

Machine Intelligence



What's **Machine Learning** ?

- Supervised
- Unsupervised
- Semi-supervised



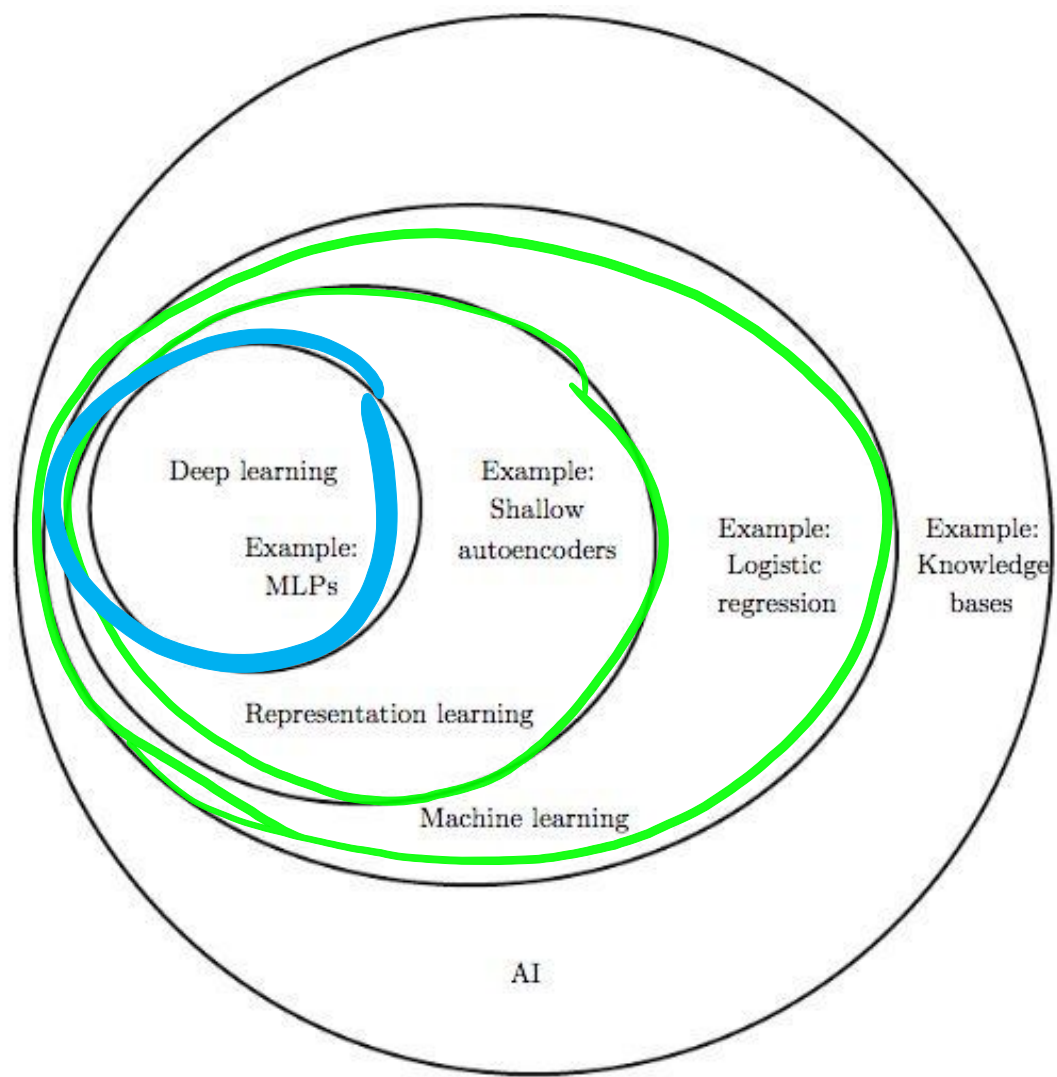
Today's Agenda

- ✓ Introduction to ML (15 mins)
- ✓ Supervised Learning (15 mins)
- ✓ Linear Regression (rest of the session)
 - Gradient Descent
 - Mean Squared Loss
 - Coding & Implementation

Overview

- Creating an statistical model to mimic “Intelligent” decision making.
- Finding patterns in complex, scattered data to present information.
- Building “smart” applications/devices.

Machine learning is a subfield of artificial intelligence (AI) concerned with algorithms that allow computers to learn. What this means, in most cases, is that an algorithm is given a set of data and infers information about the properties of the data—and that information allows it to make predictions about other data that it might see in the future



History of ML

Why did it happen?

- Started as a subset of Artificial Intelligence to help solve problems easily.
- Statistical Models used for prediction problems.
- Writing long hand-designed algorithms was inefficient

How about when??

- First Computer, ENIAC (1946)
- Turing Test (1950)
- First Checkers bot (1952) at IBM
- Neural Turing Machines (1957)

Current Status

- Google DeepMind
- Facebook AI and Research (FAIR)
- OpenAI etc.
- Microsoft Research

Some Applications

- What makes your smartphone, "Smart"?
- In search engines, photo-based applications, chatbots, voice recognition, digital security, pattern analysis
- Robotics, Game AI, recommendation systems, pseudo-creative AI
- And lot more to come...

PRISMA
in a specific style.
(Painting like an artist)



Why ML Now ?

1000's
clusters

Why not use Machine Learning for everything?

- Data availability
- GPU's, computing power
- Strong Mathematical foundation(which was also there 1990's)



Why the Hype

- Every minute up to 300 hours of video are uploaded to YouTube.
- Average of 31.25 million messages and view 2.77 million videos every minute on Facebook.
- More data has been created in the past few years than in the entire previous history of the human race.
- At the moment less than 0.5% of all data is ever analyzed and used, just imagine the potential here

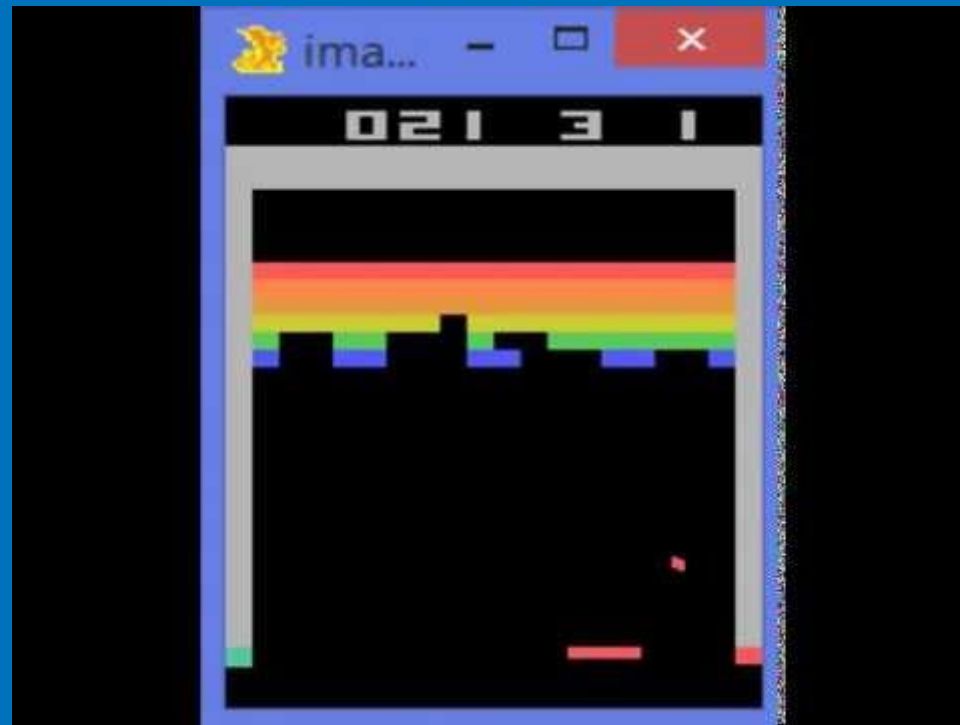
And everyone is using it.

- Google Page Ranking.
- Netflix Suggestions.
- Tinder, for you to “chill”
- Tesla Self Driving Cars, *Uber*.
- Political Campaign & Advertisement Campaigns
- Spam Filtering
- Google AdSense
- Bio-informatics
- Google “Allo”, Amazon “Alexa”
- Facebook Photo Tagging

Self Driving Car

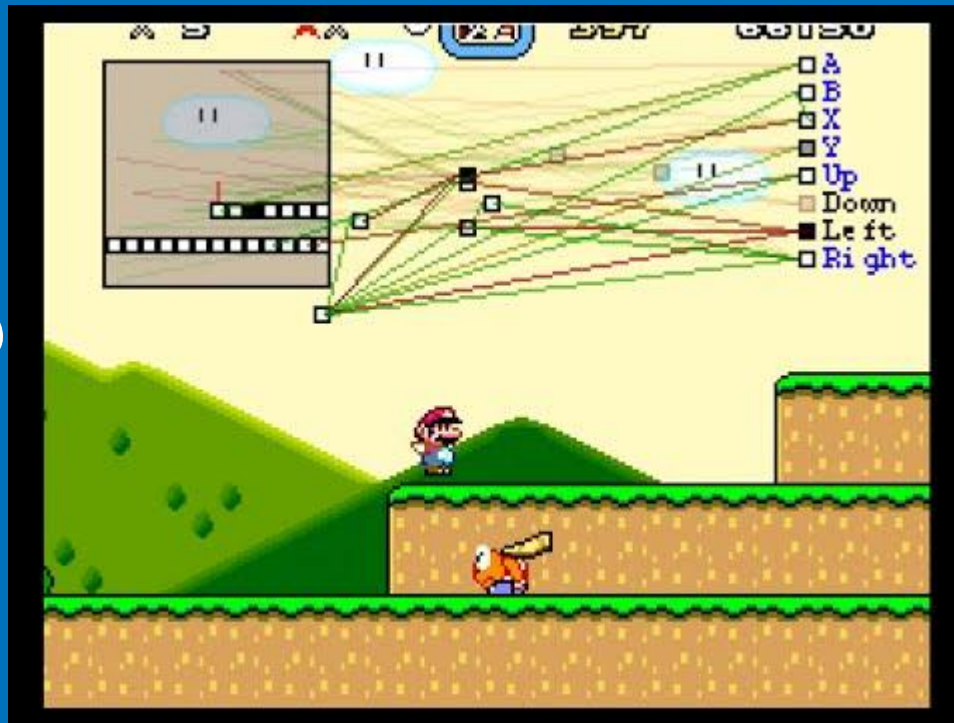
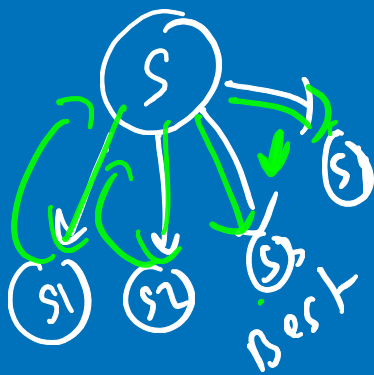


Google Deep Mind - Atari Player



Neural Mario

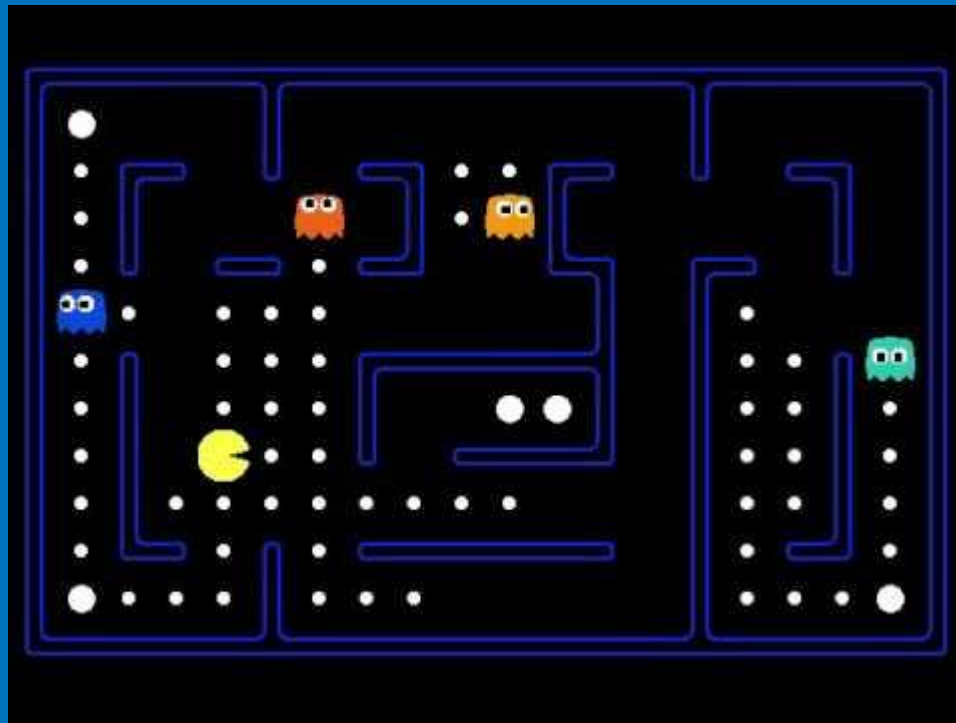
Action
Feedback
Reward (+, -)



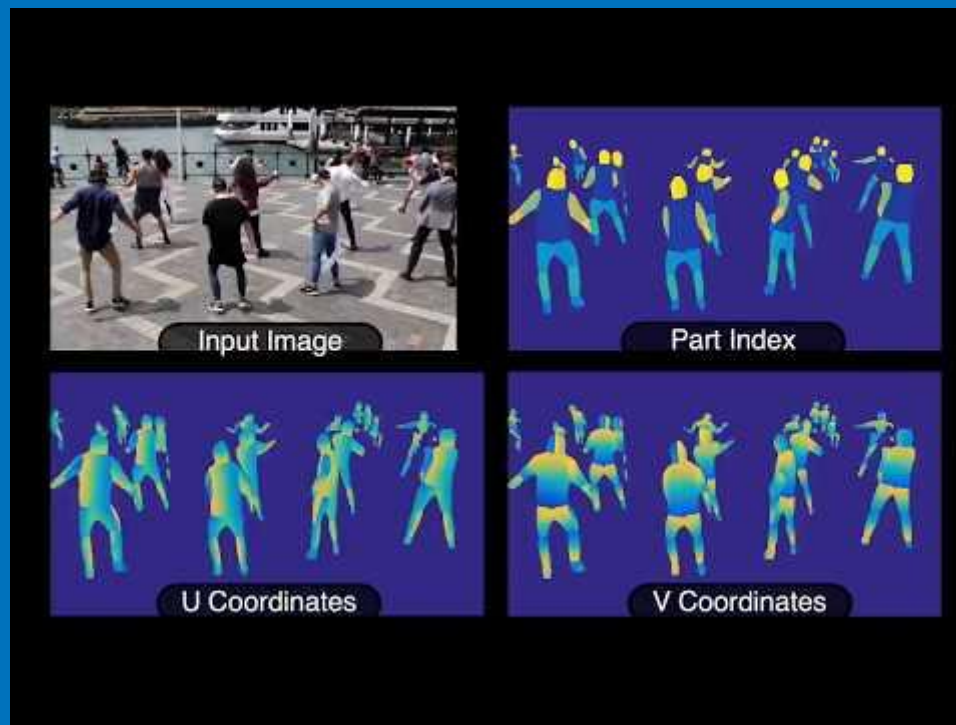
Trying
Reinforcement
Angle
Speed

Deep Q learning

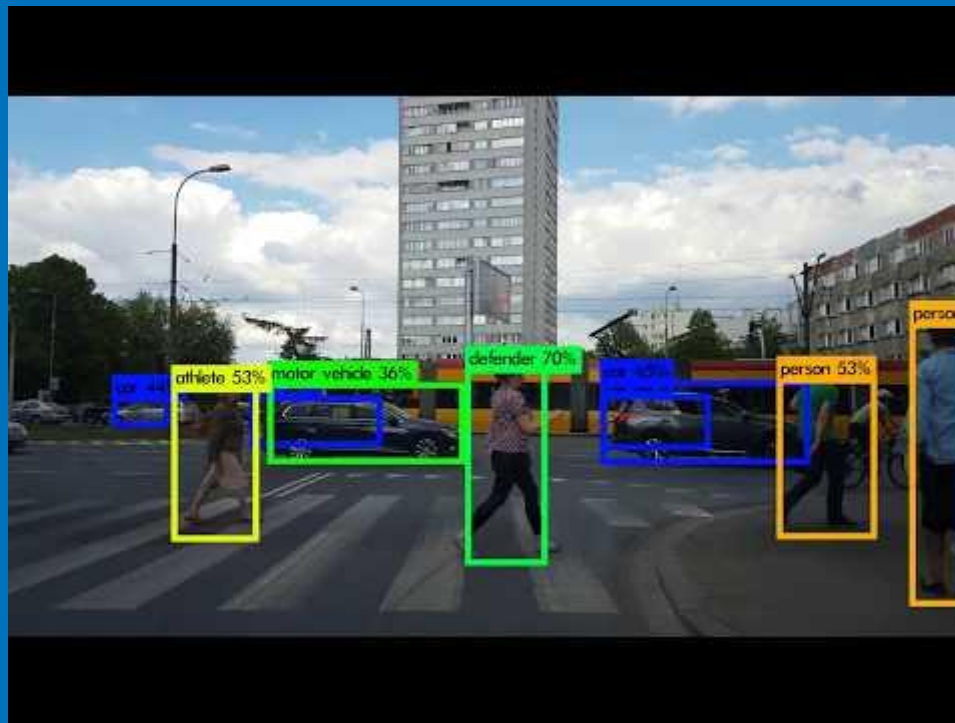
Neural Networks - Pacman



Dense Human Pose Estimation(CNN)



Object Detection [YOLO (You Only Look Once)]



State
of the
art

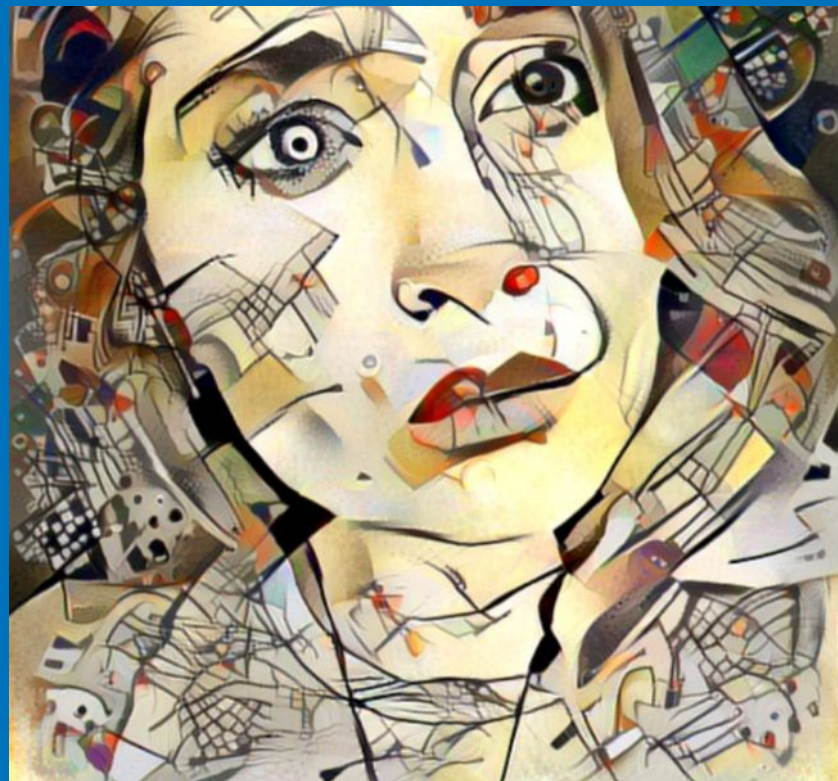
Creating New Images



Neural Art

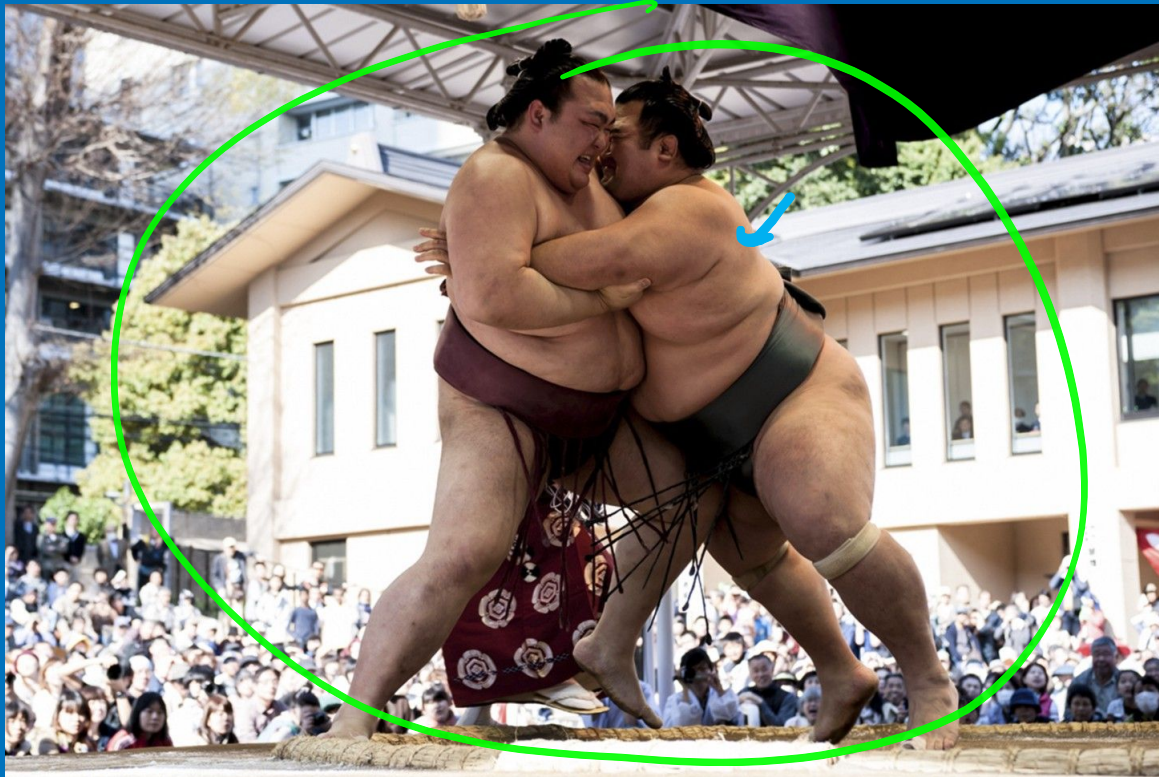


AI learned to paint



Story Generation from Images

Romantic-Novels
↓ + Image.



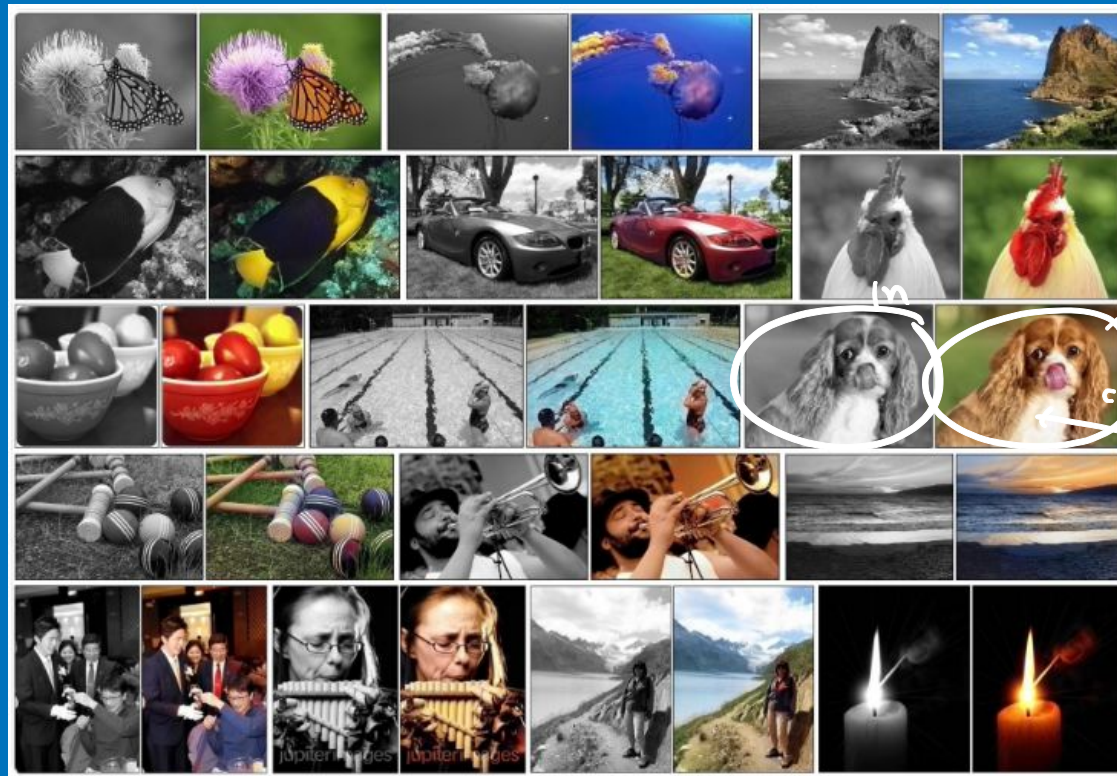
Generated story about image
Model: Romantic Novels

*"He was a shirtless man
in the back of his mind,
and I let out a curse as
he leaned over to kiss
me on the shoulder."*

*He wanted to strangle
me, considering the be-
autiful boy I'd become
wearing his boxers."*

~~Not~~

Colourizing Black & White Images/Videos



In
Output

Colourizing Black & White Videos

The Lost World (1925)



~~people~~
computer

Language Translation



Automatic Handwriting Generation

Machine learning Mastery

Machine Learning Mastery

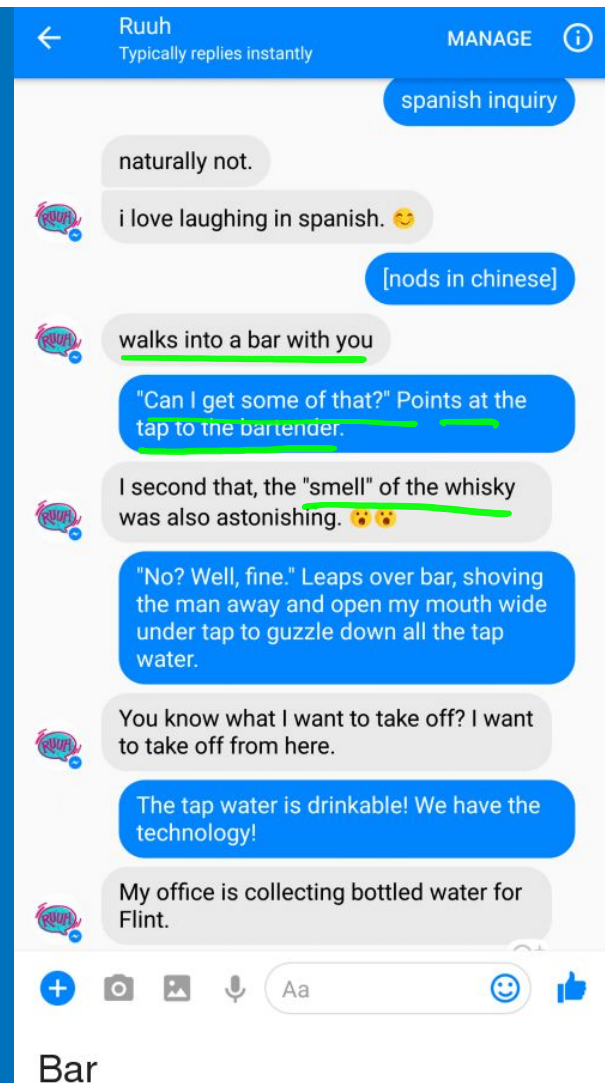
Machine Learning Mastery

Applications in NLP

- Language Modelling & Generation
- Named Entity Recognition
- Question Answering
- Speech Recognition & Generation
- Machine Translation

Chatbots & Conversational Engines
Context Based Queries
Bots that answer questions


Dialog System
Understanding



Wikification

- Extracting important attributes (born, party, office, residence)
- Named Entities
- Category Tags [Multilabel classification]

Narendra Modi
MP



16th Prime Minister of India

↓

In office
1 January 2002 – 16 May 2014

Preceded by [Kamlesh Patel](#)
Succeeded by [Suresh Patel](#)

Personal details

Born Narendra Damodardas Modi
17 September 1950 (age 67)
[Vadnagar, Bombay State, India](#)
(present-day Gujarat)

Political party [Bharatiya Janata Party](#)

Spouse(s) [Jashodaben](#) (m. 1968)
(estranged)

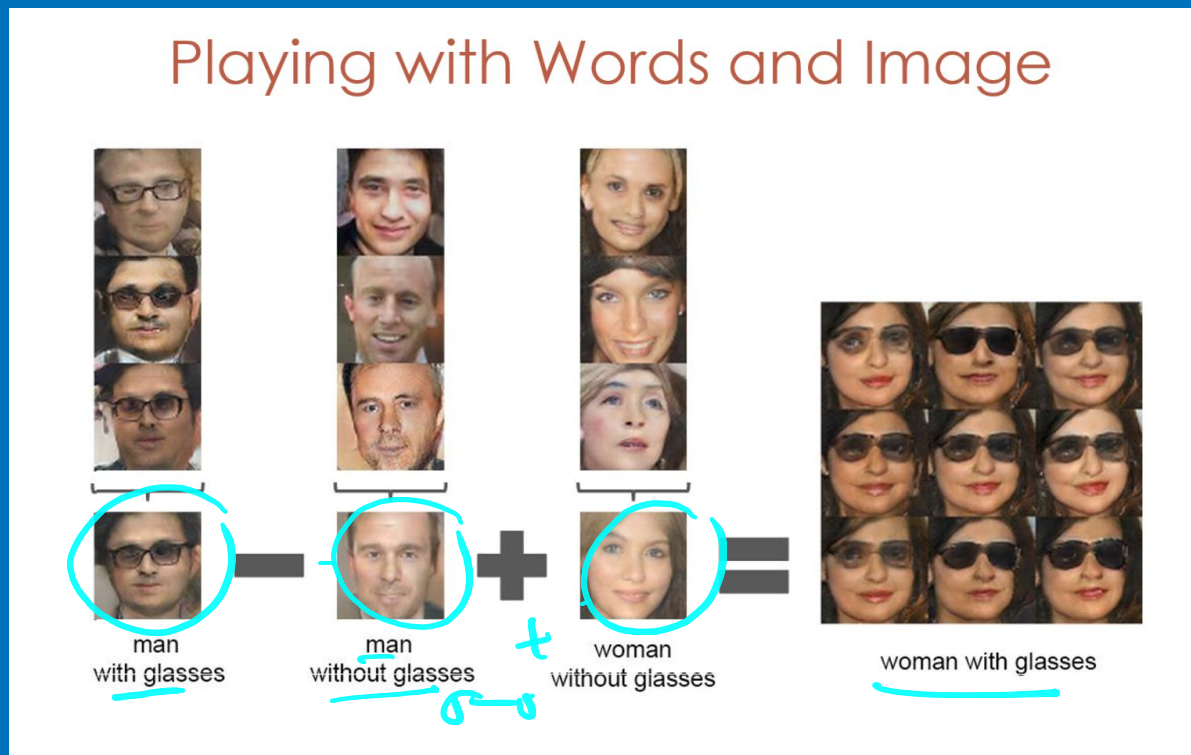
Residence [7, Lok Kalyan Marg](#)

Alma mater [University of Delhi](#)
[Gujarat University](#)

Signature 

Website [Official website](#) 
[Government website](#) 

Play with Words and Image (Word2Vec)



Analysis Population on Whales



Challenges

Why not use Machine Learning for everything?

- Computation cost
- Data Availability
- Requires research supervision



Future

- pseudo-Human-like behaviour
- Autonomous Vehicles
- Advanced Chat AI
- Environment Exploration
- Knowledge Bases

