

# INTRODUCTION TO MACHINE INTELLIGENCE WRAP UP

FALL 2019

DR. GARRETT DANCIK

# WHAT IS MACHINE INTELLIGENCE?

- **Machine intelligence**, or *artificial intelligence*, involves the automation of tasks traditionally carried out by humans.
- What are some examples of machine intelligence?

 MUST READ: Windows or Chromebook? A Best Buy salesman told me it isn't even close

# Apple Siri vs Amazon Alexa vs Google Assistant: Tests reveal which is smartest

Voice assistants from Amazon, Apple, and Google all improve on smartphones but Google Assistant is still top.



NEWS ▾

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## Coming soon to Netflix: Movie trailers crafted by AI

BY SARAH MIN

AUGUST 19, 2019 / 10:30 AM / MONEY

Letter | Published: 25 January 2017

### Dermatologist cancer with de

Andre Esteva ✉, Brett Kuprel ✉, Roberto A. Novoa ✉, Justin Ko, Susan M. Swetter, Helen M. Blau & Sebastian Thrun ✉

- Sources
  - <https://www.zdnet.com/article/apple-siri-vs-amazon-alexa-vs-google-assistant-tests-reveal-which-is-smartest/>
  - <https://www.cbsnews.com/news/netflix-trailers-made-by-ai-netflix-is-investing-in-automation-to-make-trailers/>
  - <https://www.nature.com/articles/nature21056>



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## PERSONAL FINANCE

CAREERS

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FINANCIAL ADVISOR HUB

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SAVINGS

TAX PLANNING

# Automation threatening 25% of jobs, mainly the 'I' ones:

The New York Times

*Prosecutors Don't Plan to Charge Uber  
in Self-Driving Car's Fatal Accident*



WIRED

The Best Algorithms Struggle to Recognize Black Faces Equally

TOM SIMONITE BUSINESS 07.22.19 07:00 AM

# THE BEST ALGORITHM RECOGNIZE BLACK FACES EQUALLY

NEWS

**AMAZON ALEXA CAPTURED AUDIO OF PEOPLE  
HAVING SEX, POSSIBLE SEXUAL ASSAULTS:  
REPORT**

### Sources

- <https://www.cnbc.com/2019/01/25/these-workers-face-the-highest-risk-of-losing-their-jobs-to-automation.html>
- <https://www.nytimes.com/2019/03/05/technology/uber-self-driving-car-arizona.html>
- <https://www.wired.com/story/best-algorithms-struggle-recognize-black-faces-equally/>
- <https://www.newsweek.com/amazon-alexa-recordings-romania-sex-privacy-1452173>

# OVERVIEW OF MACHINE INTELLIGENCE

**Artificial Intelligence**

**Machine Learning**

**Deep Learning**

The subset of machine learning composed of algorithms that permit software to train itself to perform tasks, like speech and image recognition, by exposing multilayered neural networks to vast amounts of data.

A subset of AI that includes abstruse statistical techniques that enable machines to improve at tasks with experience. The category includes deep learning

Any technique that enables computers to mimic human intelligence, using logic, if-then rules, decision trees, and machine learning (including deep learning)

# WHAT ~~WILL~~ DID WE LEARN IN THIS CLASS?

- Python is a general purpose programming language commonly used for Machine Intelligence
- While the details of many methods are complex, many methods can be used directly within Python or by using Python and the application program interfaces (APIs) of cloud-based services
- We will learn the basic concepts of:
  - Python
  - Natural Language Processing
  - Data Mining Twitter
  - Digital Assistants
  - Machine Learning and Neural Networks, including those for image recognition

# ADDITIONAL CLOUD-BASED SERVICES

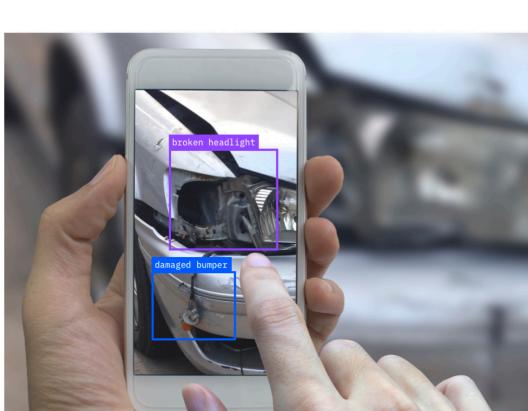


## Visual Recognition

Quickly and accurately tag, classify and train visual content using machine learning.

[Get started free](#)

Already using Visual Recognition? [Log in](#)



Watson

<https://www.ibm.com/watson>



## Tone Analyzer

This service uses linguistic analysis to detect joy, fear, sadness, anger, analytical, confident and tentative tones found in text.

\*This system is for demonstration purposes only and is not intended to process Personal Data. No Personal Data is to be entered into this system as it may not have the necessary controls in place to meet the requirements of the General Data Protection Regulation (EU) 2016/679.

By using this application, you agree to the [Terms of Use](#)

- Python can be used with IBM and Google APIs to integrate powerful machine learning tools into software / apps

## Dialogflow

Conversational experiences across devices and platforms

This end-to-end development suite lets you build conversational interfaces – chatbots – that use machine learning to conduct rich, natural interactions with your users on websites, mobile apps, messaging platforms, and IoT devices.



<https://cloud.google.com/ai-platform/>

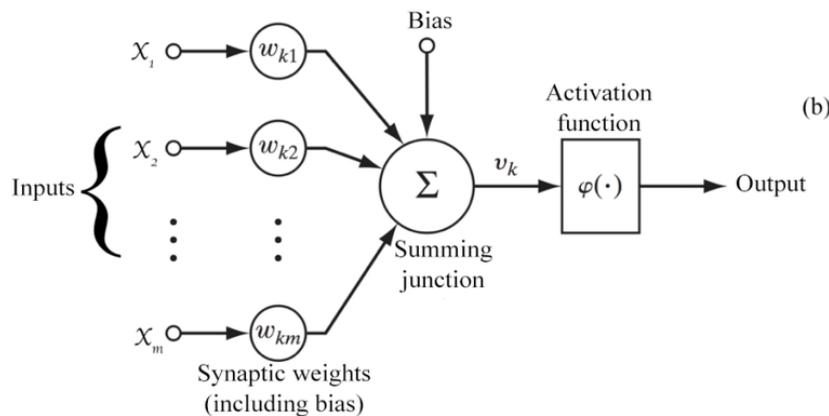
## Vision AI

Derive insights from your images in the cloud or at the edge with AutoML Vision or use pre-trained Vision API models to detect emotion, understand text, and more.

[Get started](#)

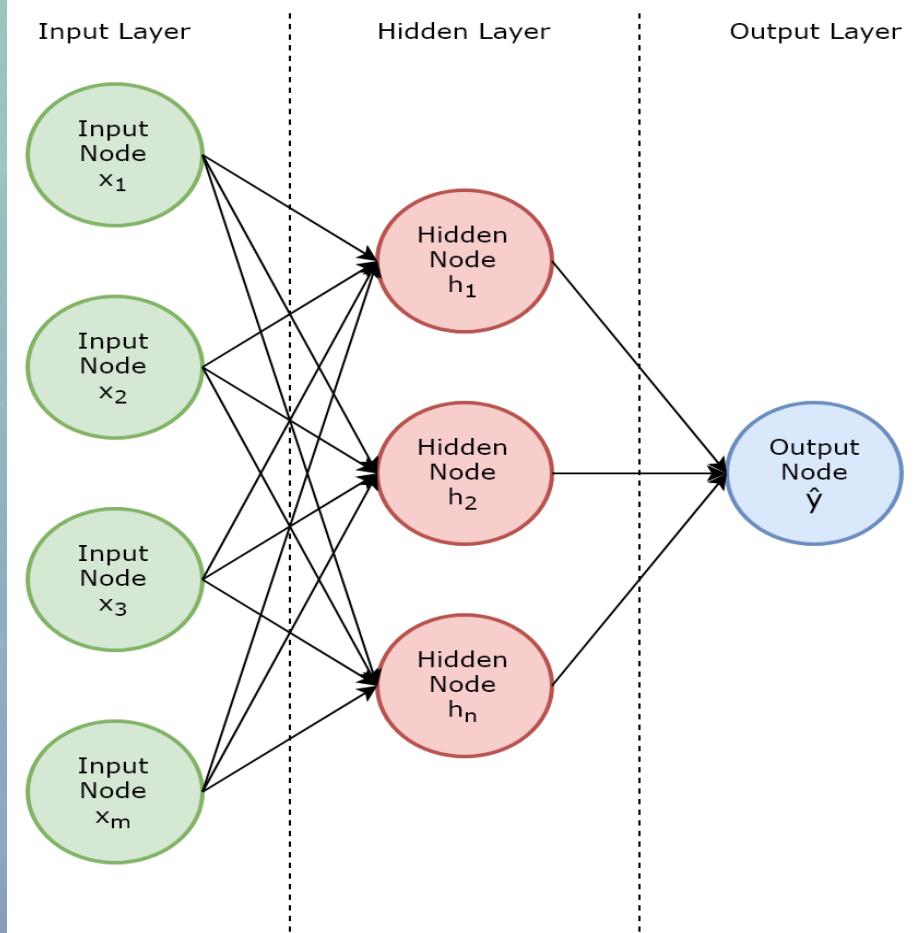
# NEURAL NETWORKS (REVIEW)

## Perceptron



Similarity between biological and artificial neural networks  
(Arbib, 2003a; Haykin, 2009b).

## Multilayer Perceptron



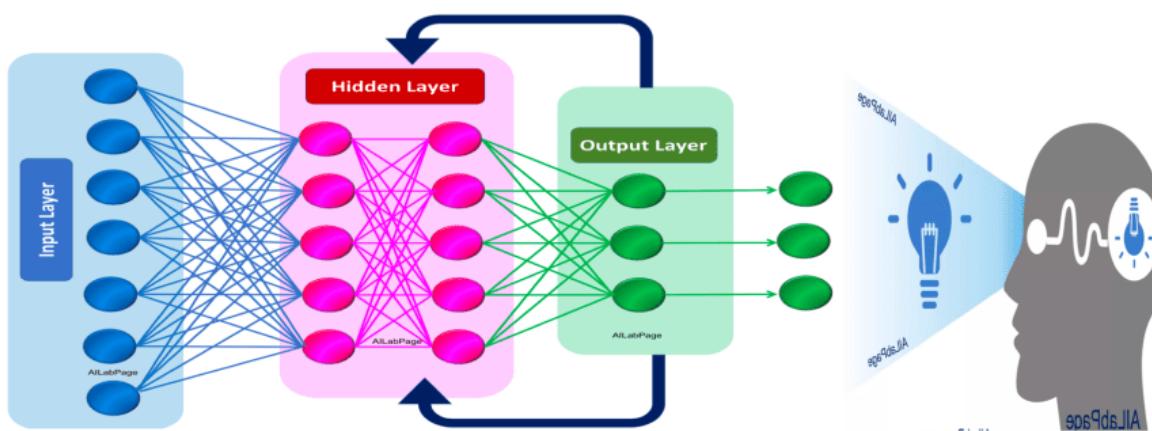
MLP Image from:

<https://www.oreilly.com/library/view/machine-learning-with/9781789346565/961ec36c-b4e9-4899-89b5-c6b762cda234.xhtml>

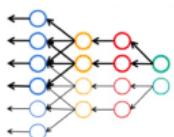
# NEURAL NETWORKS (MORE)

## Recurrent Neural Networks

Deep Learning – Introduction to Recurrent Neural Networks



- 01 **Useful**  
Useful for tasks that are dependent on a sequence of successive states.
- 02 **Training**  
The network can be trained by backpropagation.
- 03 **Memory**  
The network has a form of short-term memory.
- 04 **Simplicity**  
Simple recurrent network (SRN) has a similar form of short-term memory.

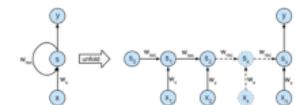


### Backpropagation through time

BPTT – An algorithm used for updating weights in the recurrent neural network, to minimize the error of the network outputs. For every recurrent network there is a feedforward network with identical behavior.

### Back Activation

A recurrent connection feeds back activation that will affect the output from the network during subsequent iterations.



<https://AI LabPage.com>

<https://vinodsblog.com>

Image source: <https://vinodsblog.com/2019/01/07/deep-learning-introduction-to-recurrent-neural-networks/>

### Applications:

- Text translation
- Sentiment analysis

# NEURAL NETWORKS (MORE)

## Applications:

- Photo generation
- Face aging
- Music synthesis
- Video prediction

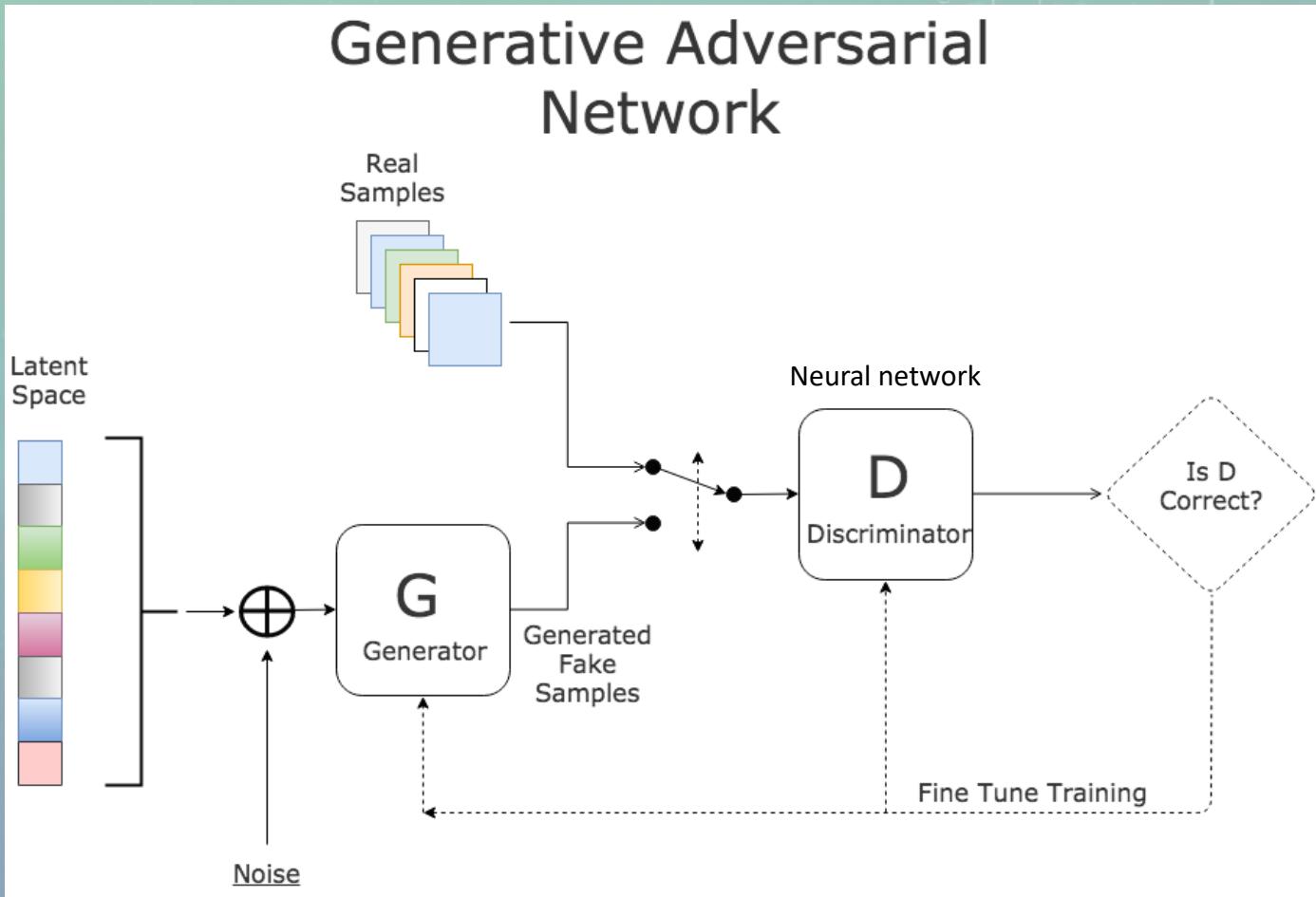
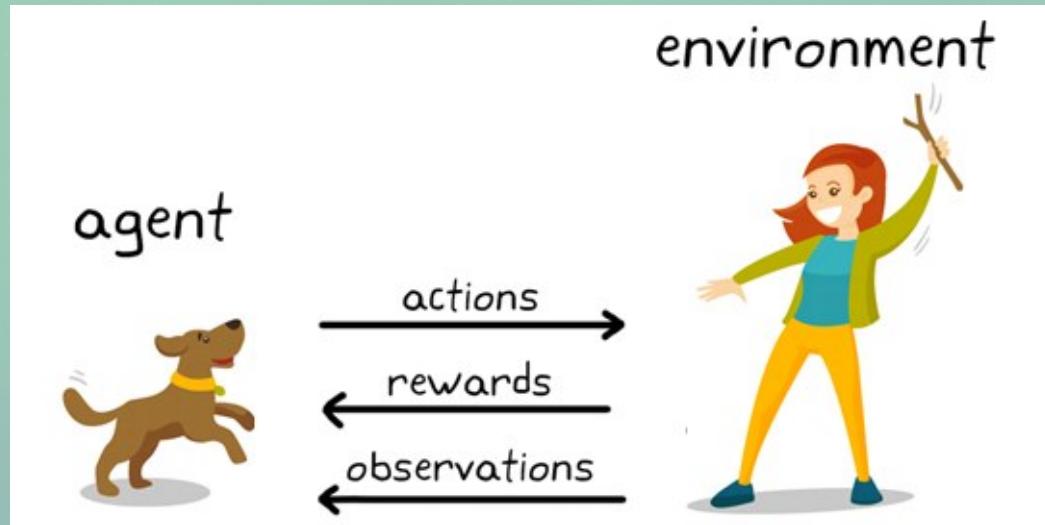


Image source:

<https://www.kdnuggets.com/2017/01/generative-adversarial-networks-hot-topic-machine-learning.html>

# REINFORCEMENT LEARNING

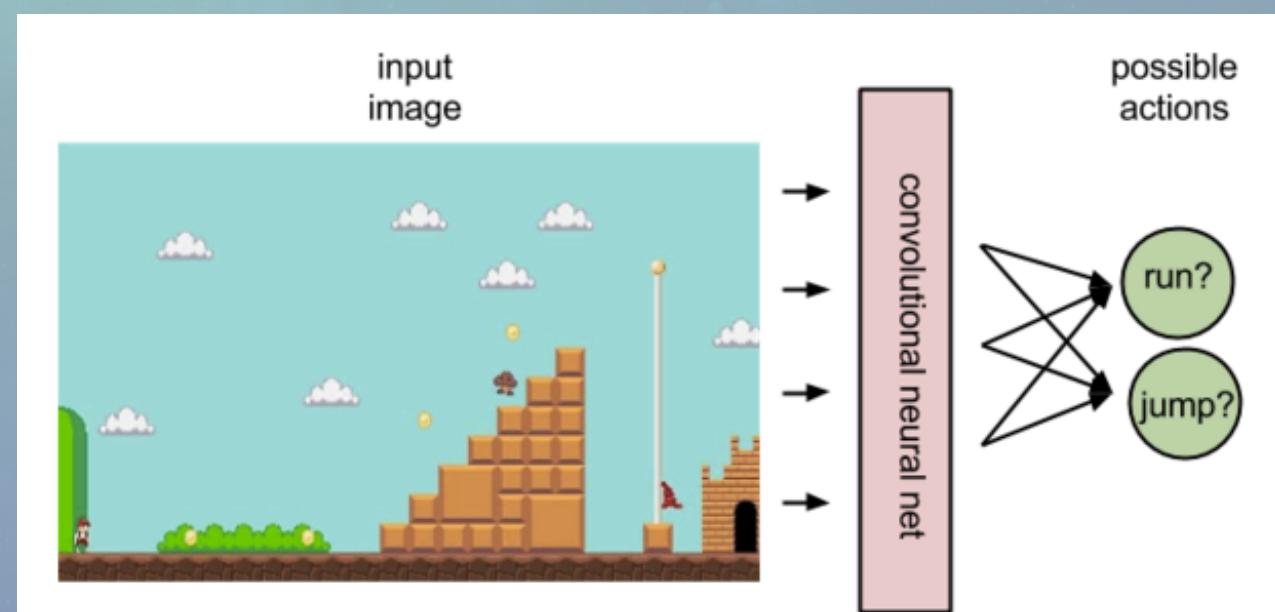


Reinforcement learning

Applications:

- Games
- Robotics / Motion control

Deep reinforcement  
learning



<https://skymind.ai/wiki/deep-reinforcement-learning>