Artificial Intelligence and Deep Learning

KSHITIZ RIMAL, DEVELOPER SESSIONS
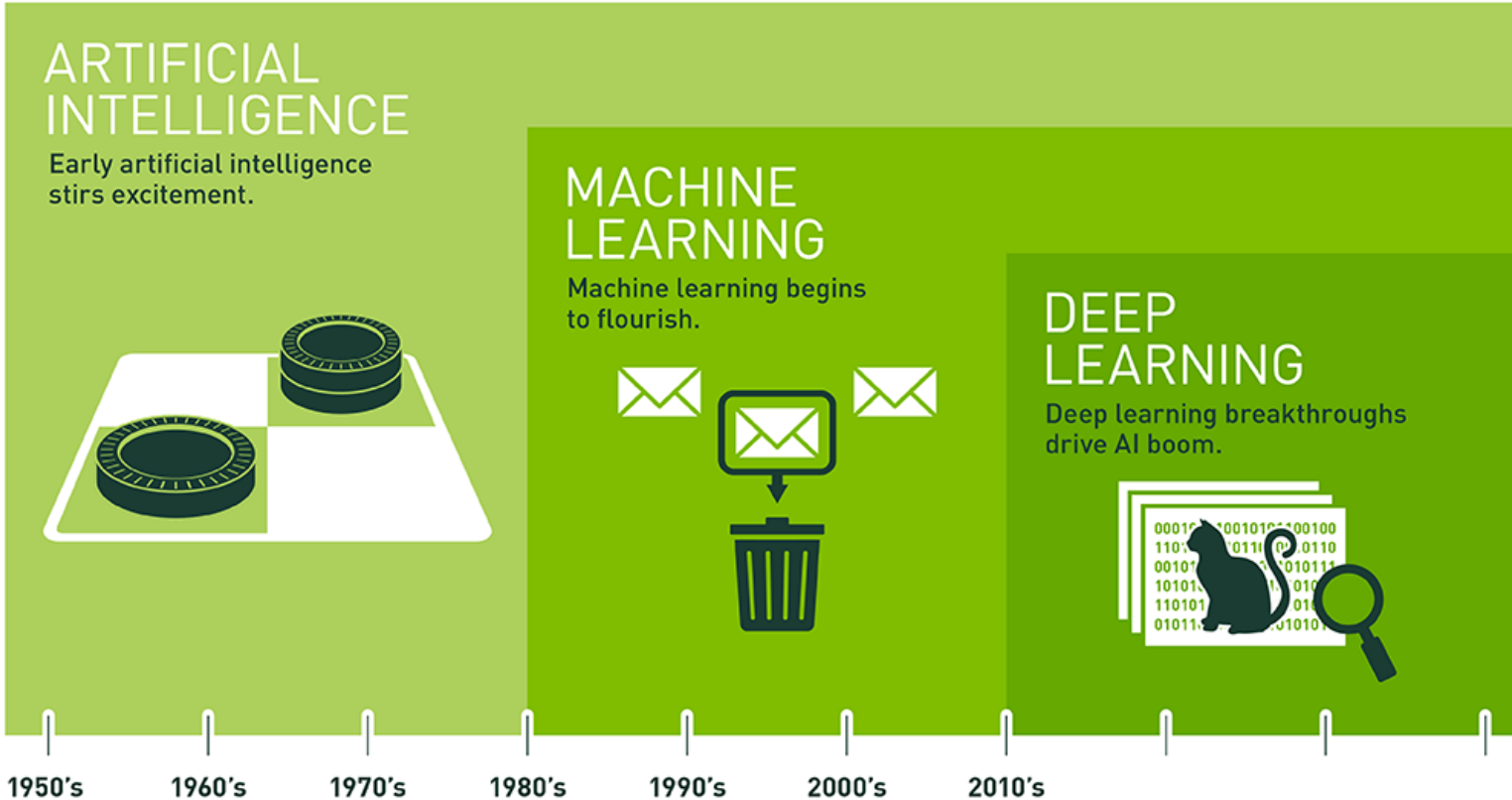
Kshitiz Rimal

- Full stack developer
- UI/UX Designer
- Machine Learning Enthusiast

AI in general

- Systems or Machines that can perform with some intelligence
- Mimics human actions
- Decision making capacity like humans
- That can reason and deduce with some human level intellect
- Predict actions like humans do

AI, Machine Learning & Deep Learning

AI without ML and DL

- Machine need to be programmed to model its behavior
- Need to model systems with rules
- Tedious Job, Hand crafted features and actions

Machine Learning

- Need for machine Learning
- Using data to train the system instead of rules and programming
- Data are used to find pattern instead of predicting and modeling each probable pattern
- Concept of features
- Data with labeled features are fed to train
- Advantages

Deep Learning

- Need for deep learning
- Based on abstract concept of biological neural network present in our brain
- Instead of actual neurons, mathematical abstraction with concept of layers are present

Deep Learning
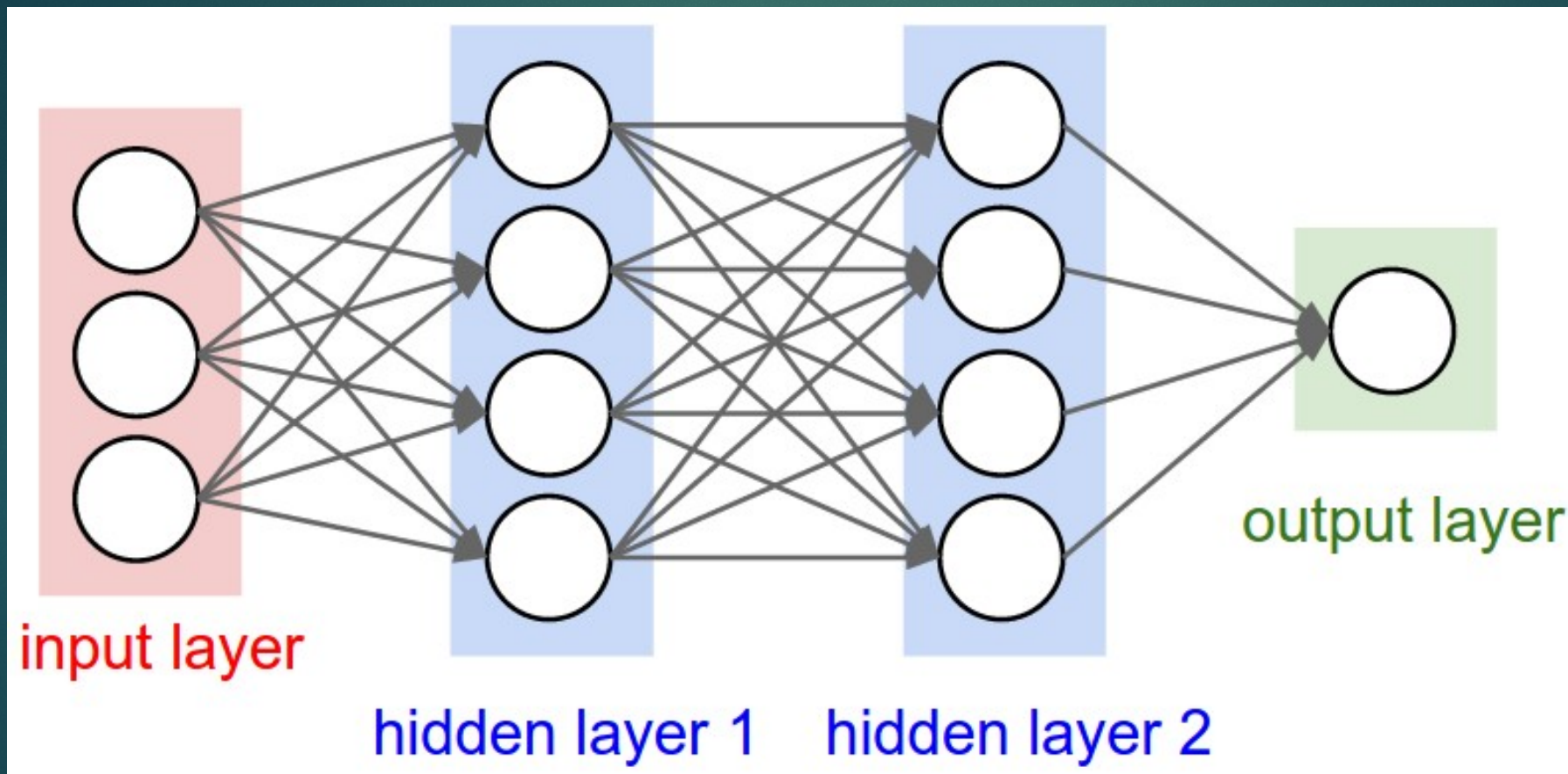
Deep Learning

▶ The System will itself create the features it needs

▶ User just input the data and increase and decrease the hidden layers

▶ Based on that configurations, it will extract its own features and train itself

▶ Example: Image Classification, before in ML user has to specify image features to be read by the system like histogram, sharp edges, colors, brightness values etc.

▶ Now just input the image the system will create its own features
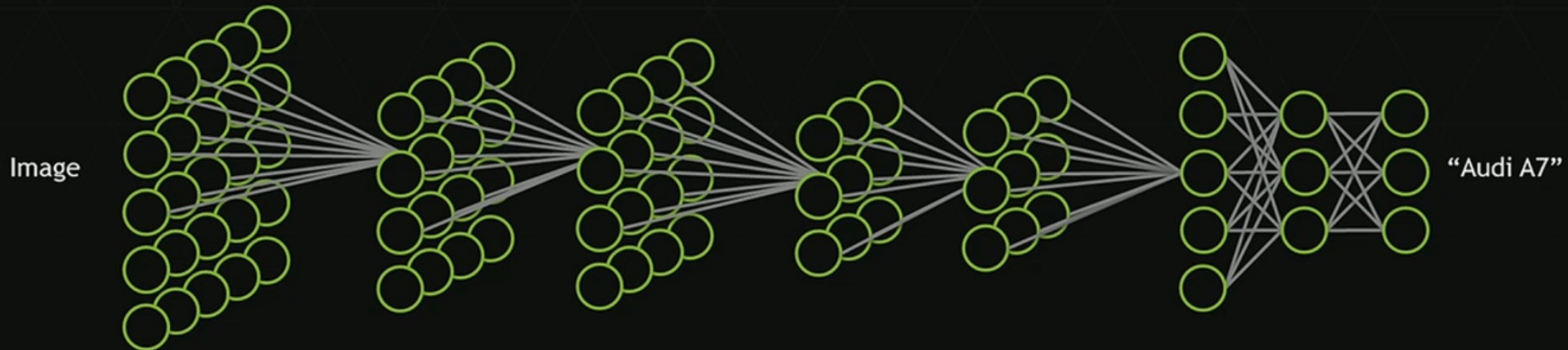
HOW A DEEP NEURAL NETWORK SEES

Image

"Audi A7"

Image source: "Unsupervised Learning of Hierarchical Representations with Convolutional Deep Belief Networks" ICML 2009 & Comm. ACM 2011.
Honglak Lee, Roger Grosse, Rajesh Ranganath, and Andrew Ng.

Deep Learning

- Why Now?
- Internet, Huge amount of Data, Fasters GPUs

Real Applications — Style Transfer

- URL: https://www.youtube.com/watch?v=Khuj4ASldmU

Photo/Video Manipulations

- URL : https://www.youtube.com/watch?v=D4C1dB9UheQ

Create 3d Model from Picture of face

- URL: https://www.youtube.com/watch?v=u9UUWqVquXo

Create UI elements for Web and Mobile devices from Image

- URL: https://www.youtube.com/watch?v=Fevg4aowNyc

Self Driving Car

▶ URL: https://www.youtube.com/watch?v=GMvgtPN2IBU

Prerequisites: Theory

- Matrix Operations
- Derivative and partial derivatives (Power rule, Chain Rule)
- Vectors
- Some programming concepts

Famous Programming Languages

- Python
- Lua
- C++

Frameworks

- Why/what frameworks?
- Torch (Lua Based) — Mainly by researchers
- pyTorch (Python based) — Researchers and companies
- Tensorflow (Python, C++) — For Production ready apps
- Theano (Python) — Research
- Caffe(Image Classification, C++/Python/Matlab) — Production Apps

How to Learn

▶ Also given in Handouts

▶ Free Courses

    ▶ Machine Learning , Andrew Ng, Coursera (Theory)

    ▶ CS231n Lectures, Stanford University, Youtube (Theory + Little Implementation)

    ▶ Machine Learning Playlist by Sentdex, Youtube (Implementation)

    ▶ Siraj Raval, Youtube (Concepts, Theory and Implementations)

Further Studies

- Deep Learning Book, Ian Goodfellow, Yoshua Bengio
- Paid Courses
  - Deep Learning Courses by Lazy Programmer on Udemy

Workshop on AI

Q&A

Thank you