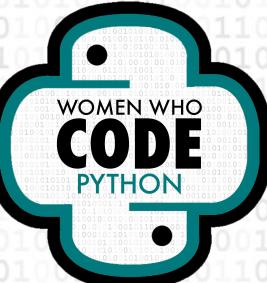


Welcome everyone!

- You can find these slides on GitHub here:
<https://github.com/WomenWhoCode/WWCodePython>
- Please make sure your chat is set to “All panelists and attendees”.
- Some housekeeping rules:
 - Everyone will be muted throughout the webinar, but there will be opportunities for participation!
 - Please share your thoughts on the chat and/or ask questions in the Q&A.
 - The entire team is here today. Please reach out to us with any technical questions!



Discover NLP with Python



Welcome to Session #2!

THANK YOU TO OUR LEADERS!



OUR MISSION

Inspiring women to
excel in technology
careers.



OUR VISION

A world where women are representative as technical executives, founders, VCs, board members and software engineers.



OUR TARGET

Engineers with two or more years of experience looking for support and resources to strengthen their influence and levelup in their careers.



CODE OF CONDUCT

WWCode is an inclusive community, dedicated to providing an empowering experience for everyone who participates in or supports our community, regardless of gender, gender identity and expression, sexual orientation, ability, physical appearance, body size, race, ethnicity, age, religion, socioeconomic status, caste, creed, political affiliation, or preferred programming language(s).

Our events are intended to inspire women to excel in technology careers, and anyone who is there for this purpose is welcome. We do not tolerate harassment of members in any form. Our **Code of Conduct** applies to all WWCode events and online communities.

Read the full version and access our incident report form at womenwhocode.com/codeofconduct



230,000

Members

70 networks in 20 countries

Members in 97+ countries

10K+ events

\$1025 daily Conference tickets

\$2M Scholarships

Access to [jobs](#) + [resources](#)

Infinite connections



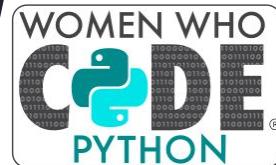
OUR MOVEMENT

As the world changes, we can be a connecting force that creates a sense of belonging while the world is being asked to isolate.



Natural Language Processing & Deep Learning

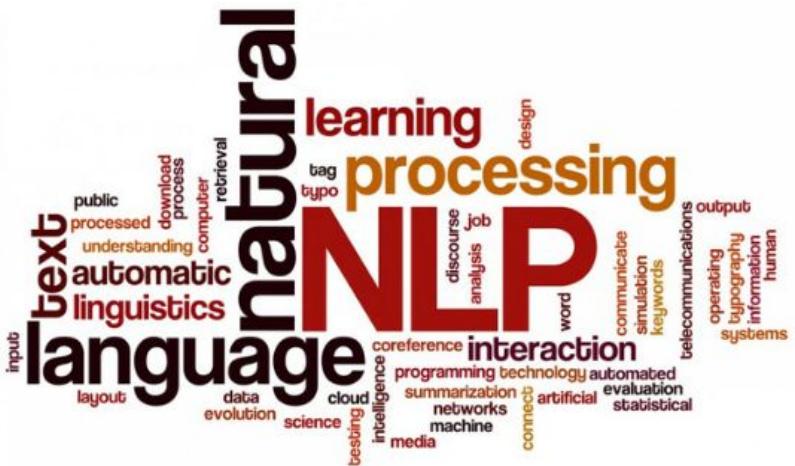
*Session 2 : Evolution of NLP and Introduction to
Deep Learning and their use-cases in the real-world*



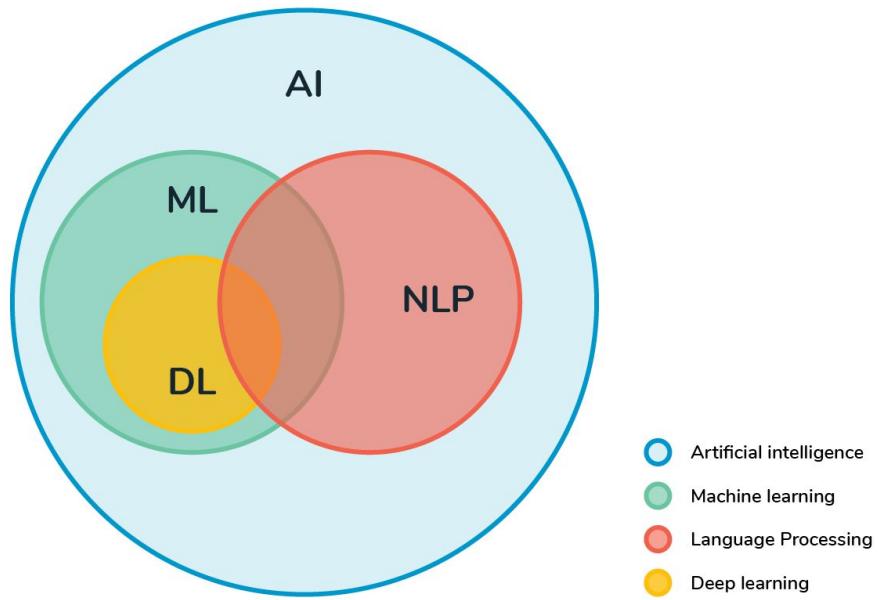
AGENDA

1. Recap – Week 1
 2. What is Deep Learning?
 3. Introduction to Neural Networks & its types:
 - a. CNN (Convolutional Neural Network)
 - b. RNN (Recurrent Neural Network)
 - c. LSTMs
 4. Evolution of NLP
 5. Word Vectorization
 6. Google Colab Demo
 7. Recap and Wrap-up
-

1. Recap - Week 1

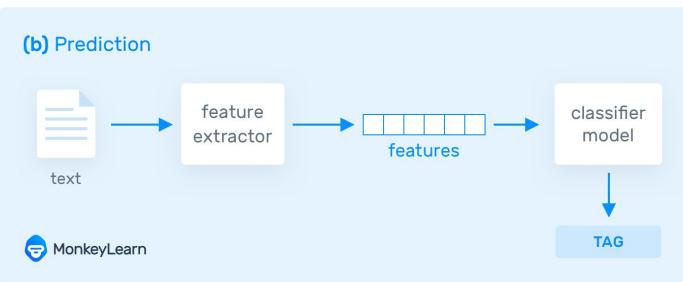
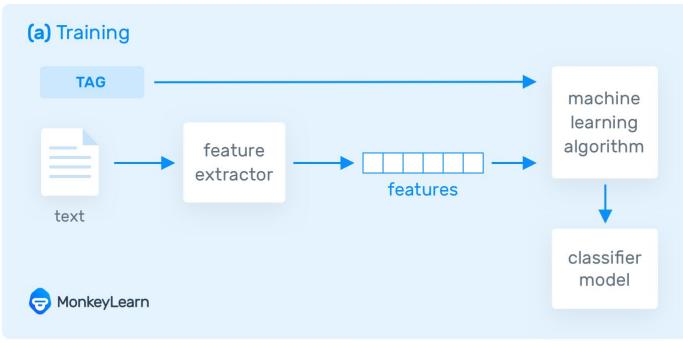


What is NLP?

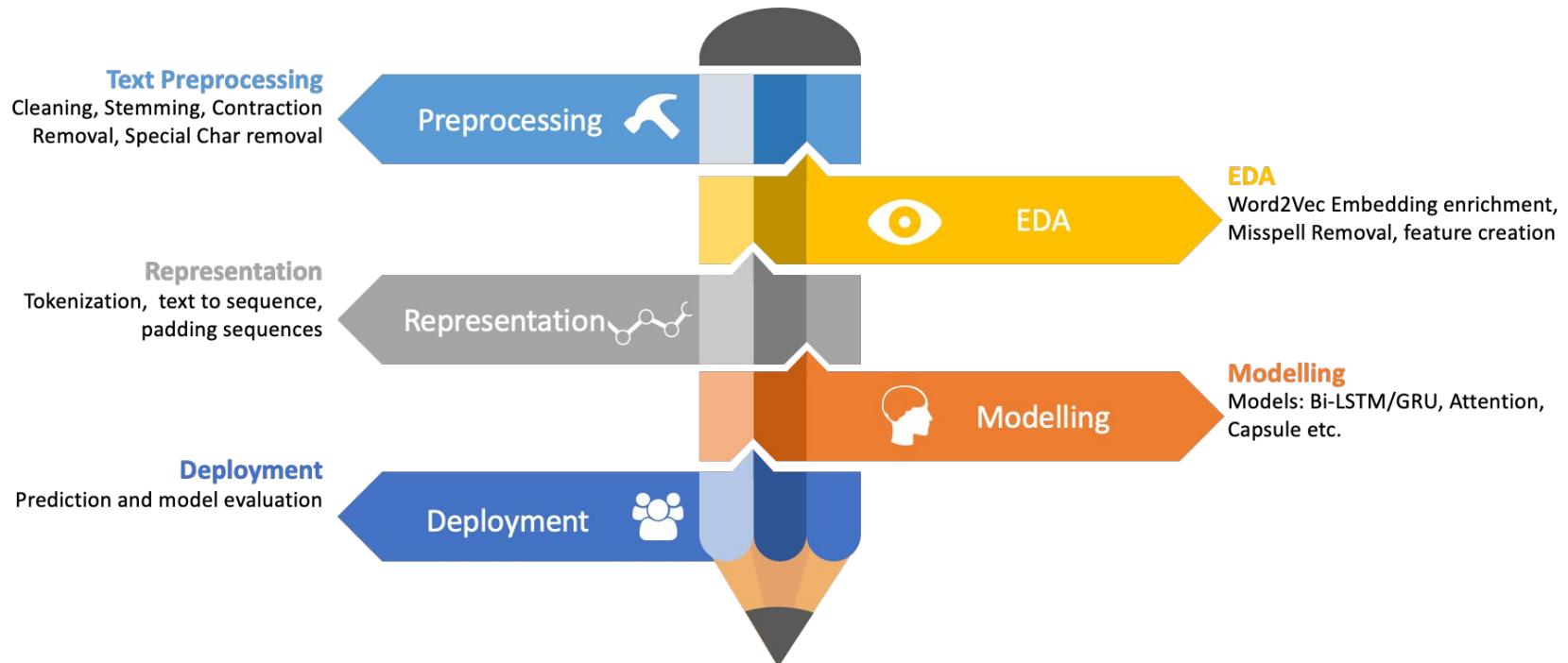


- Subfield of computer science and artificial intelligence
- Allows humans to bypass programming languages to speak to computers and use normal human speech instead
- Applications: text classification, machine translation, sentiment analysis
- Our devices nowadays: Apple's Siri, Amazon's Alexa, and Gmail's spam filter

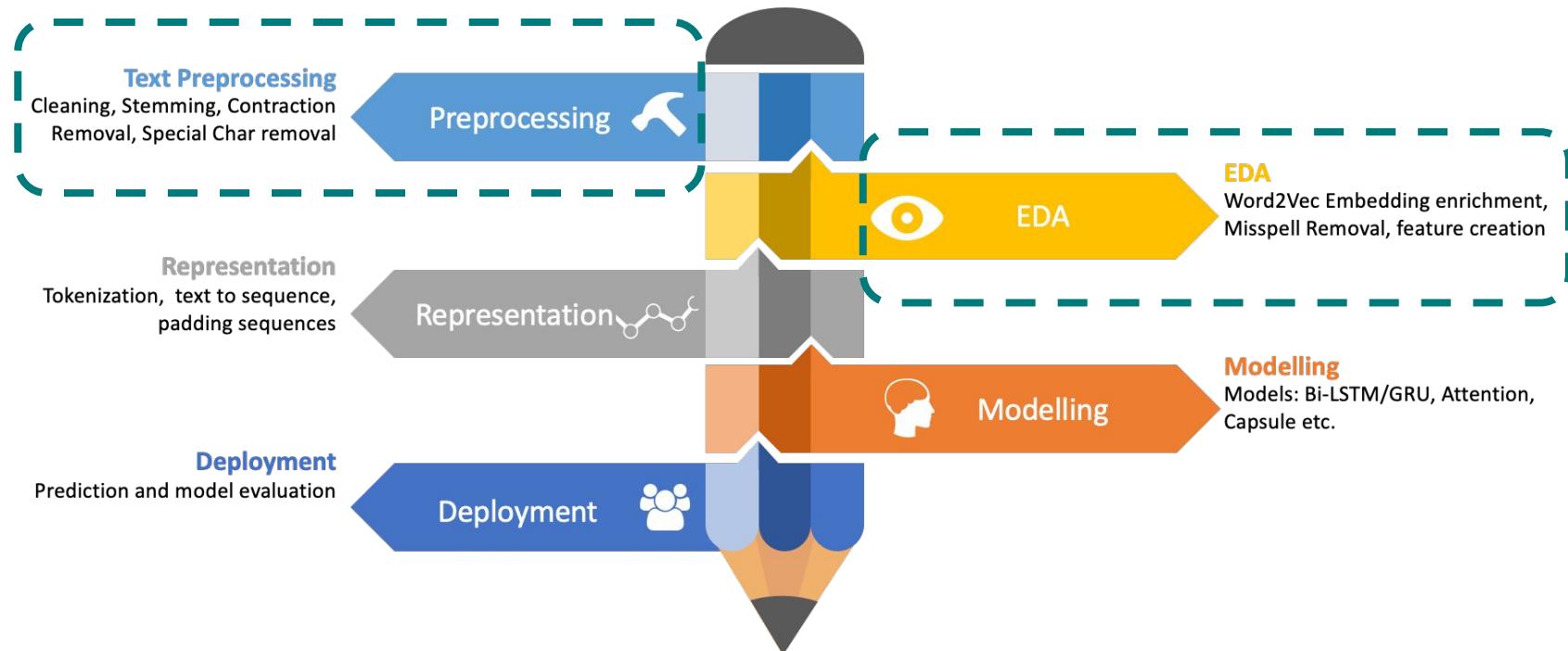
NLP and its Applications



NLP Workflow

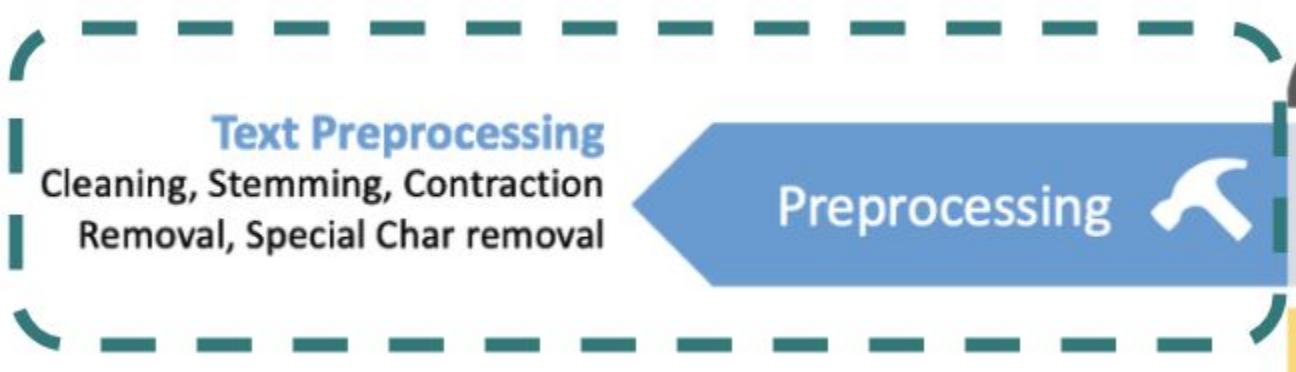


NLP Workflow



NLP Workflow: Preprocessing & EDA

1. Noise Cleaning
2. Tokenization
3. Spell Checking
4. Contraction Mapping
5. Stemming / Lemmatization
6. Stopwords Identification & Removal

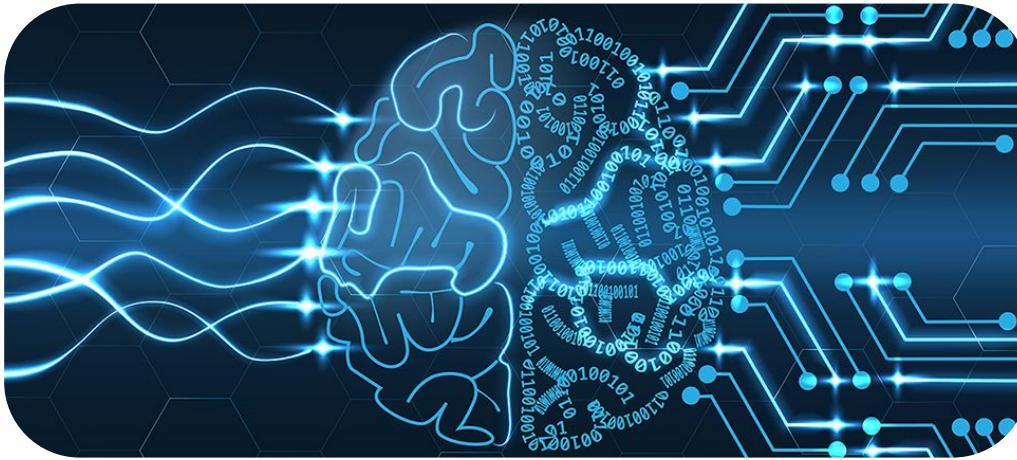


NLP Workflow: Preprocessing & EDA



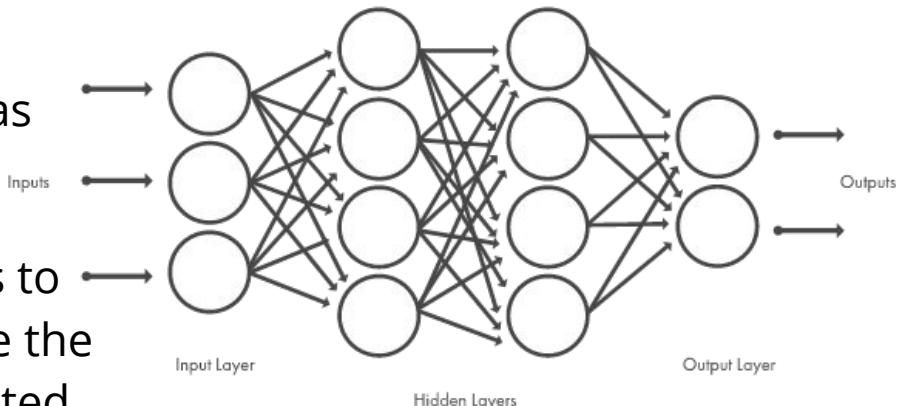
- Process of exploring data, generating insights, testing hypotheses, checking assumptions and revealing underlying hidden patterns in the data
- Through these goals, we can get a basic description of the data, visualize it, identify pattern in it, identify potential challenges of using the data, etc.

2. What is Deep Learning?



Deep Learning Overview

- Deep Learning is the sub-field of Machine Learning based on the algorithms, known as Neural Networks
- Computers/machines performing the tasks to think & process like humans -- this is where the Deep Learning technique will be implemented
- Processes involved are to create, train and deploy the models



Deep Learning - Use Cases

Use Cases:

- Text analysis & Extraction
- Speech and Face Recognition
- Language translations
- Chatbots

The depth of the Neural Network is based on the number of hidden/middle layers

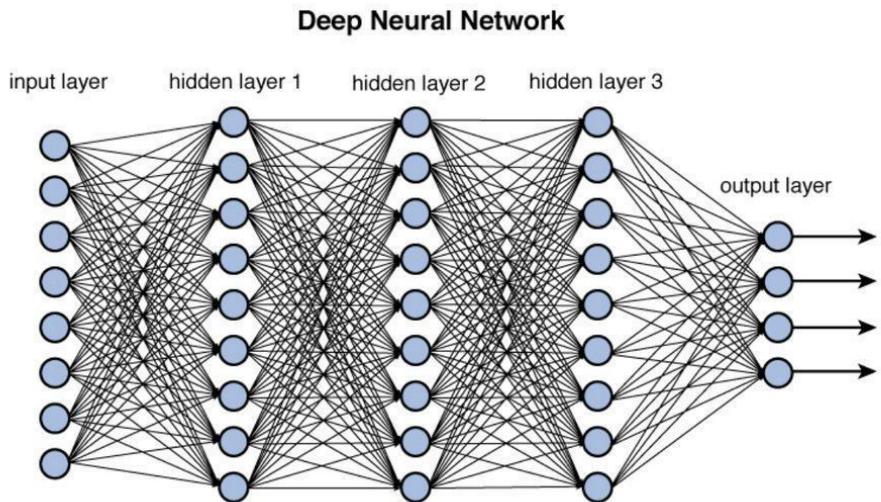
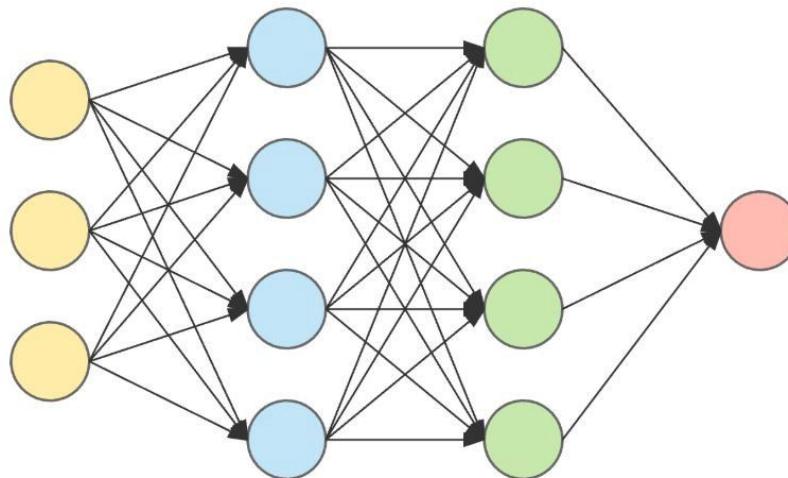


Figure 12.2 Deep network architecture with multiple layers.

Image above – Multiple Layered Deep Neural Network

3. Intro to Neural Networks



Neural Networks (NN) - Overview

Neural Networks (NN) is a widely adopted architecture for creating deep learning models and its NLP applications

Types of Neural Networks:

- CNNs = Convolutional Neural Networks
- RNNs = Recurrent Neural Networks
- LSTM = Long Short-Term Memory

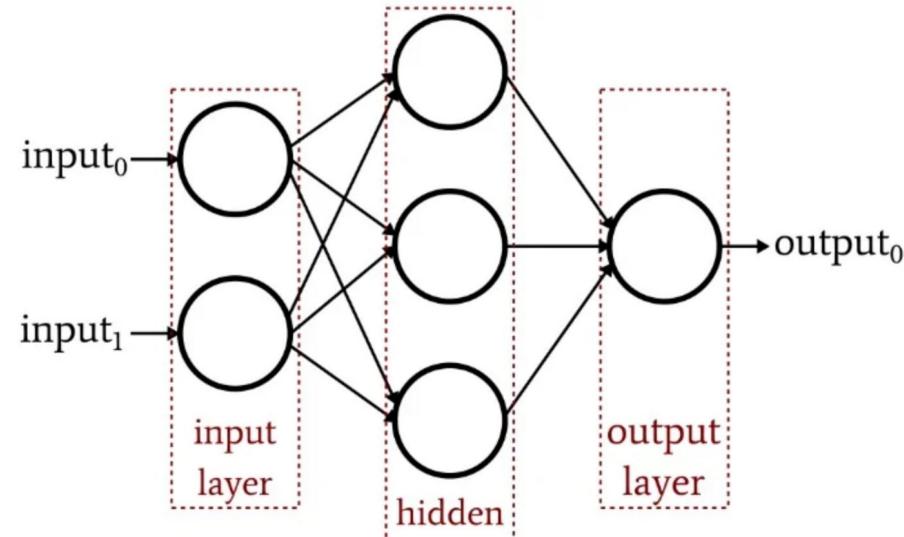


Image: Basic or Fundamental Architecture of Neural Network.

Neural Networks aka Artificial Neural Networks (ANN).

Neural Networks - Its Architecture

The common architecture of Neural Networks comprises of neurons/nodes organized in a multi-layered structure

- The **initial layer** is the input layer for the data feed
- Followed by **hidden layers** aka middle layers for extracting features from the input and
- Final layer being the **output layer** for prediction and response

Number of neurons in each layer are variable and modified for the best results

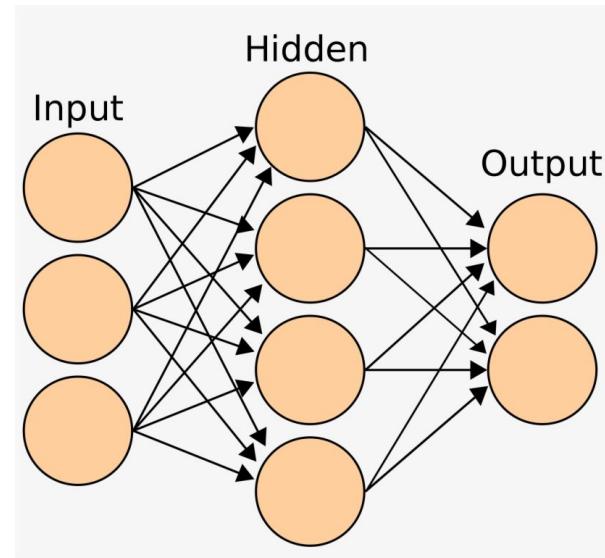


Image: Number of layers and Neurons varies upon dataset.

Neural Networks - Type 1: CNN Overview

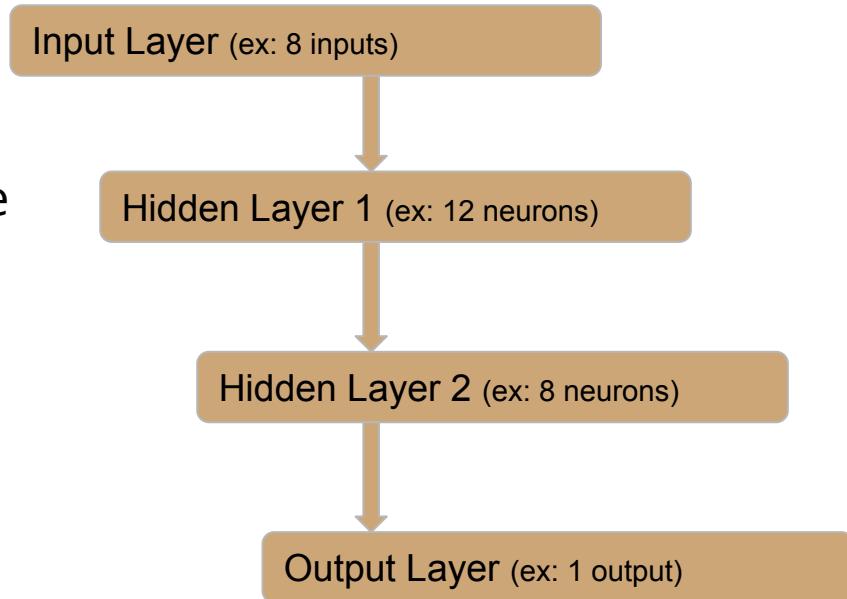
CNN: **Convolutional Neural Networks**.

One of the algorithms of Neural Networks.

On the right: explains the general structure of NN architecture → data will be fed into the input layer and predictions will be made in the output layer

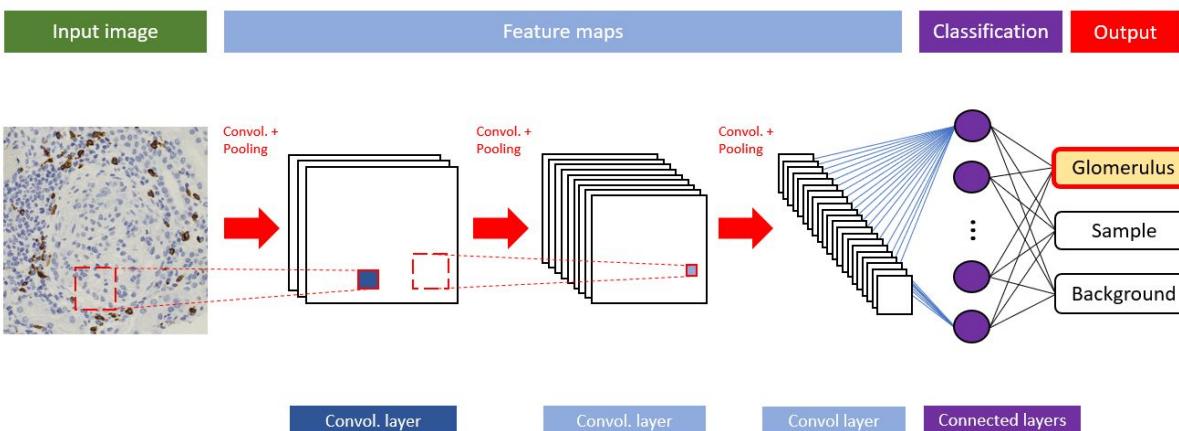
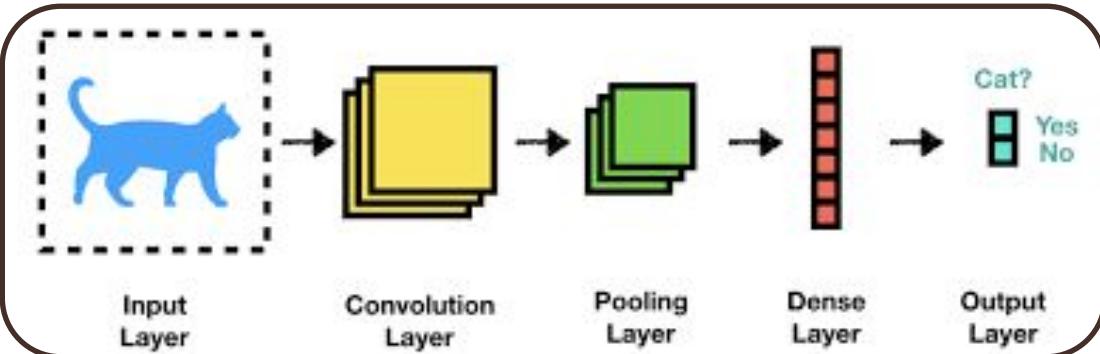
Use Cases:

- Image Recognition
- Classification prediction problems



CNN - Illustrations

- Examples of applications of CNN for Image Recognition



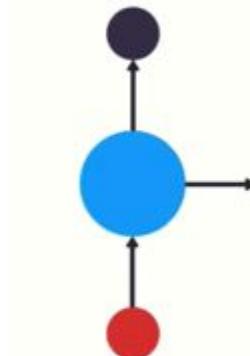
Neural Networks - Type 2: RNN Overview

RNN: Recurrent Neural Networks

Another type of NN architecture

Use Cases:

- Sequential prediction problems.
- Speech Recognition
- Text Classification prediction problems



Neural Networks - Type 3: LSTMs Overview

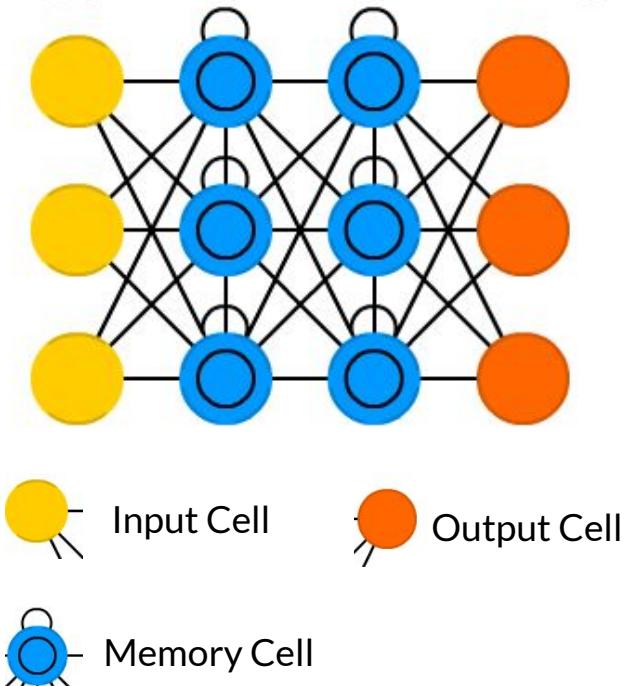
LSTM: Long Short Term Memory

- LSTM is advanced version of Recurrent Neural Network, i.e., trained using Backpropagation through time and overcomes the vanishing gradient problem
- LSTM has been able to train the networks more efficiently and perhaps it's been used for a wide range of applications

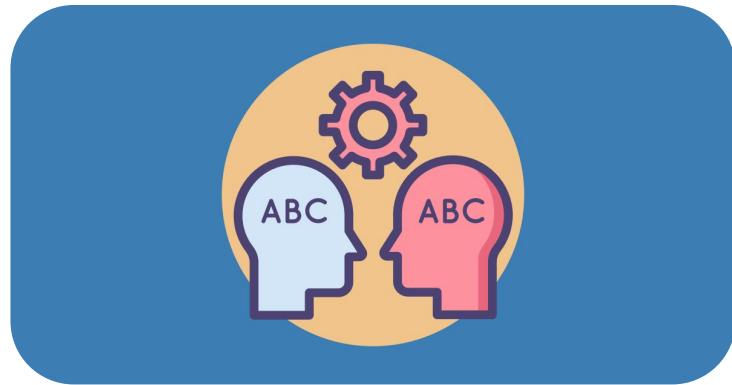
LSTMs

- Instead of Neurons, LSTM networks have memory blocks that are connected into layers
- It uses memory from the previous input (word/alphabets), to predict the next word/alphabets in the sequence

Long / Short Term Memory (LSTM)



4. Evolution of NLP

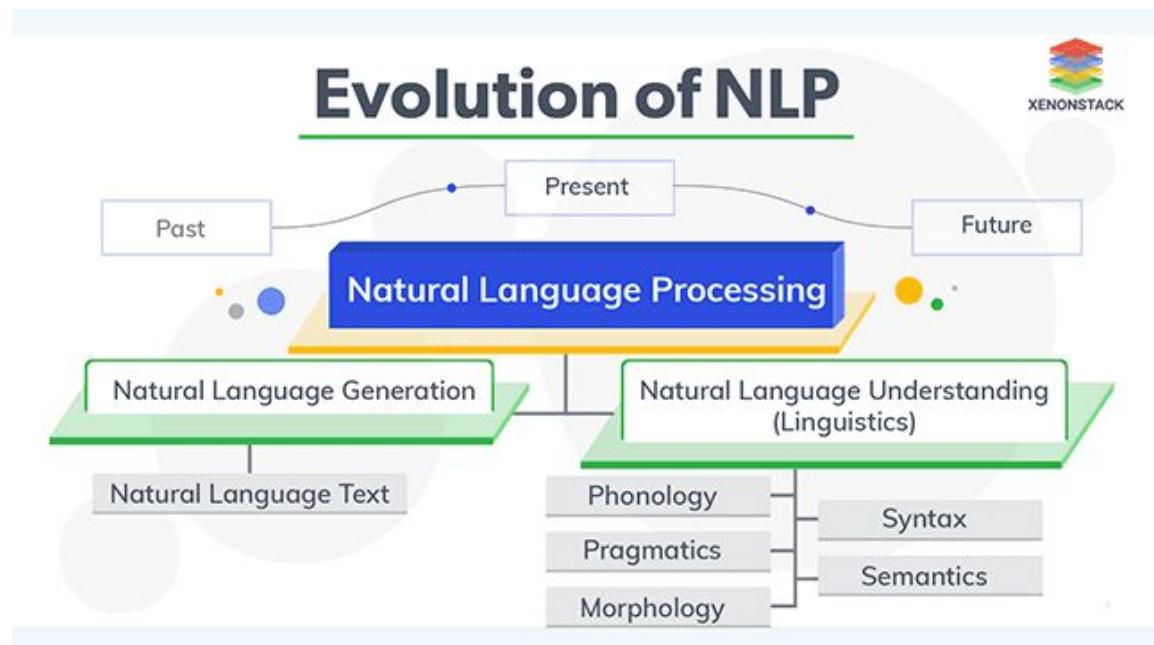


The Neural History

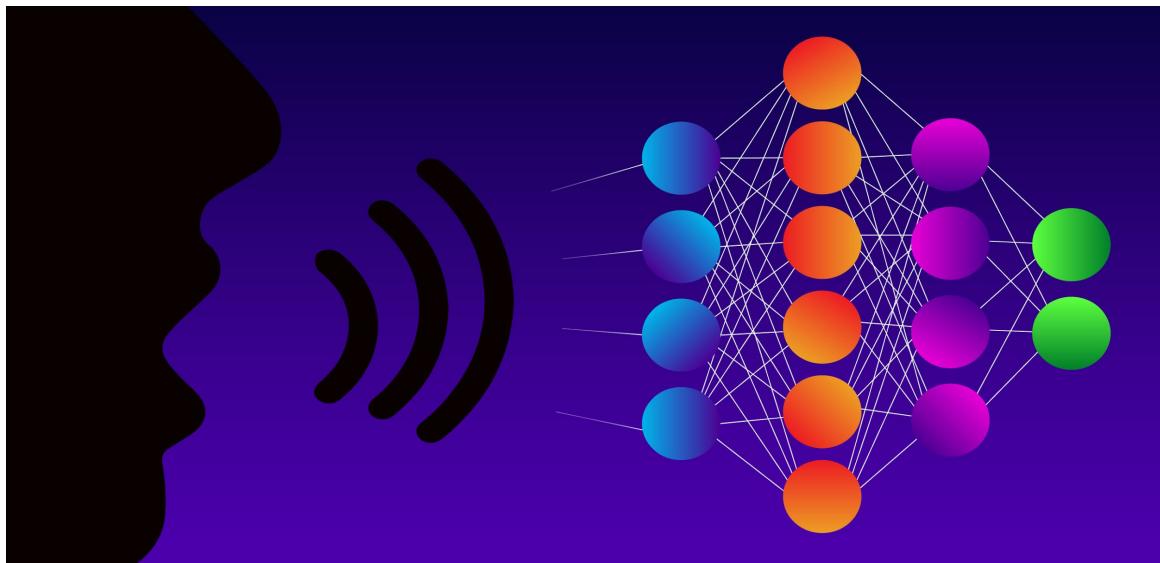


NLP - Its Evolution

Natural Language Processing technique has evolved over the past decade as the amount of data has evolved



NLP - Its Evolution



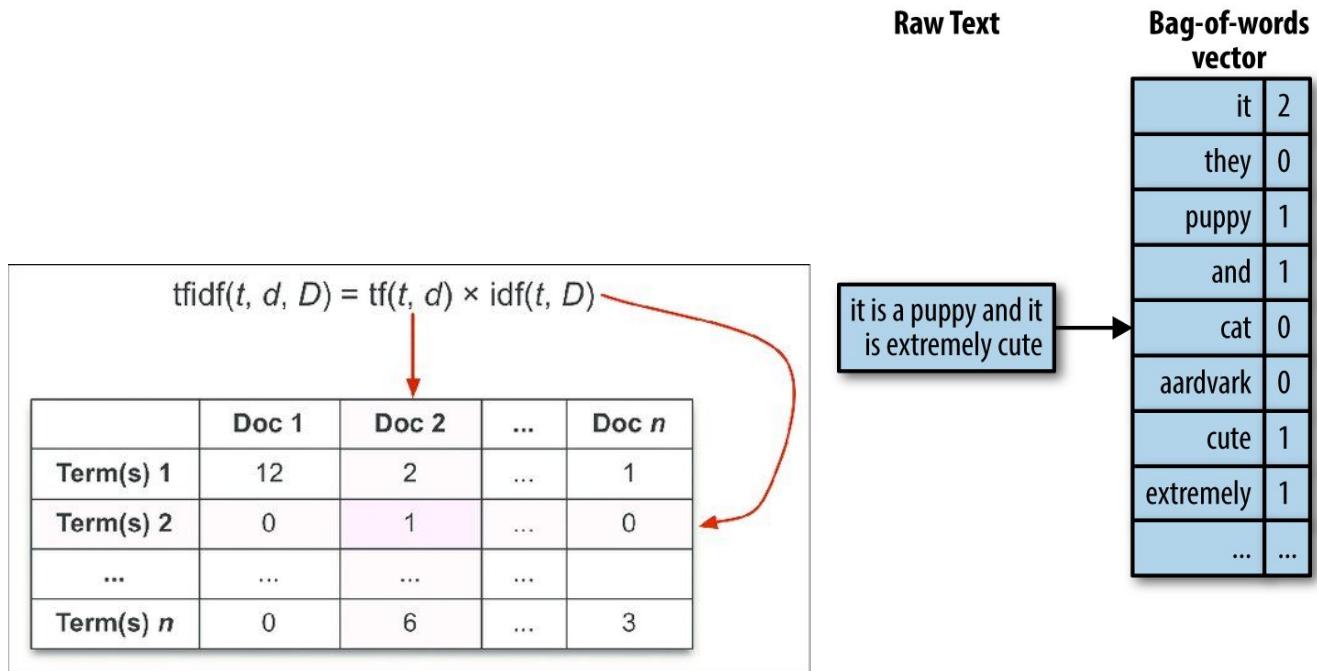
1. Hidden Markov Model
2. Word2Vec
3. RNN and LSTM
4. Attention-based
 - o Transformer
5. BERT
6. ULMFit
7. XLNet
8. ERNIE 2.0

5

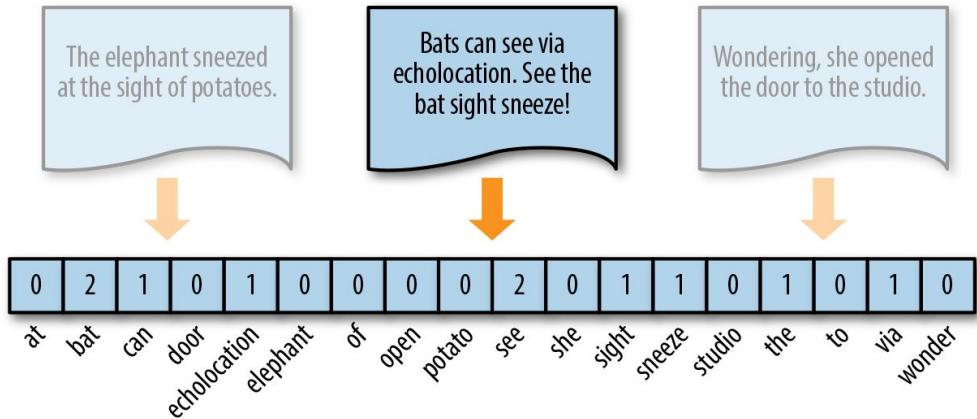
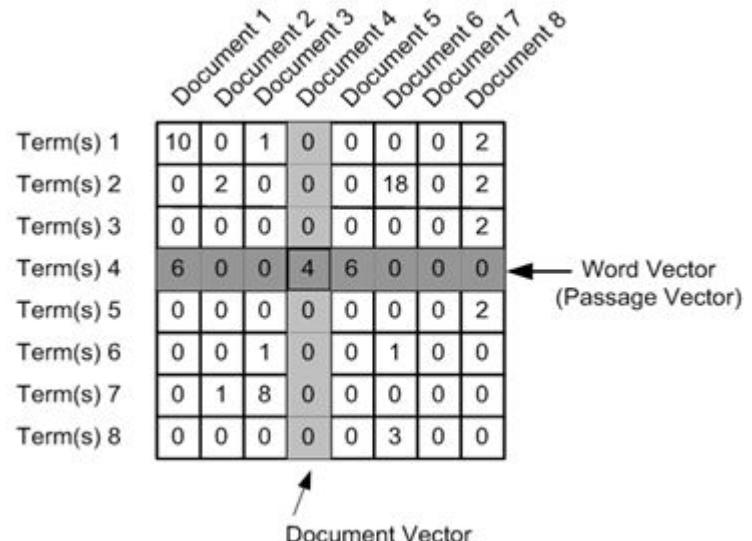
Word Vectorization

What is Word Vectorization?

- Transform text into a vector
- Represent unstructured data as numeric vectors
- Exs: Bag-of-Words, TF-IDF, Word2Vec



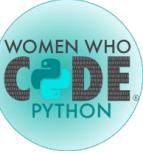
Why do we need word vectorization?

The diagram shows a document-term matrix with 8 documents and 16 terms. The columns are labeled "Term(s) 1" through "Term(s) 8". The rows are labeled "Document 1" through "Document 8". The matrix entries are binary values (0 or 1).

	Document 1	Document 2	Document 3	Document 4	Document 5	Document 6	Document 7	Document 8
Term(s) 1	10	0	1	0	0	0	0	2
Term(s) 2	0	2	0	0	0	18	0	2
Term(s) 3	0	0	0	0	0	0	0	2
Term(s) 4	6	0	0	4	6	0	0	0
Term(s) 5	0	0	0	0	0	0	0	2
Term(s) 6	0	0	1	0	0	1	0	0
Term(s) 7	0	1	8	0	0	0	0	0
Term(s) 8	0	0	0	0	0	3	0	0

An arrow points from the label "Word Vector (Passage Vector)" to the fourth column of the matrix, which corresponds to Term(s) 4. Another arrow points from the label "Document Vector" to the eighth row of the matrix, which corresponds to Document 8.



WOMEN WHO

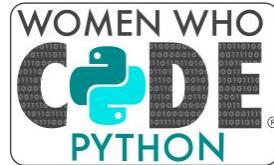
Questions?

R

6

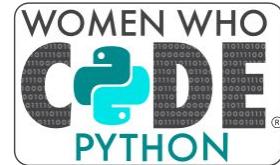
Google Colab Coding!

<https://github.com/rishikasb/DiscoverNLPwithPython>



7

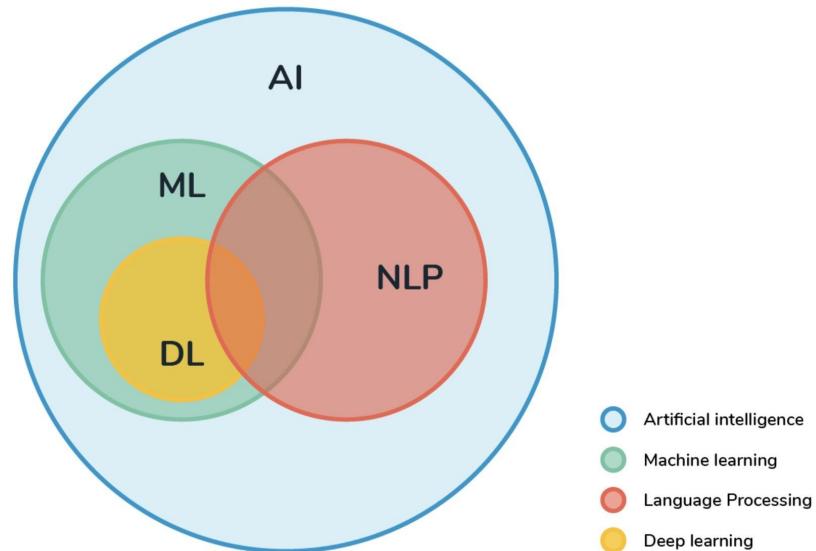
Recap & Next Steps

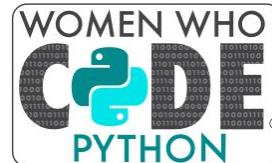


Recap

In this session, we learned about:

1. Deep Learning, its theory and use cases
2. Neural Networks, their types and use cases
3. Leveraging NN architecture to solve NLP-based problems?
4. The importance of vectorization for NLP tasks





Resources & Further Reading

- **RNN and LSTM:**

<https://machinelearningmastery.com/crash-course-recurrent-neural-networks-deep-learning/>

- **Read further on NLP:**

<https://www.dataversity.net/what-is-natural-language-processing-nlp/>

- **History and evolution of NLP:**

<https://www.swarthmore.edu/NatSci/echeeve1/Ref/HH/HHmain.htm>

- **Using Python and NLTK:**

<https://www.geeksforgeeks.org/removing-stop-words-nltk-python/>

Next Session!



NLP and Word Vectorization

November 29th, 8:00-9:30 pm (EDT)

Upcoming Events!

FRI
30
OCT

💡 AMA with Megan, Data Scientist at Microsoft💡

4:00 PM – 5:00 PM (EDT) | 🔍 Zoom

[Register](#)

WED
04
NOV

✨ Beginner Python Study Group ✨ Session 6: Open Q&A/Review Session Recurring

8:00 PM – 9:30 PM (EST) | 🔍 Zoom

[Register](#)

THU
12
NOV

🚗 Introduction to Autonomous Vehicles 🚗

11:00 PM (EST) | 🔍 Zoom

[Register](#)

WED
18
NOV

✨ Beginner Python Study Group ✨ Session 7: Writing Your Own Python Module Recurring

8:00 PM – 9:30 PM (EST) | 🔍 Zoom

[Register](#)

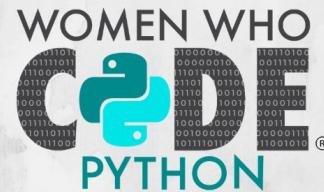
FRI
27
NOV

❓ Ask Me Anything(AMA) with Patricia Tillotson ?

3:00 PM – 4:00 PM (EST) | 🔍 Zoom

[Register](#)

Stay Connected

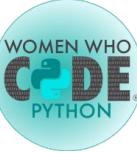


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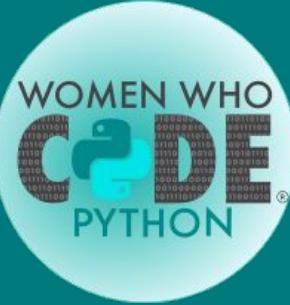
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Questions?

Join our Slack channel: #discover-nlp-with-python



Thanks
everyone!