

In today's episode

1. Types of Machine Learning - slides
2. Neural Networks introduction - python
3. Neural Network Training procedure - slides
4. Word Embeddings - slides
5. Using word embeddings for document classification - python

Deep Learning for NLP - Focus on Medical Applications

Introduction to ML/DL

What is ML/DL



Three Main Types

- Supervised Learning

- We know what is the input and the corresponding output data
- Examples
 - Classification
 - Entity extraction
 - Event prediction

- Unsupervised Learning

- We only have input data
- Examples
 - Clustering

- Reinforcement Learning

- Games
- NAS

Supervised Learning - Entity Extraction

Input:

He was diagnosed with cancer

Output:

He was diagnosed with cancer C1306459 - PRIMARY MALIGNANT NEOPLASM - T191 - NEOPLASTIC PROCESS - 0.53

$$\{x_i, y_i\}_i$$

$x_1 = ('He', 'was', 'diagnosed', 'with', 'cancer')$ ----> Input

$y_1 = (0, 0, 0, 0, 1)$ ----> Output

Unsupervised Learning

- We only have the input data
 - No results
- Goal is to find some structure/patterns in the input
 - Usually difficult to validate

$$\{x_i\}_i$$

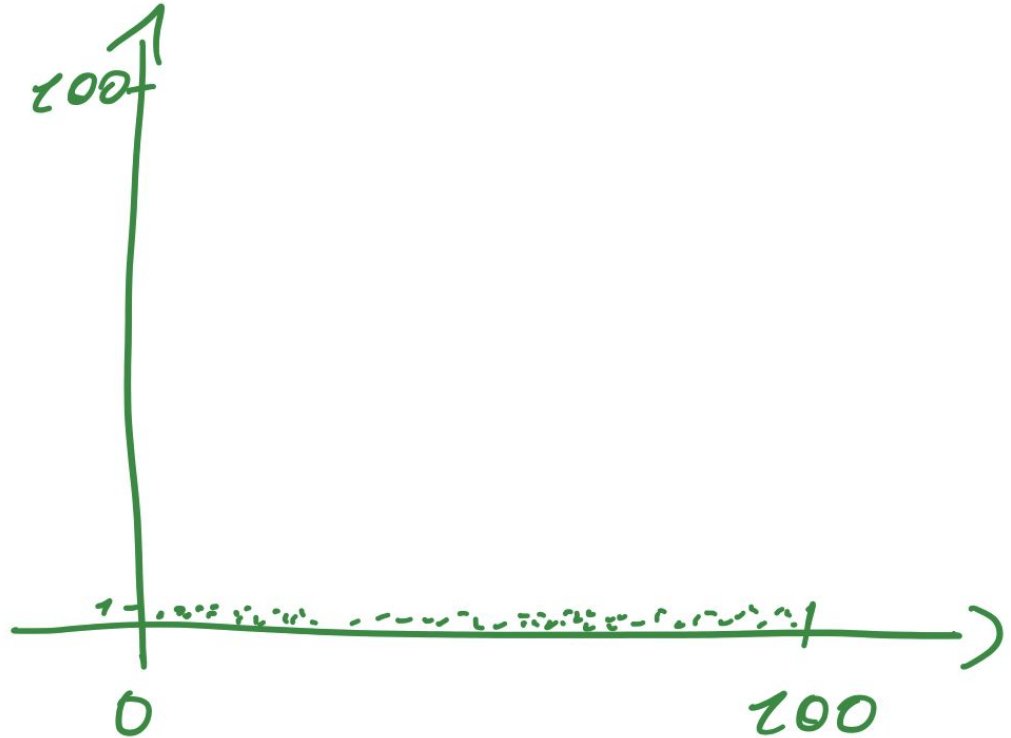
Unsupervised Learning - Clustering

$N = 100$ patients

Age $\in [0, 100]$

Health $\in [0, 1]$

$D = \{ (2, 0.1),$
 $(10, 0.5),$
 \vdots
 $\}$



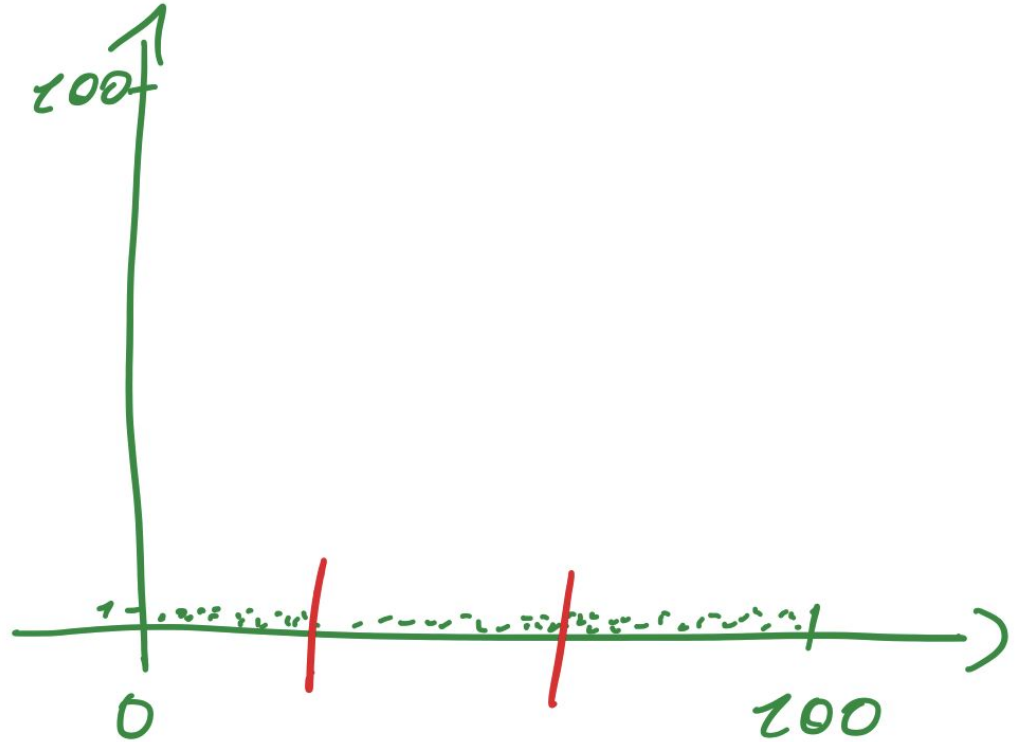
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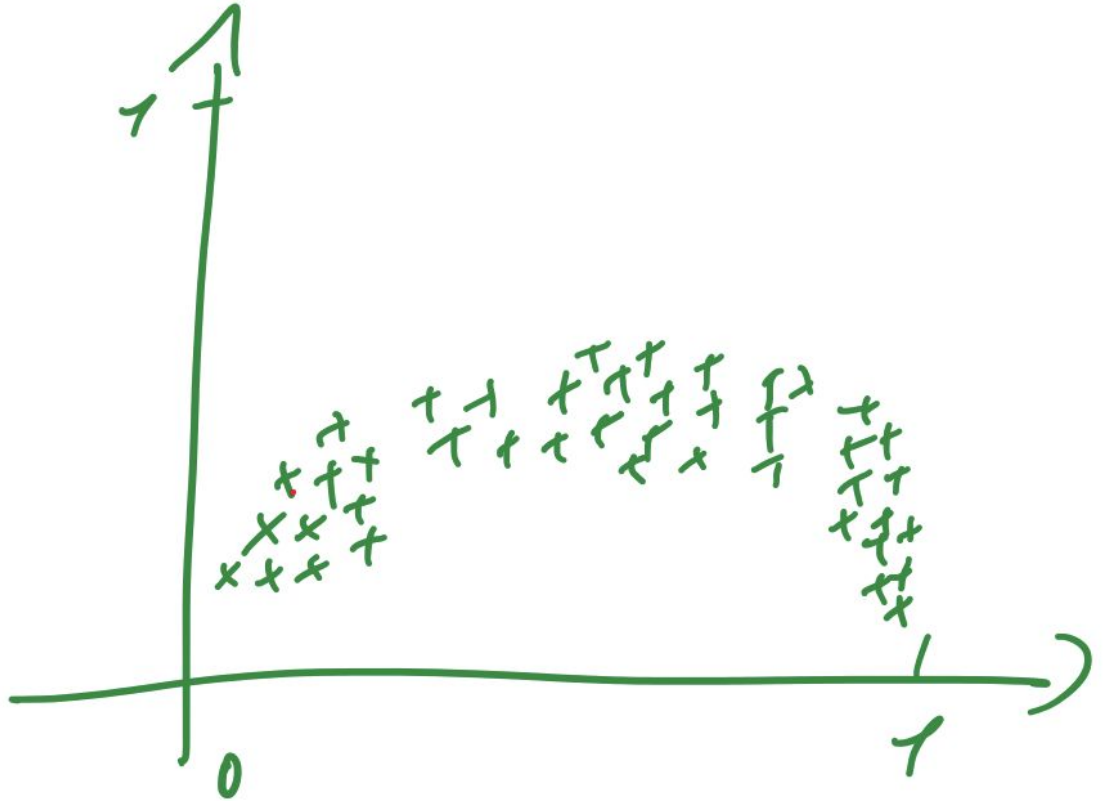
Unsupervised Learning - Clustering (Normalization)

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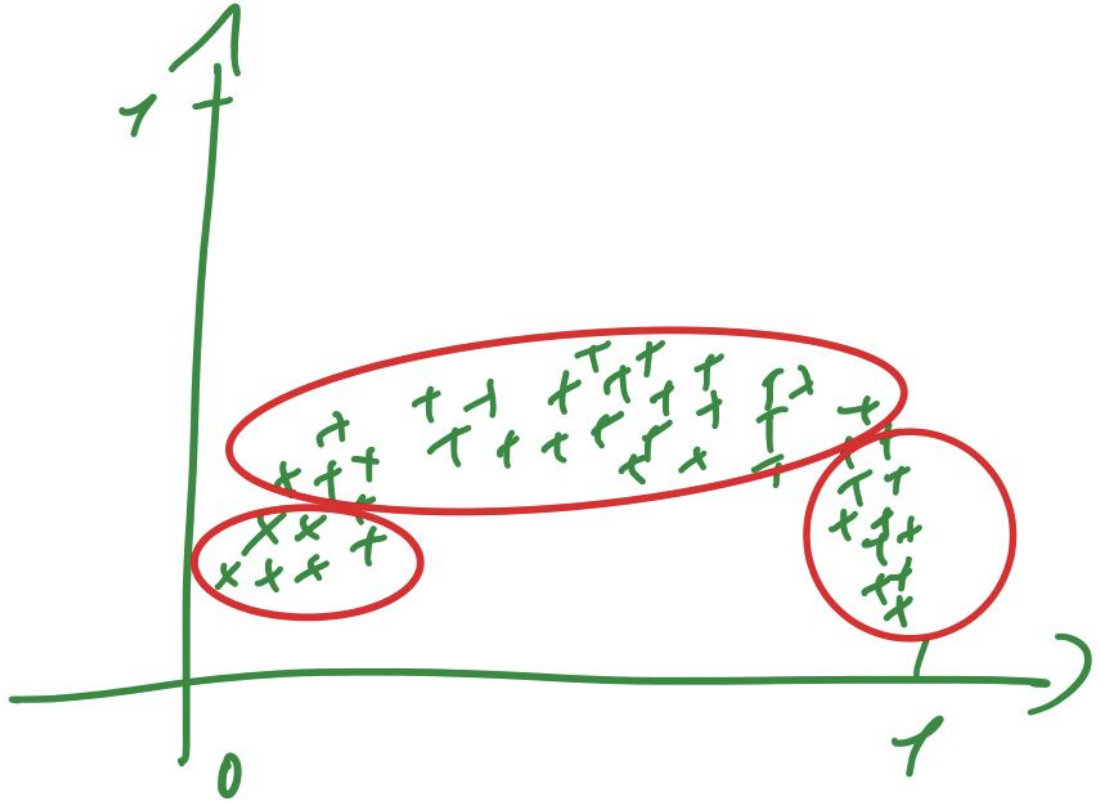
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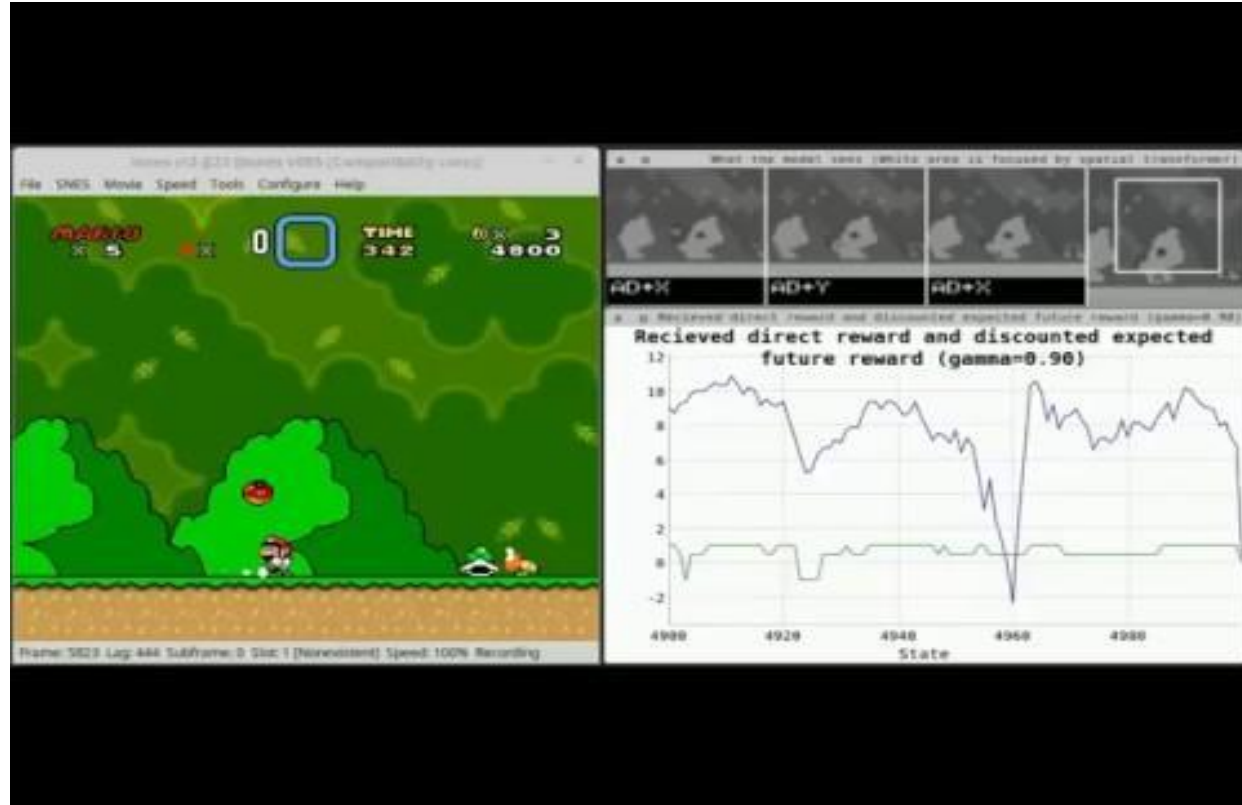
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Reinforcement Learning

- Reward/Punishment
- Agents
- Active environment
- Goal oriented



Reinforcement Learning - Neural Architecture Search

- Reward/Punishment
- Agents
- Active environment
- Goal oriented

Controller

Child Model

input

DAG