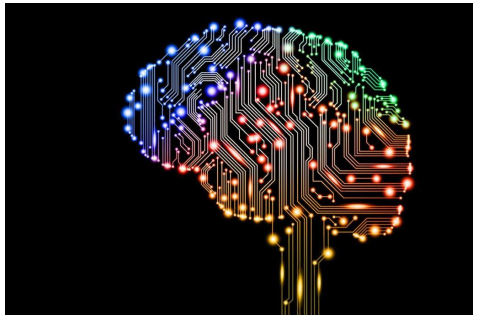
Welcome to Undergraduate Artificial Intelligence Society

Presented by: Justin Stevens and Sherry Xu

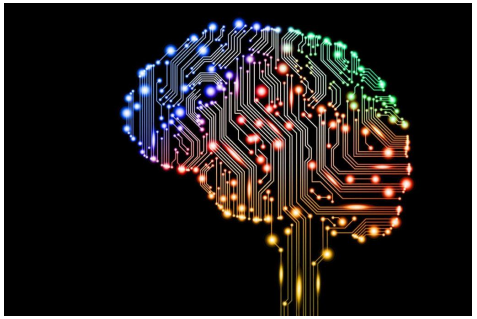
Introduction



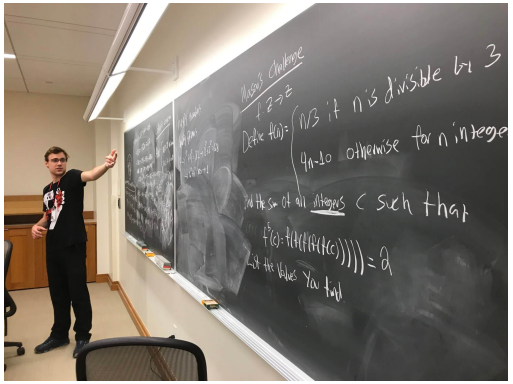
- The Undergraduate Artificial Intelligence Society is a new student group on campus.
- We hope to provide a supportive community for students interested in learning AI.
- We'll learn the basic tools to begin programming an artificial intelligence system including neural networks and reinforcement learning and then apply them to projects.
- These projects will be team collaborative efforts, with students learning how to work on a team with leadership roles and using version control systems (such as GitHub).
- As there are many diverse subfields in artificial intelligence, it's important to respect unique perspectives. No matter if you're a beginner or expert, there's a place for you.

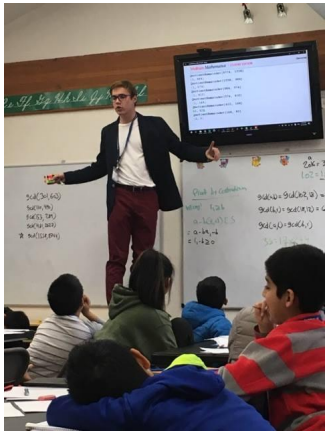
Justin Stevens

- Born in Edmonton, grew up in Louisville, Kentucky (1998-2011).
- Went to highschool in Reno at the Davidson Academy of Nevada (2012-2016).
- Worked in a robotics lab at the University of Nevada, Reno (2015-2016).
- Attended one year of postsecondary at Harvey Mudd College (2016-2017).
- Second year student in Mathematics and Computing Science (2018-).
- Worked as summer math instructor in SFBA and Cambridge, Massachusetts.



HARVEY MUDD COLLEGE





Houze Xu (Sherry)

- Born in China, grew up in Nanchang, Jiangxi,China.(2000-2018)
- Went to highschool in Nanchang No.2 Middle School (2015-2018)
- First year student in statistics(2018-2022)
- Worked as an instructor in the Education of Gaoze

worked as an instructor here

APEX

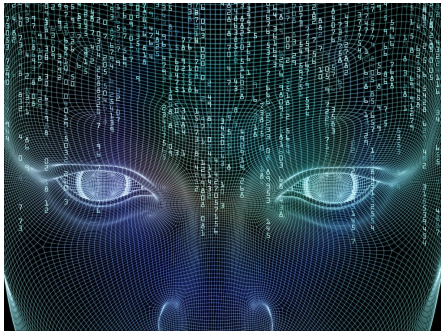
高择教育

地址：南昌市红谷滩新区铜锣湾广场写字楼12楼1207室

乘坐地铁一号线至庐山南大道站B出口，乘坐17路、19路、22路、214路、252路、708路公交车到沙井小区站下车

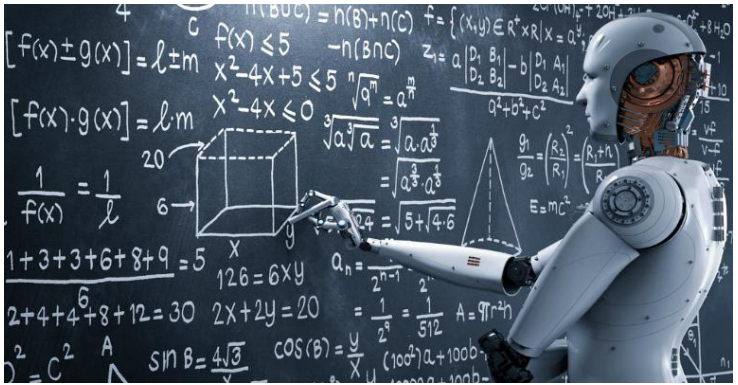
联系方式：15979063648（郑老师）13907923213（龙老师）18507912981（陈老师）

What is Artificial Intelligence?



Artificial intelligence (AI) is a term for simulated **intelligence** in machines. These machines are programmed to "think" like a human and mimic the way a person acts.[1]

What type of problems would you like to see AI solve?
For people attending a second time:
What areas in artificial intelligence interest you the most?



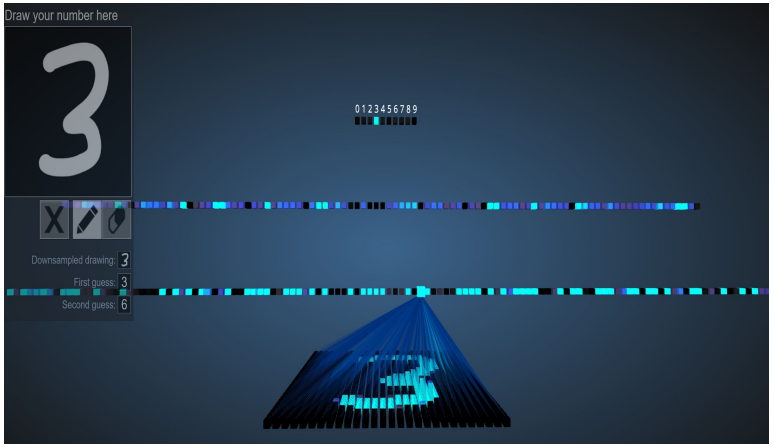
1 *Source:* Investopedia

Subfields of Artificial Intelligence

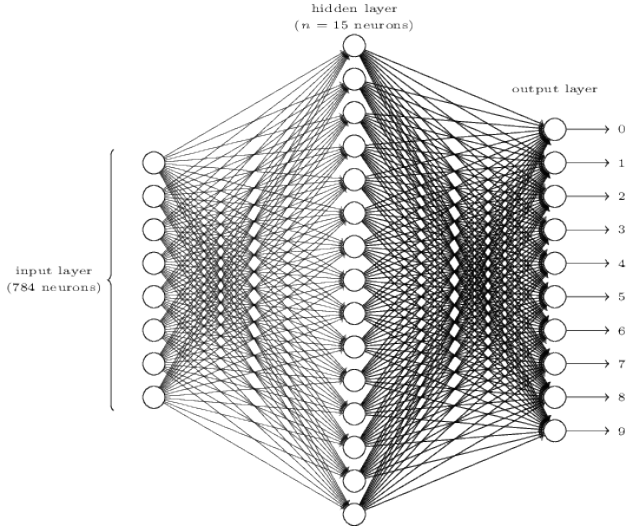
- Neural Networks - e.g. brain modeling, classification
- Vision - e.g. object recognition, image understanding
- Evolutionary Computation - e.g. genetic algorithms, genetic programming
- Robotics - e.g. intelligent control, autonomous exploration
- Natural Language Processing - e.g. machine translation, turing test
- Planning - search algorithm, game playing
- Machine Learning - data analysis using statistical techniques

Source: http://www.cs.bham.ac.uk/~jxb/IAI/w2.pdf

Neural Networks



Source: http://scs.ryerson.ca/~aharley/vis/fc/



Source: *Neural Networks and Deep Learning*

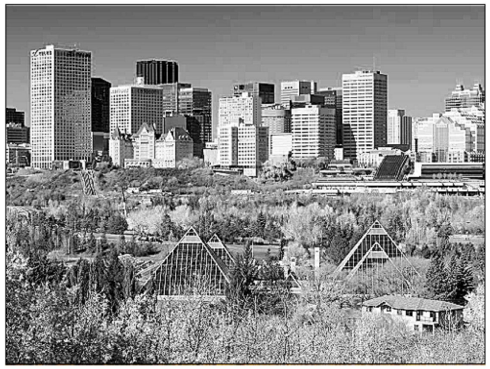
Computer Vision

Here's a playground were you can select different kernel matrices and see how they effect the original image or build your own kernel. You can also upload your own image or use live video if your browser supports it.

Choose File SEP13_PROF..._POST.jpg Live video

0	-1	0
-1	5	-1
0	-1	0

custom

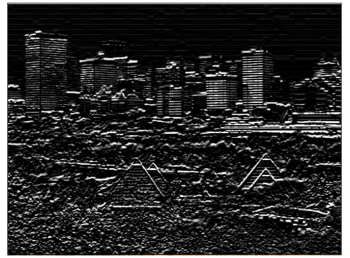


0.0625	0.125	0.0625
0.125	0.25	0.125
0.0625	0.125	0.0625

blur

-1	-2	-1
0	0	0
1	2	1

bottom sobel

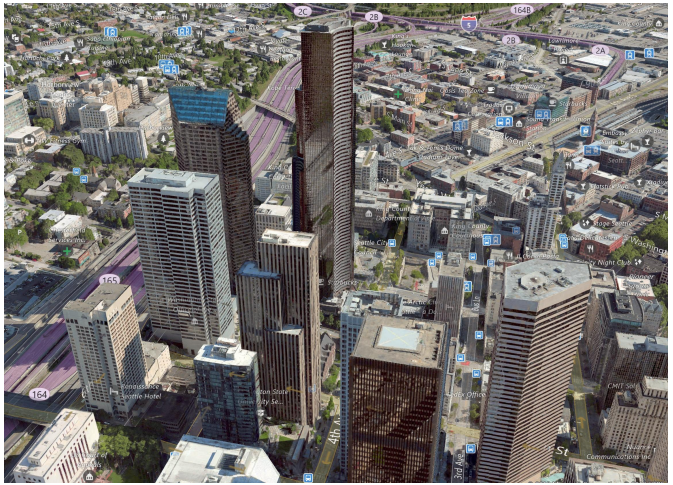


-1	-1	-1
-1	8	-1
-1	-1	-1

outline

Source: http://setosa.io/ev/image-kernels/

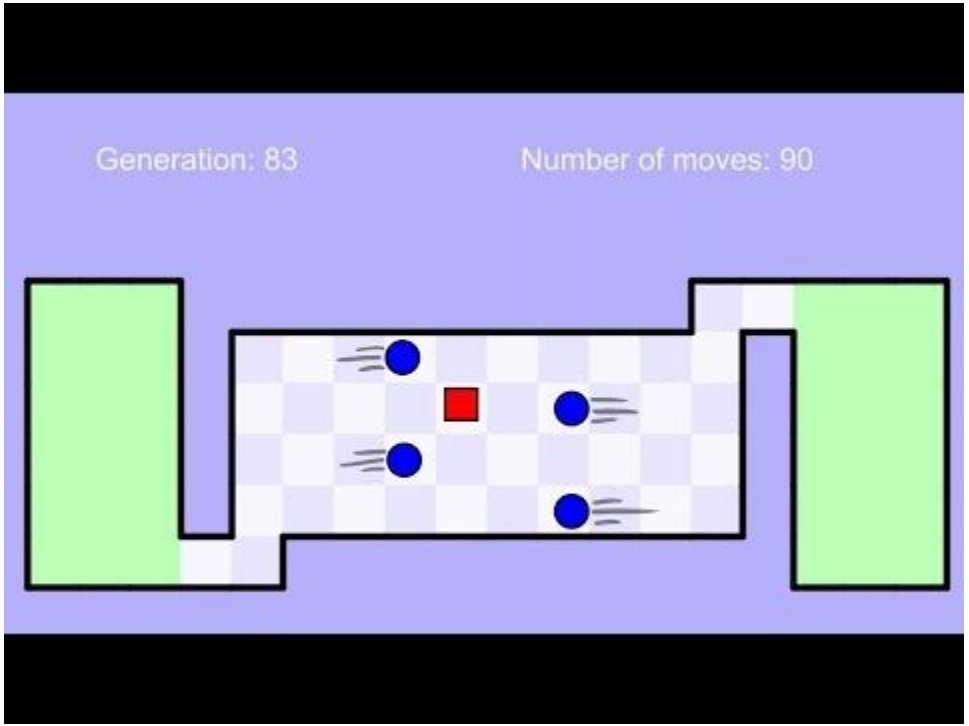
Applications of Computer Vision



Microsoft Virtual Earth of Seattle, WA

Self-driving car at UNR

Evolutionary Computation



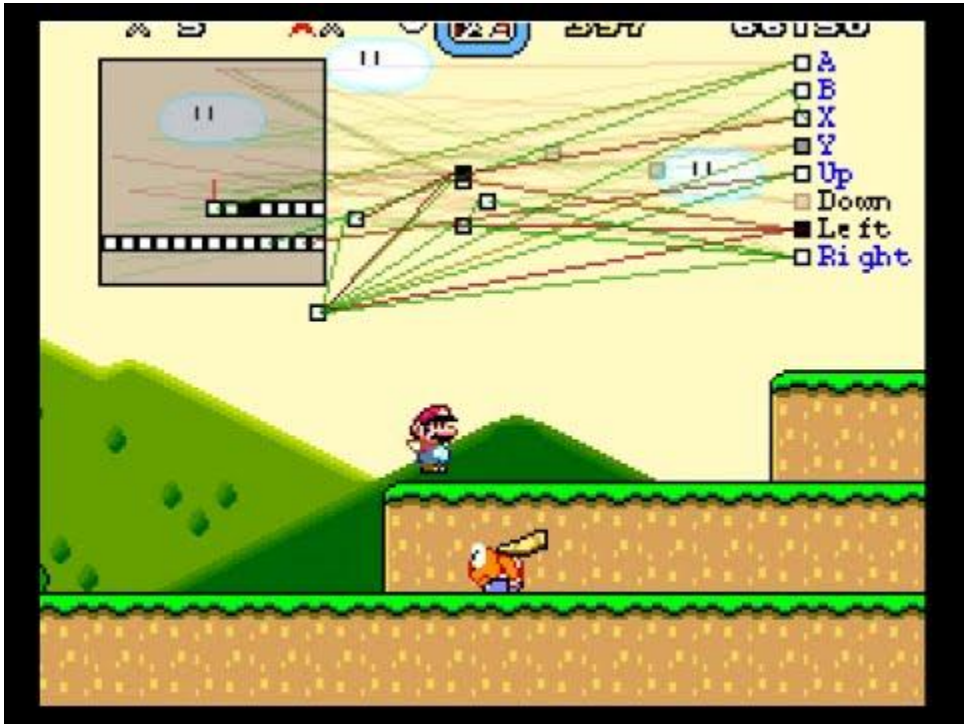
Fitness is a metric of an individual's ability to survive and reproduce to future generations.

Natural selection is a process by which favourable genes are passed on and unfavourable genes die out.

Each subsequent generation will evolve towards the global maximum.

Source from University of Washington

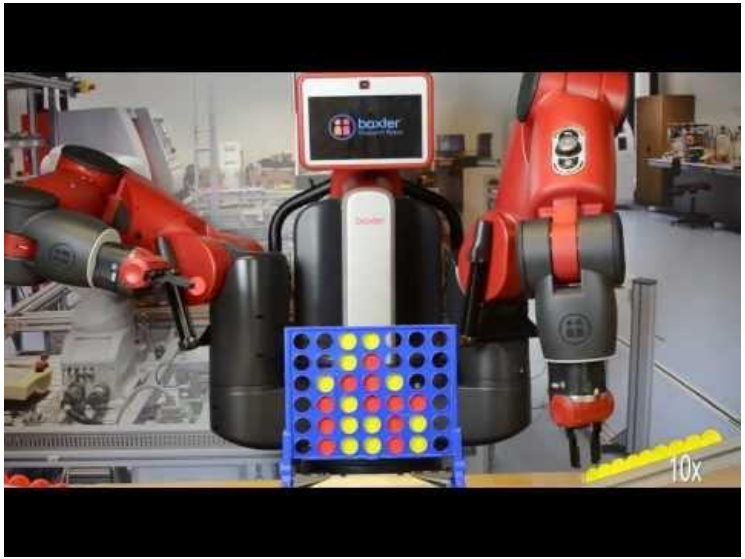
Neural Net with Genetic Algorithms



- How is a genetic algorithm being used in Mar.io?
- How is a neural network being used in Mar.io?

Genetic Algorithms fall under the class of “Reinforcement Learning”. The University of Alberta is a world leader in reinforcement learning.

Robotics



Alpha-Beta Pruning for Connect Four AI

Notice three different fields were involved:

- Vision for the Baxter robot to detect the state of the connect 4 board.
- Planning for the Baxter robot to determine the optimal next move.
- Robotics, since Baxter is a robot!

Google Duplex

- What problems could arise in such a system?
- Would these conversations pass the Turing test?
- Was this whole event staged?

Opinion Piece:
https://www.extremetech.com/computing/269030-did-google-duplexs-ai-demonstration-just-pass-the-turing-test
Latest News:
https://www.theverge.com/2018/10/9/17955866/google-duplex-release-date-pixel-devices-next-month-november-assistant-calls

Natural Language Processing

- Natural Language Processing is a process by which machines learn to interpret human speech and data.
- This is usually done through sentence segmentation.
- Markov models are used for predictive text.
- In 1950, Alan Turing published the paper "Computing Machine and Intelligence" where he tried to answer the question: "can machines think?". He also explored the idea of consciousness.
- In this paper, he proposed the turing test, a machine's ability to exhibit intelligent behaviour indistinguishable from a human.
- There's a talk titled "Beyond the Imitation Game" on October 25th at 6:30 PM in CCIS 1-430.

AI Resources

- Courses/Books/Videos
  a. Fast.ai: http://www.fast.ai (“making neural nets uncool again”)
  b. Elements of AI: https://www.elementsofai.com
  c. Open Learning Platform: http://ai-4-all.org/open (launching 2019)
  d. Andrew Ng: https://www.coursera.org/learn/machine-learning
  e. Deep Learning Book: http://www.deeplearningbook.org/
  f. Hands on Machine Learning: http://shop.oreilly.com/product/0636920052289.do

Project Based Learning

- We'll apply the basic machine learning and AI skills we learn in this club to fun, engaging, and collaborative projects. Here are a few starting places:
  - Experiments with Google: https://experiments.withgoogle.com/experiments?tag=TensorFlow
  - Kaggle Competitions: https://www.kaggle.com/competitions
  - OpenAI Gym: https://gym.openai.com/
    - Join us on October 25th at 2PM while we work out our skills in SIC!