qualities extracted from data point; represented as an n-dimensional vector
- Choosing good features
  - older machines were not strong enough to use raw data
  - must choose representative features
- Curse of dimensionality
  - Having so many features, mathematics is getting exponentially worse
  - Thus, Dimensionality Reduction
    - Principal Component Analysis (PCA)
    - Singular Value Decomposition (SVD)
- Metrics:
  - Correlation, Mutual information, Class separability

JARGON:

Cross-validation

- Normal validation results may be statistical outlier given the small normal val. data size
- Cross validation: Break entire training data into n equal-sized parts. Use n-1 parts for training and 1 part for validation. Repeat n times. Average result. More statistically robust

Active Learning

- New data may show up. Illogical to train all over again
- Run the new data through the model, use only the data that gives huge error for re-training

Ensemble Learning

- Train multiple different kinds of algorithms and join the results of them all (average, etc.)

Oracle

- Algorithm to create synthetic test cases

Overfitting

- Model became too confident in identifying the images given in training, but doesn't generalise well enough to identify new images
- Training data is not diverse enough
- Called a brittle model, very easy to break with an anomalous data point

Explainability

- Being able to explain the logic behind the model's decision

Bias

- Model decision hinges on either irrelevant features or features that should be protected

Neural Network

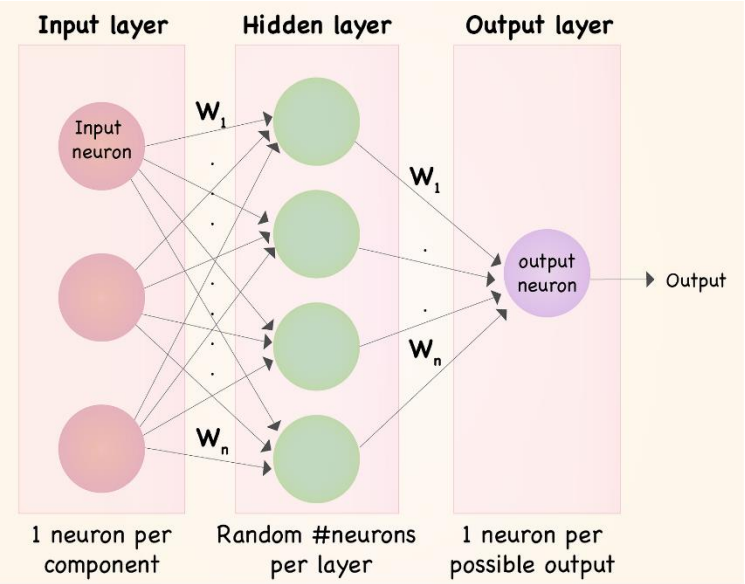

Image Source: https://towardsdatascience.com/understanding-neural-networks-what-how-and-why-18ec703ebd31

NN with no hidden layer: **Perceptron**
NN with many hidden layers: **Deep NN**

Convolutional Network
(Refer to animation and diagram on slides)
Extract image features such as edges by watching for difference in pixel values

ReLU returns the max(0, x) for input value x
-i.e., if value is less than 0, return 0, else return value

Softmax
Real numbers translated to probability distributions