Introduction
Administrivia

- [https://cs.Pomona.edu/classes/cs152/](https://cs.Pomona.edu/classes/cs152/)
  - Assignments
  - Projects
  - Grading
  - Policies

- [https://web.speakup.info/room/join/80740](https://web.speakup.info/room/join/80740)
Projects

1. Individual Proposals (due week 3)
2. Introduction Outline (due week 4)
3. Related Works Search (due week 5)
4. First Project Check-In (due week 6)
5. Introduction and Related Works Draft (due week 7)
6. Methods Outline (due week 9)
7. Second Project Check-In (due week 10)
8. Discussion Outline (due week 11)
9. Complete Rough Draft (due week 13)
10. Completed Project (due week 15 or finals)
Artificial Intelligence Disclaimers

- Don't need any background
- Don't need expensive computers
- Don't need a ton of data (transfer learning)
- Anthropomorphism is misleading
- Non-AI
Neural Network Applications

Tell us if an Amazon review is positive or negative based on text alone.
Tell us if an image contains a cat or a dog.
Translate an English sentence to German.
Tell us where in an image we can find a boat.
Automatically generate a caption for an image.
Direct a robot around a building.
Play a board game or a video game.
Tell us about the orientation of a person’s limbs for a virtual reality game.
Prevent an autonomous car from driving off the road.
Group together all users of a social network that are likely to listen to the same music.
Create a new piece of art.
Predict the sale price of a house.
Predict the future sale price of an investment.
Suggest products to purchase or movies to watch.
Diagnose an injury from an X-ray CT scan.
Automatically summarize a news article.
Label a news article as fake or real.
Artificial Intelligence and Machine Learning

AI (Knowledge Base)

ML (logistic regression)

Representation Learning

NN – no feature engineering
"Learned" Programs

normal

input → program → output

parametrized program

input → [param] → output

learned program

input → [NN] → output

correct output

comparison
Neural Networks

Example: predict sale price of a house

Inputs:
• size
• number of rooms
• zip code
• cost of living

Outputs:
• price
Limitations

They only learn from what you put in front of them.

They produce a guess/estimate. You'll want to check the output.

Easy to create an abomination! They "learn" human biases well.
Semester vs. Topic Timelines

- **Foundations**
  - Math
  - Calc
  - Lin Alg
  - Coding
  - Python
  - Libs
  - Comp thy
  - HPC
  - CLI

- **NN Basics**
  - Terminology (1)
  - History (2)
  - Ethics (4)
  - Neurons (5)
  - Networks (6)
  - Back prop (7)

- **NN Inter.**
  - Optimizers
  - Overfitting
  - Convolutions
  - Recurrent

- **NN Adv.**
  - Transfer learning
  - Deploy + Inf. (3)
  - GANs
  - RL
  - Attention
  - Transformers
History

Alternative names: Cybernetics, Connectionism, Artificial NN, Deep Learning

1943: Neuron
1958: Perceptron (neuron + activation)
1969: Reached limits
1970s-80s: AI Winter
1980s: Multiple perceptrons
  - End of Winter
  - Universal Approximation Theorem
- VCEP
- GPUs