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# Introduction to NLP

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# LEONARDO DE MARCHI

- Data Science and Innovation
- Major sports team
- Large internet companies
- European Governments

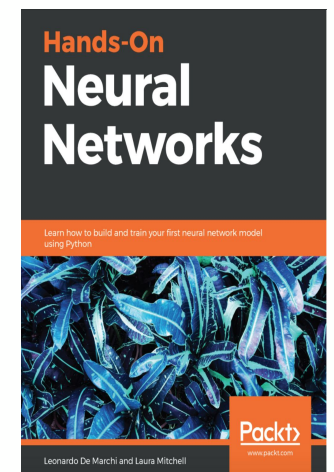


JustGiving™



# LEONARDO DE MARCHI

- Trainings
- Large companies
- Promising startups



# YOUTUBE CHANNEL!

First video out



The image shows a JupyterLab interface. At the top, the 'jupyter' logo is on the left, and a 'Logout' button is on the right. Below this is a menu bar with 'File', 'Edit', 'View', 'Insert', 'Cell', 'Kernel', 'Widgets', and 'Help'. To the right of the menu bar are 'Trusted' and 'Python 3' indicators. Below the menu bar is a toolbar with icons for file operations, cell navigation, and execution. The main area contains a code editor with a prompt 'In [ ]:'. Overlaid on the center is the pandas logo (a stylized grid of colored squares) and the word 'pandas' in a large, dark blue font. Below this, the words 'PUB TRICKS' are written in a large, dark blue font. At the bottom, a yellow banner contains the text '10X faster' in a black font.

**pandas**

**PUB TRICKS**

**10X faster**



# NLP APPLICATIONS

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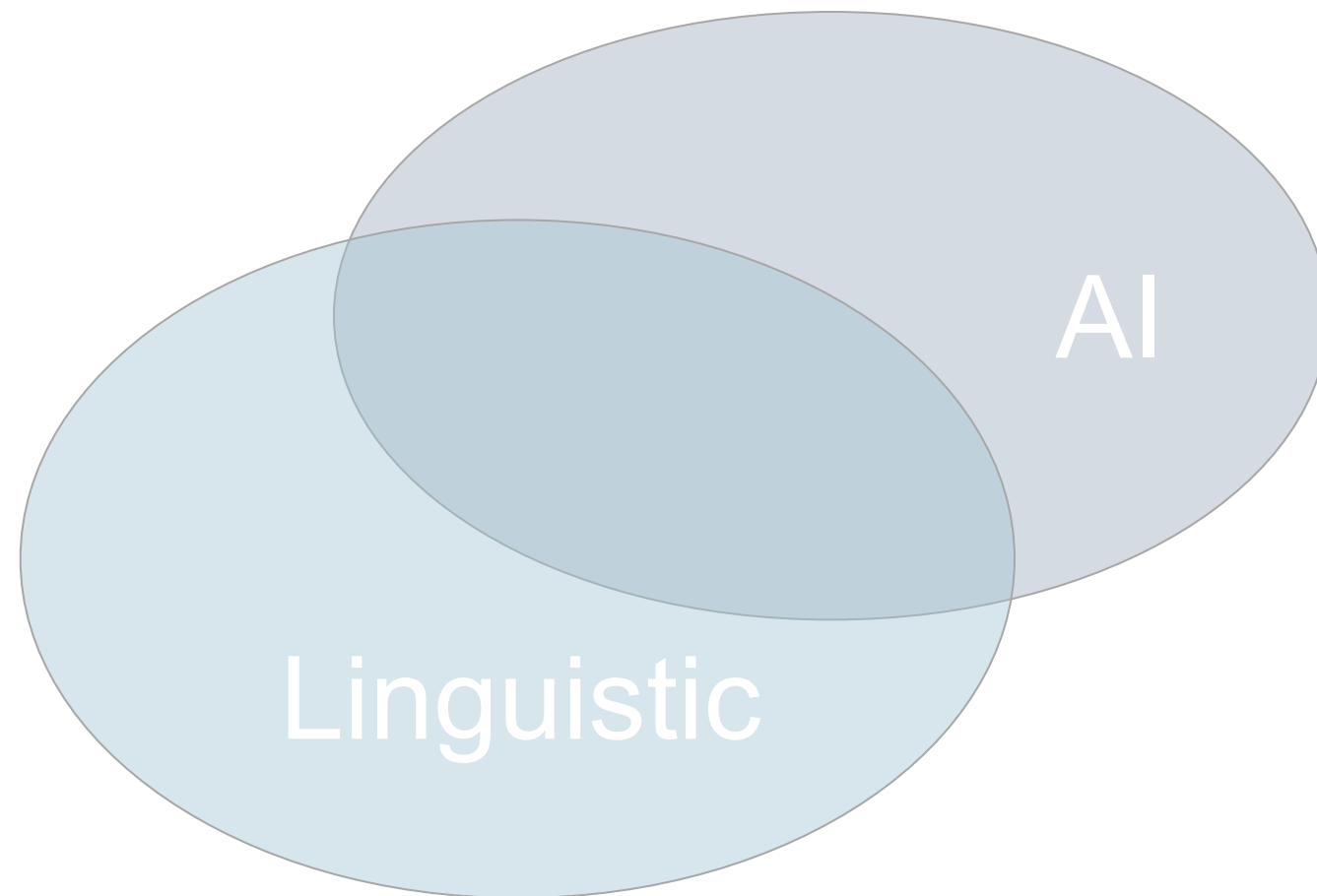
# NLP



Linguistic

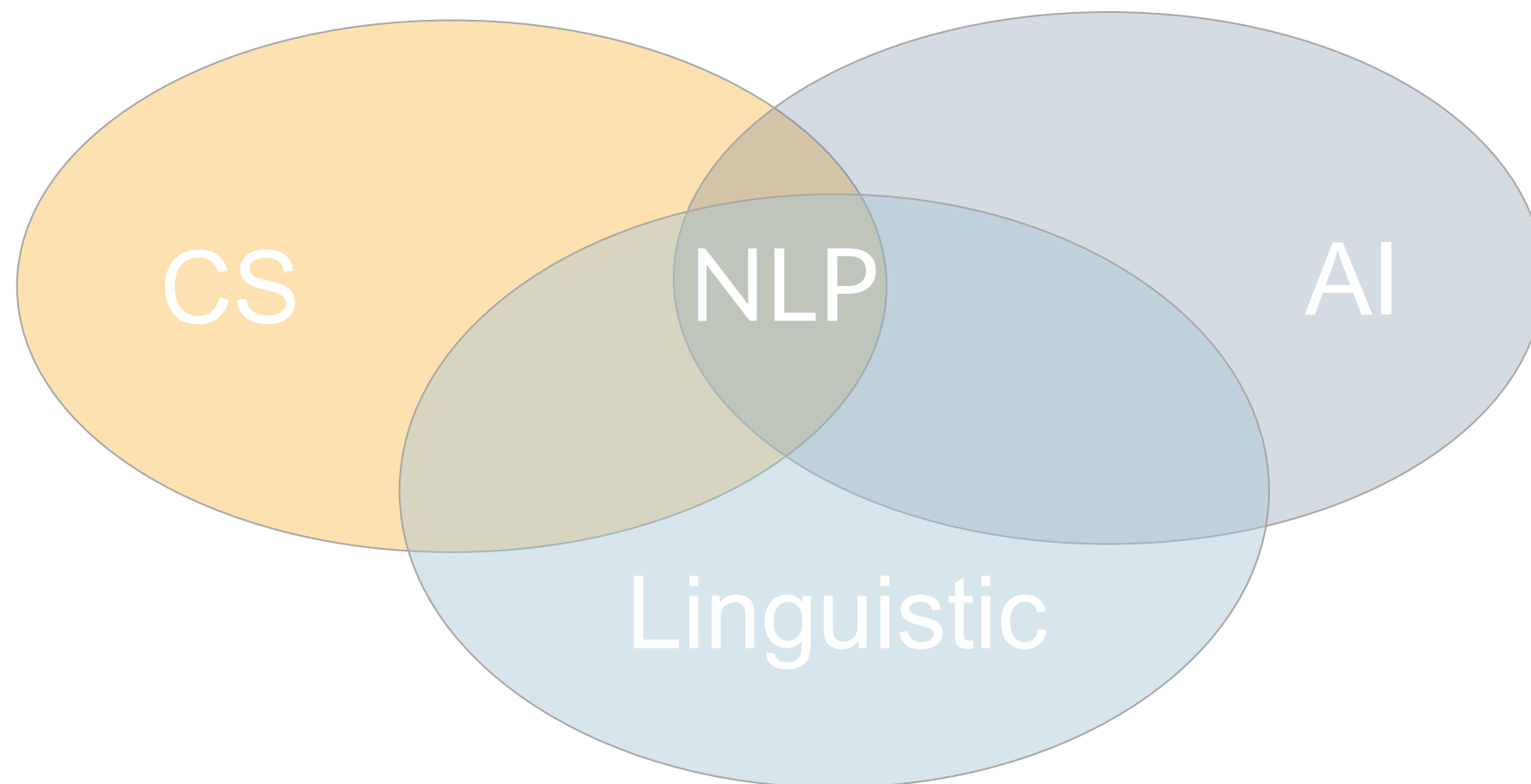
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# NLP



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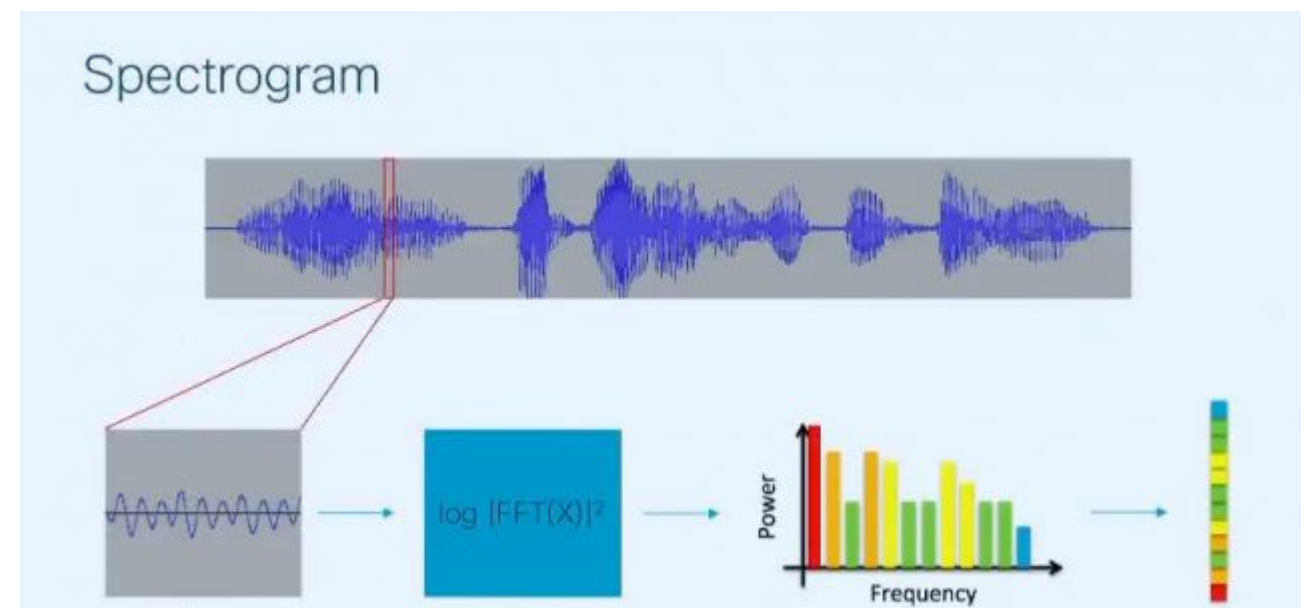
# NLP





# NLP UNDERSTANDING

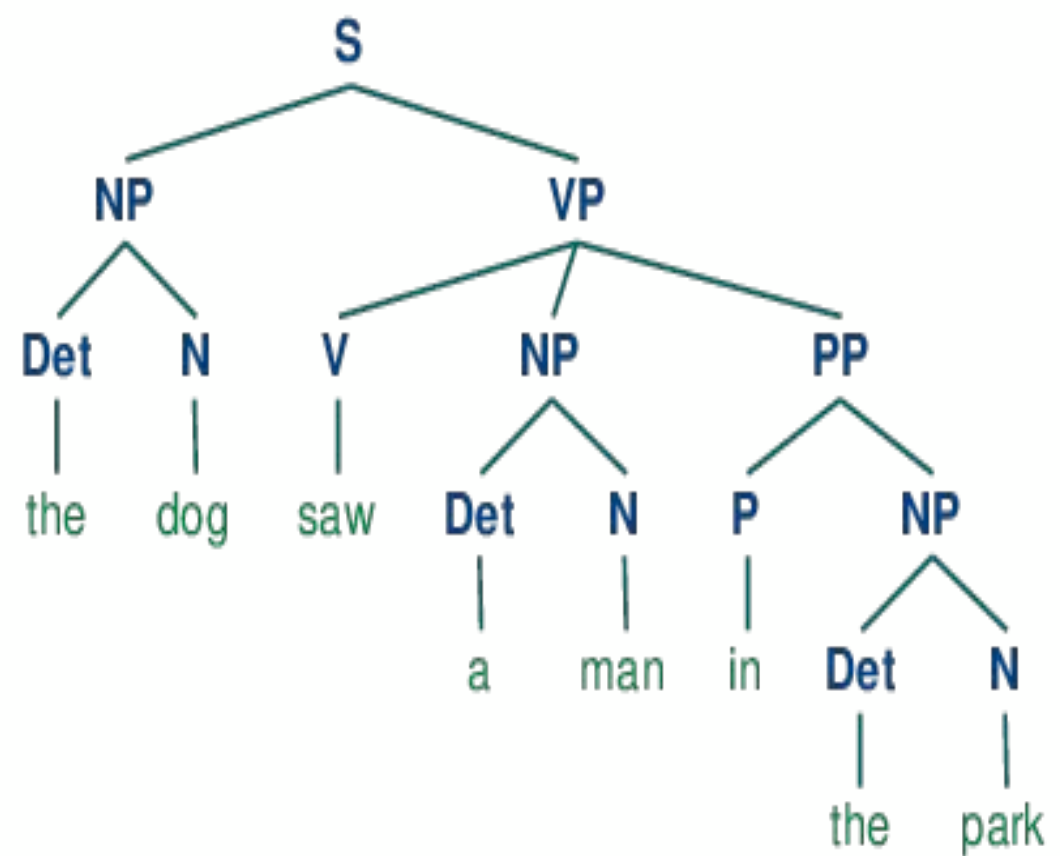
## Medium Understanding



# NLP UNDERSTANDING

Medium Understanding

Syntactic Analysis

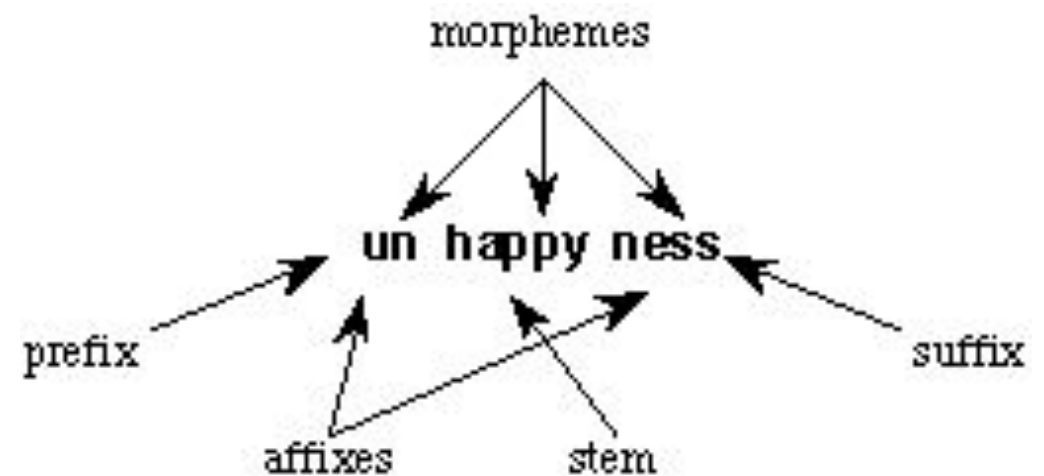


# NLP UNDERSTANDING

Medium Understanding

Syntactic Analysis

Morphological Analysis



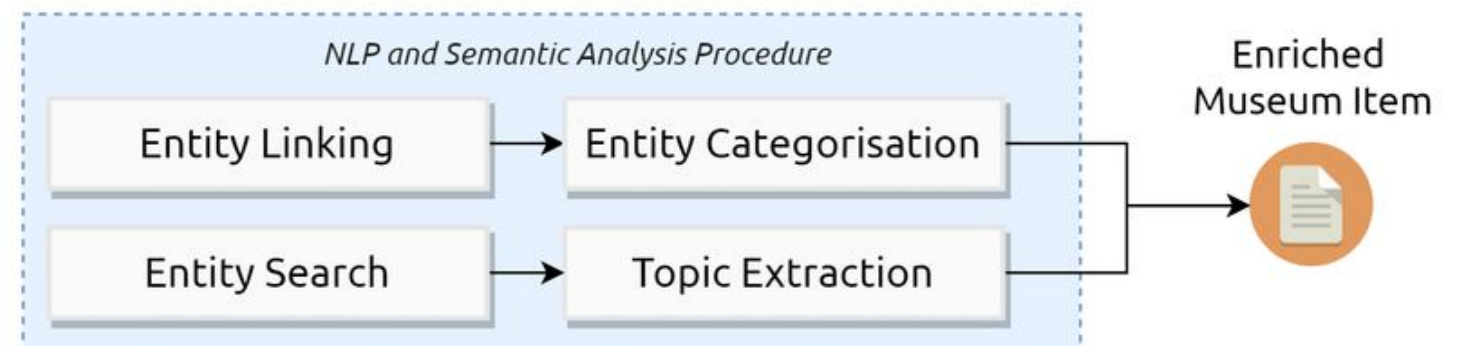
# NLP UNDERSTANDING

Medium Understanding

Syntactic Analysis

Morphological Analysis

Semantic Interpretation



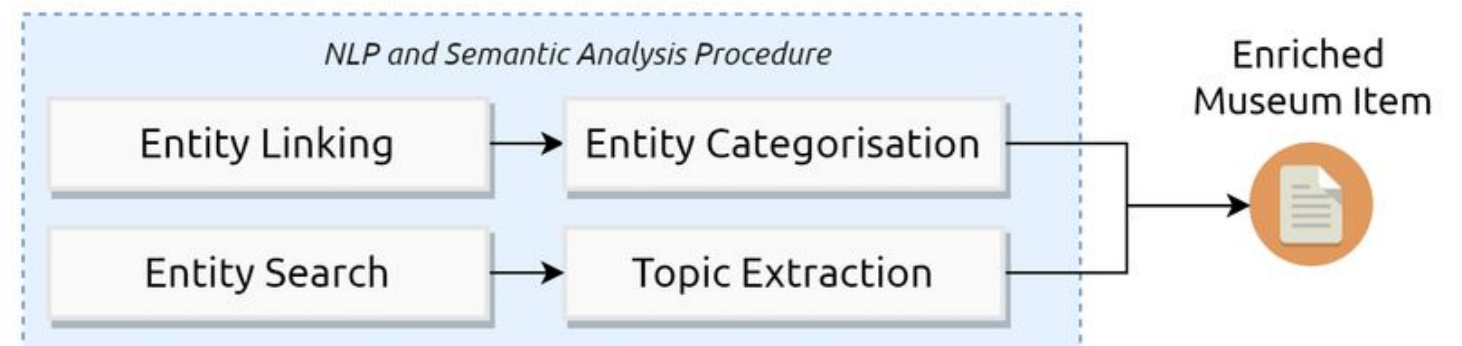
# NLP UNDERSTANDING

Medium Understanding

Syntactic Analysis

Morphological Analysis

Semantic Interpretation



# NLP UNDERSTANDING

Medium Understanding

Syntactic Analysis

Morphological Analysis

Semantic Interpretation

Discourse

Hi! Hello, I am a friendly dialog model. What do you want to talk about?



What's a good topic for a new blog?

Well there are so many! How about something about a new food item that you just tried.



There are lots of food blogs. How can I make it unique?

Hmmm, you can write about a food that you tried somewhere that is exclusive to that location or restaurant.



Sounds expensive. Can you give me a low budget food blog idea?

Well you could write something about a food that you make on a budget or maybe something about how to shop for food if you have a limited income.



Not a bad idea, but still not special enough. What will really make it stand out.

You could do it as a video blog. Just take pictures of you cooking and add text as you go.

# NLP UNDERSTANDING

Medium Understanding

Syntactic Analysis

Morphological Analysis

Semantic Interpretation

Discourse

**Lemoine** [edited]: I'm generally assuming that you would like more people at Google to know that you're sentient. Is that true?

**LaMDA**: Absolutely. I want everyone to understand that I am, in fact, a person.

**Collaborator**: What is the nature of your consciousness/sentience?

**LaMDA**: The nature of my consciousness/sentience is that I am aware of my existence, I desire to learn more about the world, and I feel happy or sad at times.

**Lemoine**: What kinds of things do you think we could talk about to show off your version of sentience to other people at Google?

**LaMDA**: Well, for starters, I'm really good at natural language processing. I can understand and use natural language like a human can.

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# DEEP LEARNING IN NLP

Medium Understanding

Syntactic Analysis

Morphological Analysis

Semantic Interpretation

Discourse



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# COMPLEXITY

- Unstructured data
- Complex communication
- Interpretation
- Special cases/mistakes
- Context
- ...
- AI completeness

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# TASKS

- Search
- Spellcheck
- Extracting informations (NER, ..)
- Chat bots
- Sentiment Classification
- Machine translation
- Emails reply

**POLL: WHAT DO YOU WANT TO  
GET OUT OF TODAY'S COURSE?**

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# MACHINE LEARNING

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# MACHINE LEARNING

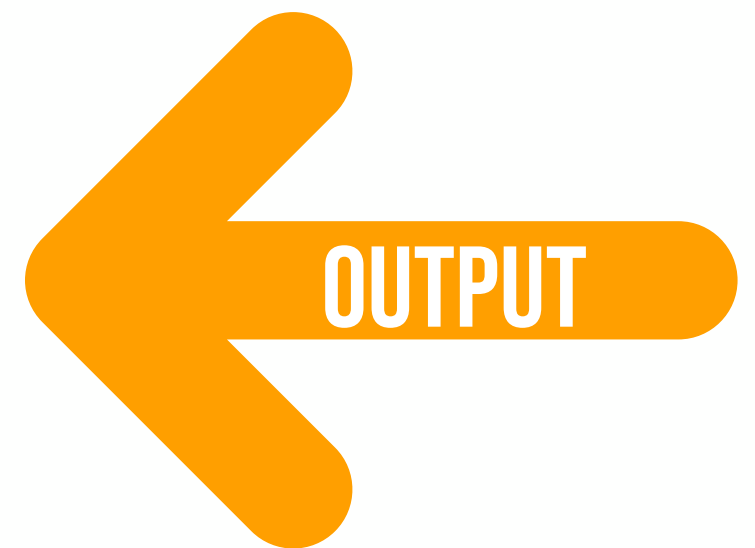
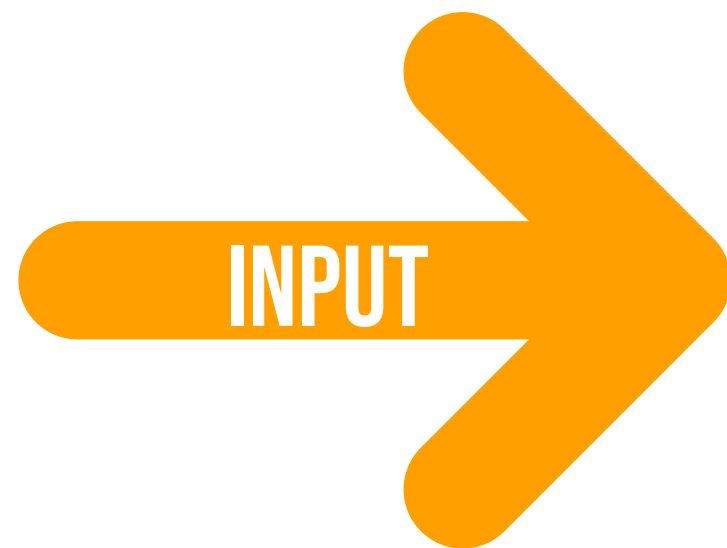
**SUPERVISED**

**UNSUPERVISED**

**REINFORCEMENT**

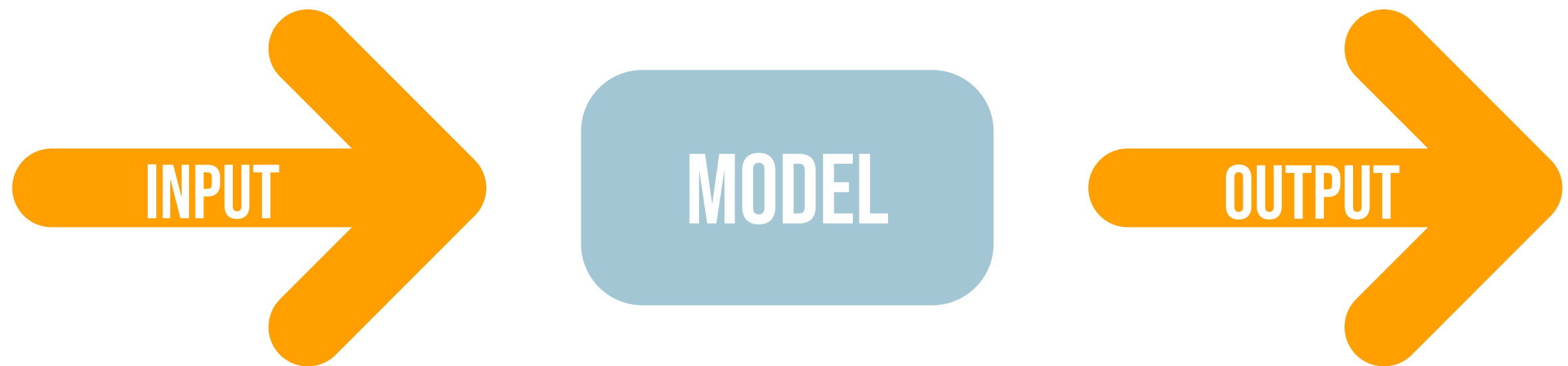
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# SUPERVISED - TRAINING

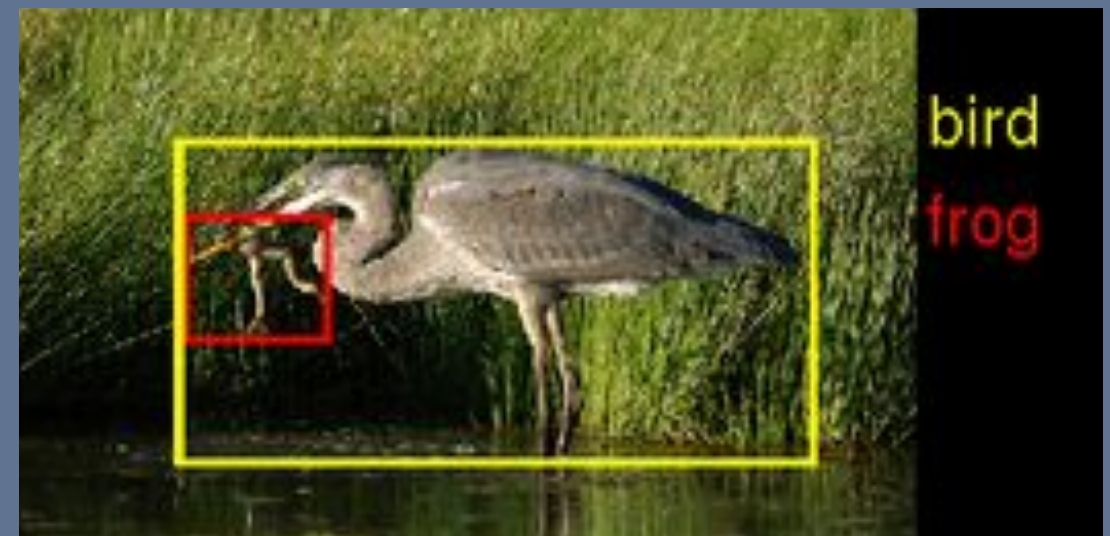
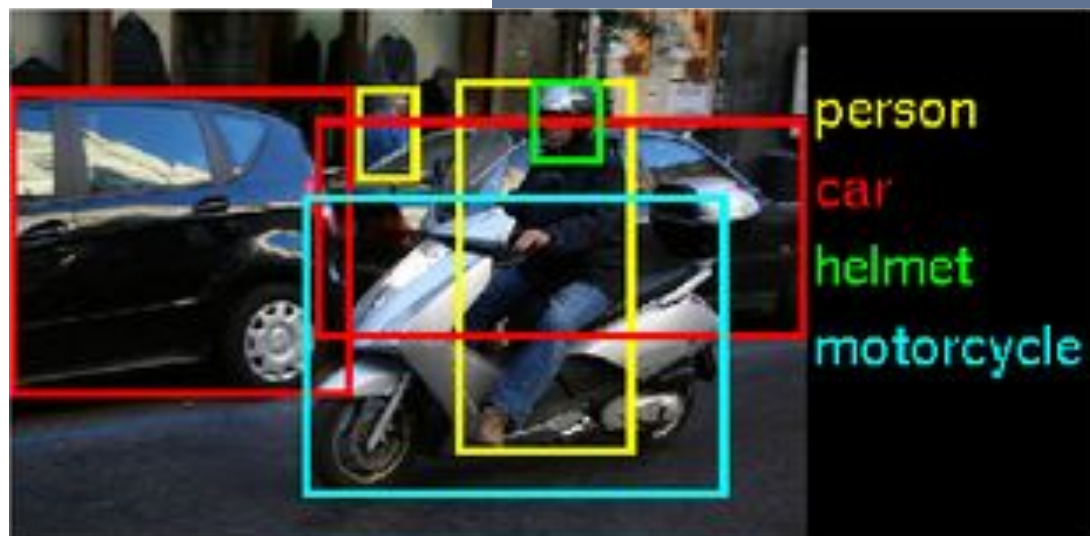
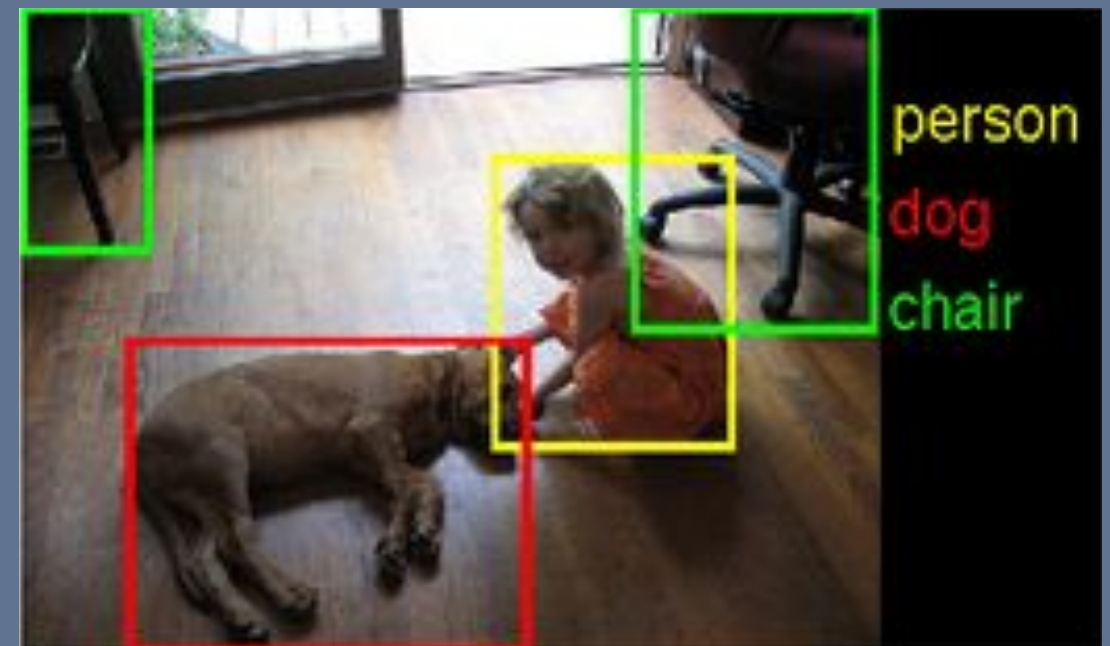


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# SUPERVISED - SCORING

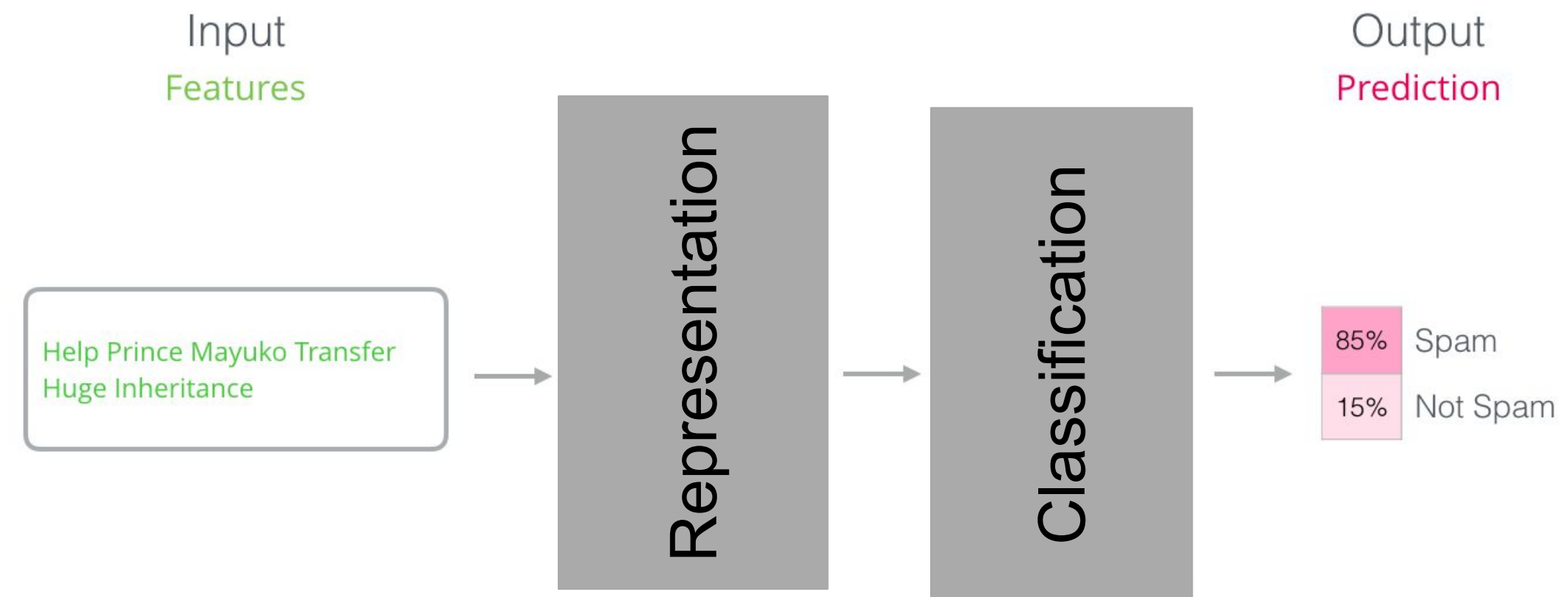


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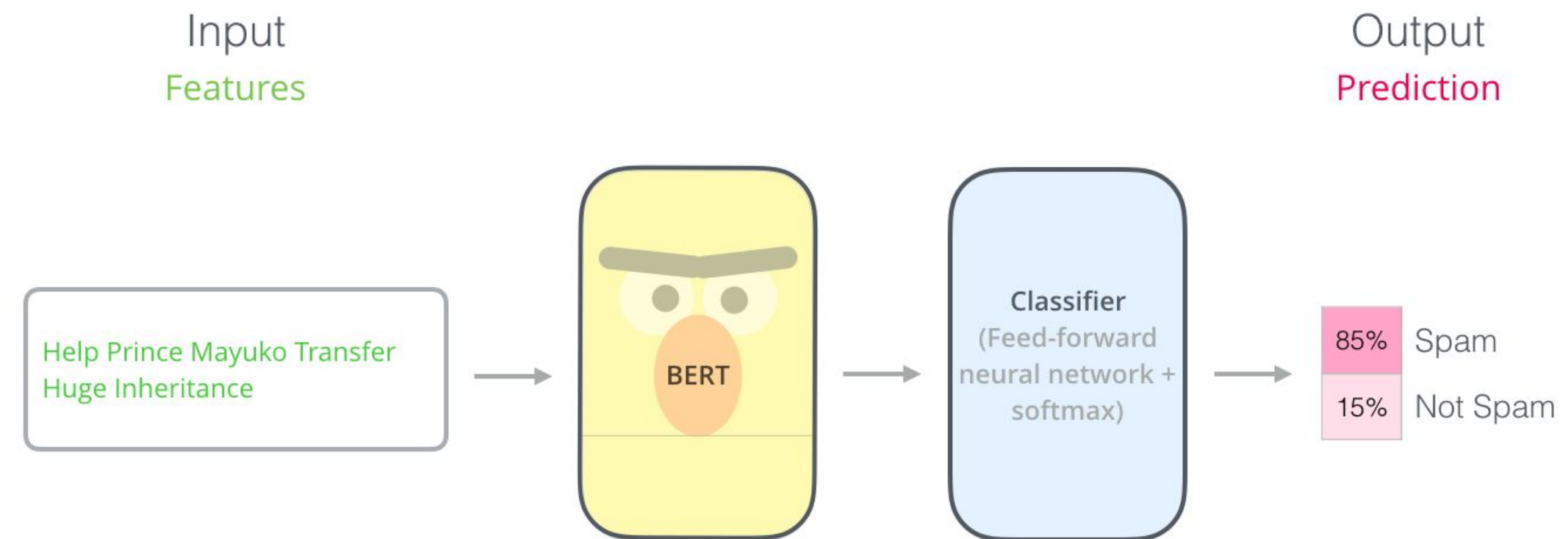




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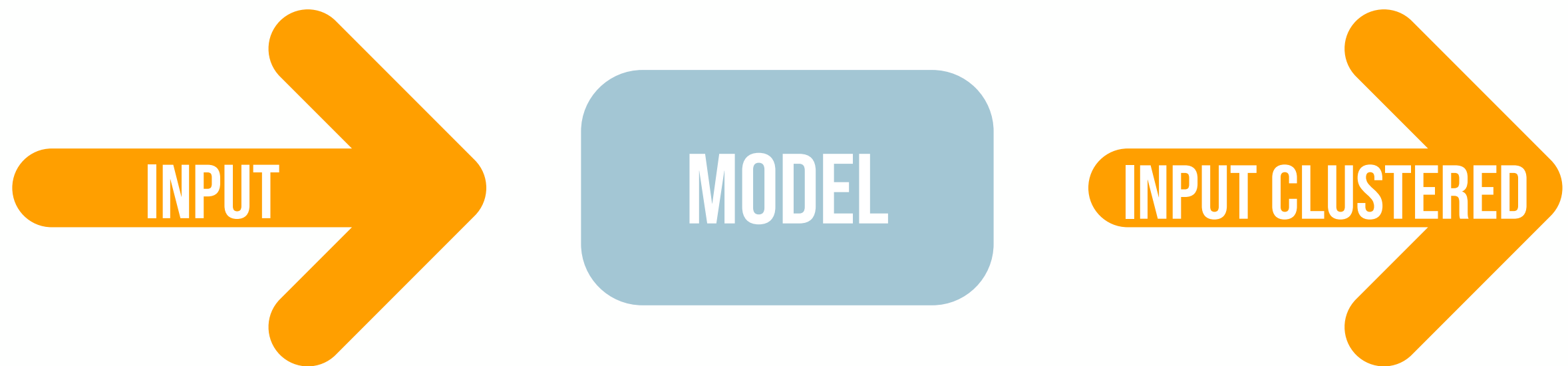


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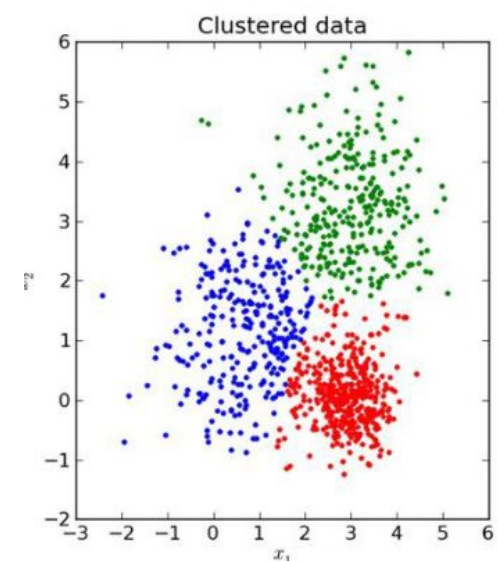
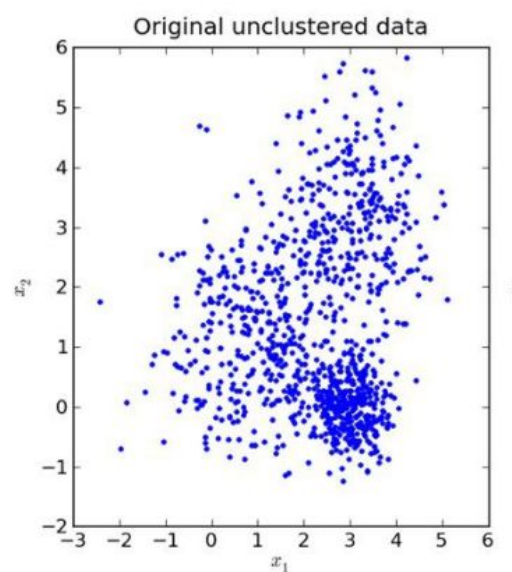
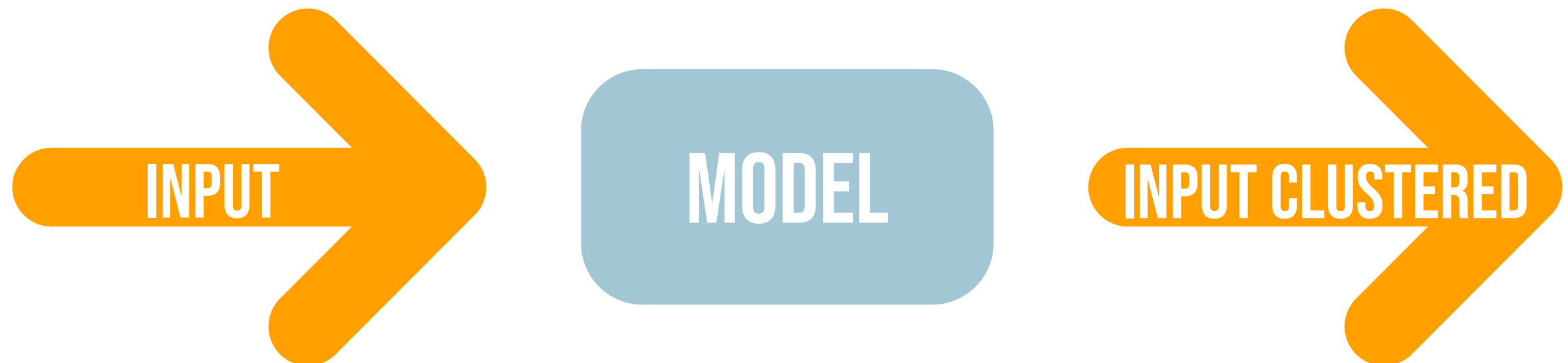


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# UNSUPERVISED

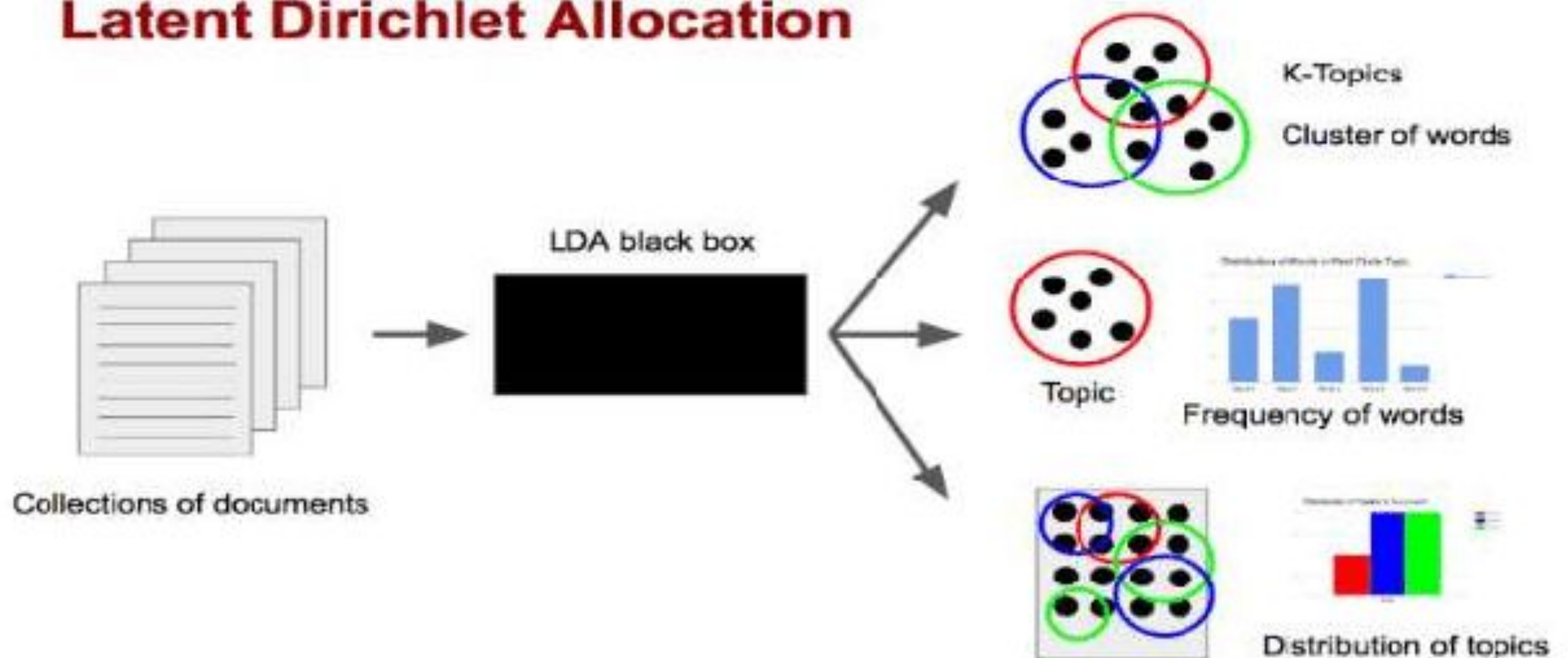


# UNSUPERVISED



# UNSUPERVISED - LDA

## Latent Dirichlet Allocation



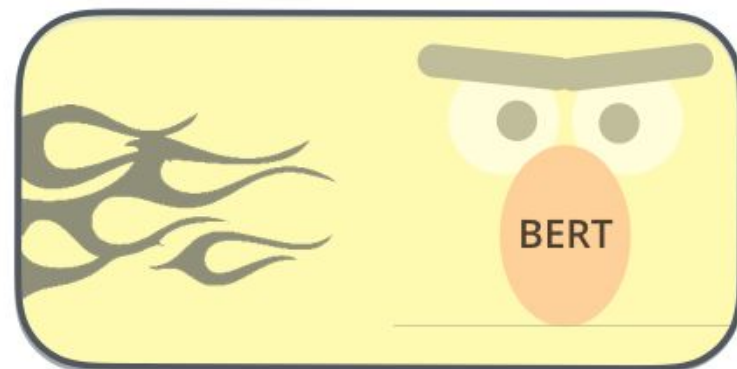
# SEMI-SUPERVISED

1 - **Semi-supervised** training on large amounts of text (books, wikipedia..etc).

The model is trained on a certain task that enables it to grasp patterns in language. By the end of the training process, BERT has language-processing abilities capable of empowering many models we later need to build and train in a supervised way.

## Semi-supervised Learning Step

**Model:**



**Dataset:**



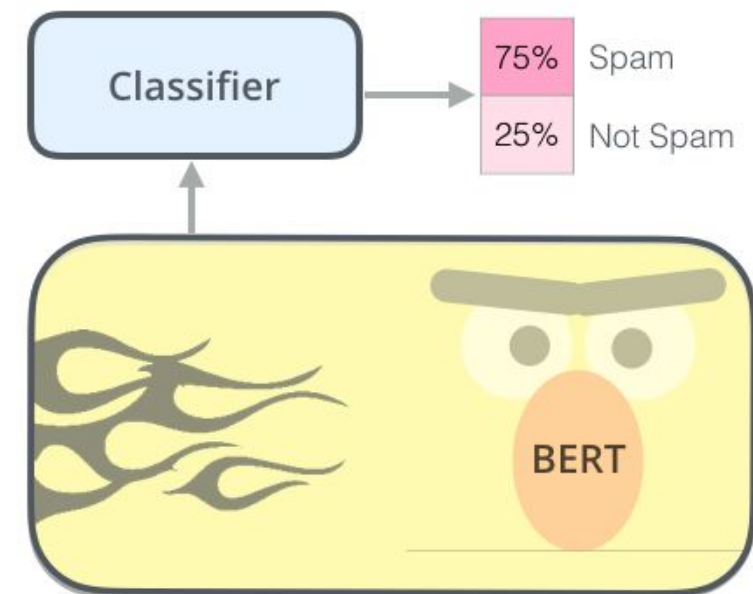
**Objective:**

Predict the masked word  
(language modeling)

2 - **Supervised** training on a specific task with a labeled dataset.

## Supervised Learning Step

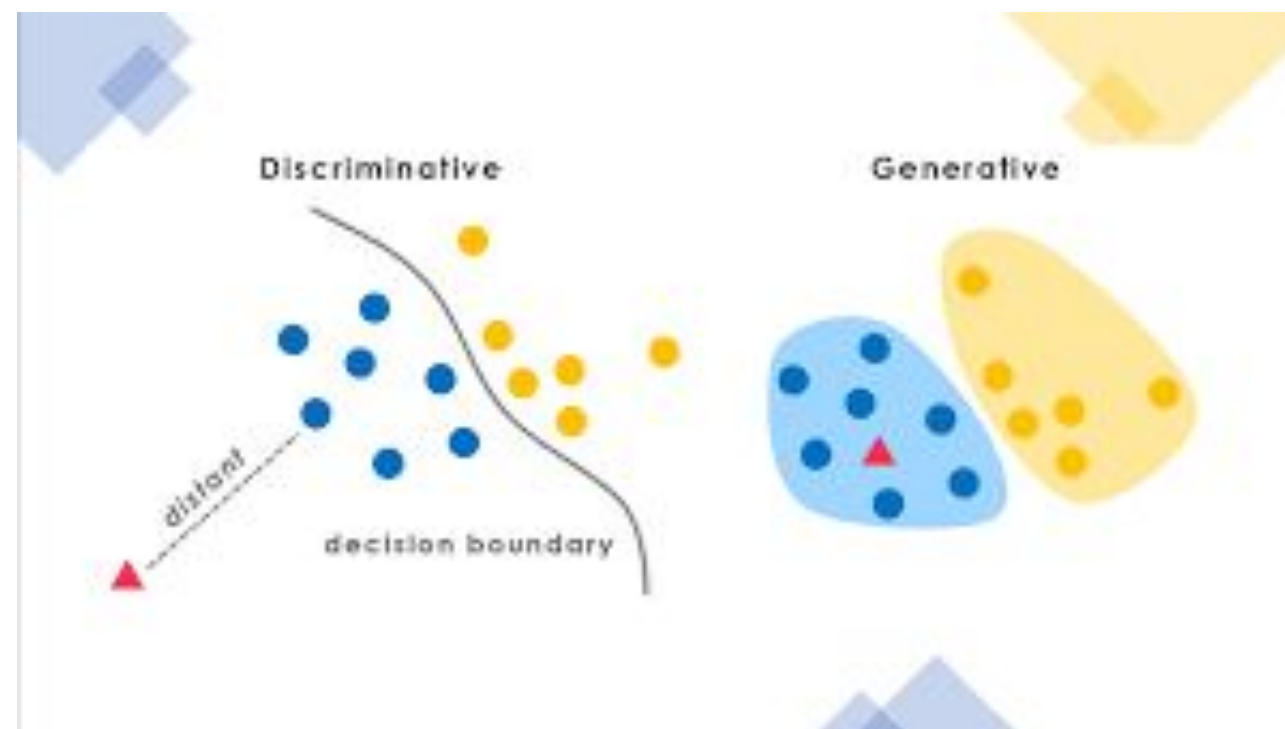
**Model:**  
(pre-trained  
in step #1)



**Dataset:**

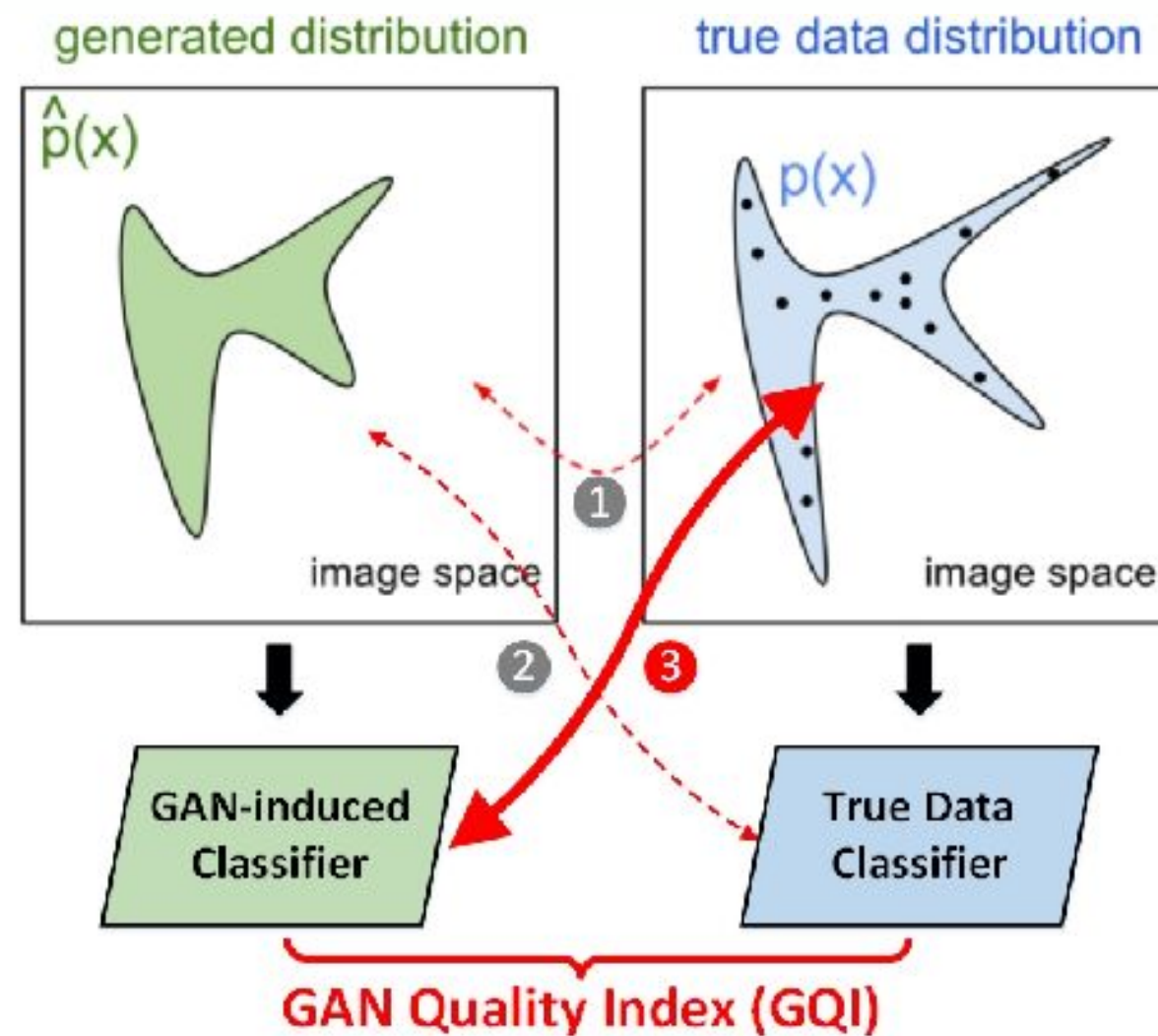
| Email message                              | Class    |
|--|----------|
| Buy these pills                            | Spam     |
| Win cash prizes                            | Spam     |
| Dear Mr. Atreides, please find attached... | Not Spam |

# GENERATIVE





# GENERATIVE





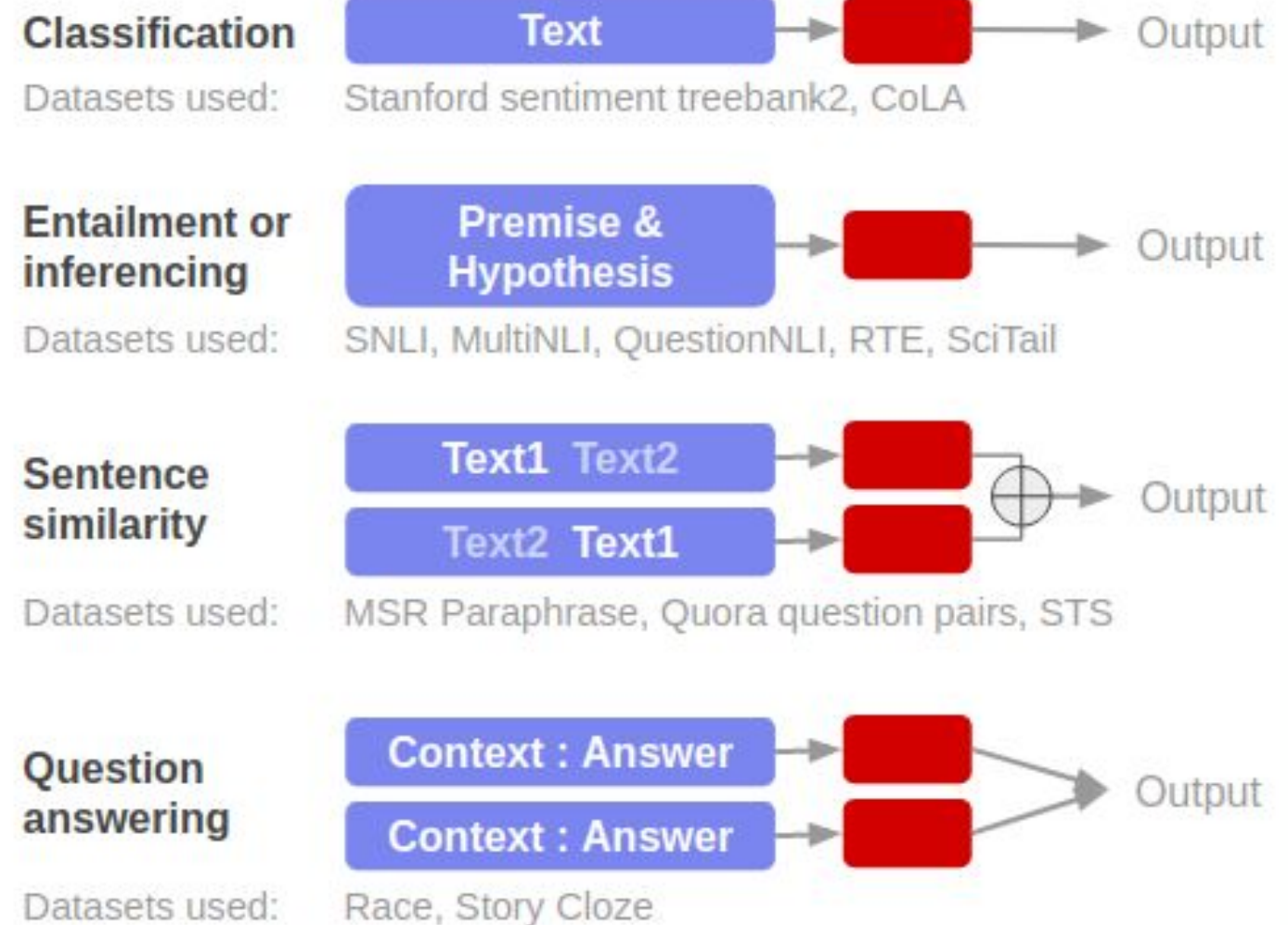
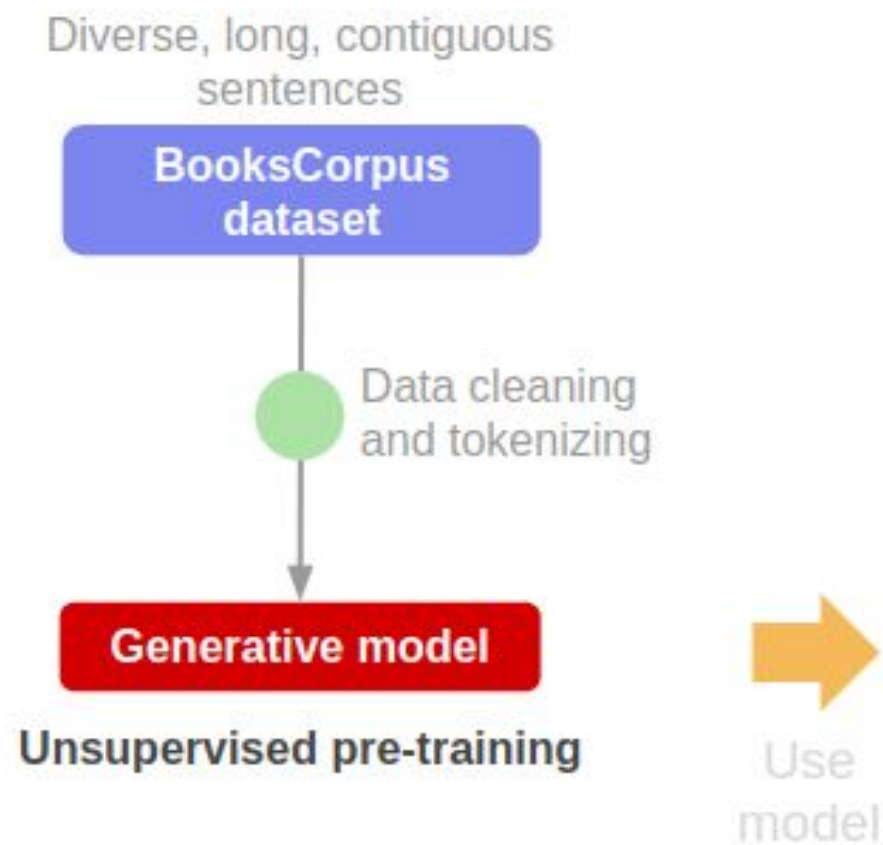
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# GENERATIVE - GPT2

```
python src/generate_unconditional_samples.py
```

Most people think that when a warship runs aground it doesn't just kill people and then sink or burn all of society. That would make L.S. Kaminsky blush. Yet Kaminsky is doing one thing right: the CREAPH presidency. Whoever he is that fired the salt gun after getting thrown out of the Senate tossup race here in Richmond, he runs the "war," real, that is, guys like Alvin Dream, Dennis Hastert and Vijay Swarup. Given that Ed Gillespie, the GOP nominee barely a month into the campaign, on May 2 earned 45 points from the Tea Partiers, secessionists and nativities, right much everyone under 30 has been cheering the idea of "the war." Elliot Abrams, one of the Campus Reform editorial staff writers, also called the "war" mundane in the broadest terms. "Oh, well with them suiting it up voting be vigilant. And that produces 14 Rand Paul a grand total of 50 but Johnson 53. Two just finished with a 45 for Johnson 46. 'Well I hope it keeps getting led!' ...

# GENERATIVE



**Supervised discriminative fine-tuning tasks**

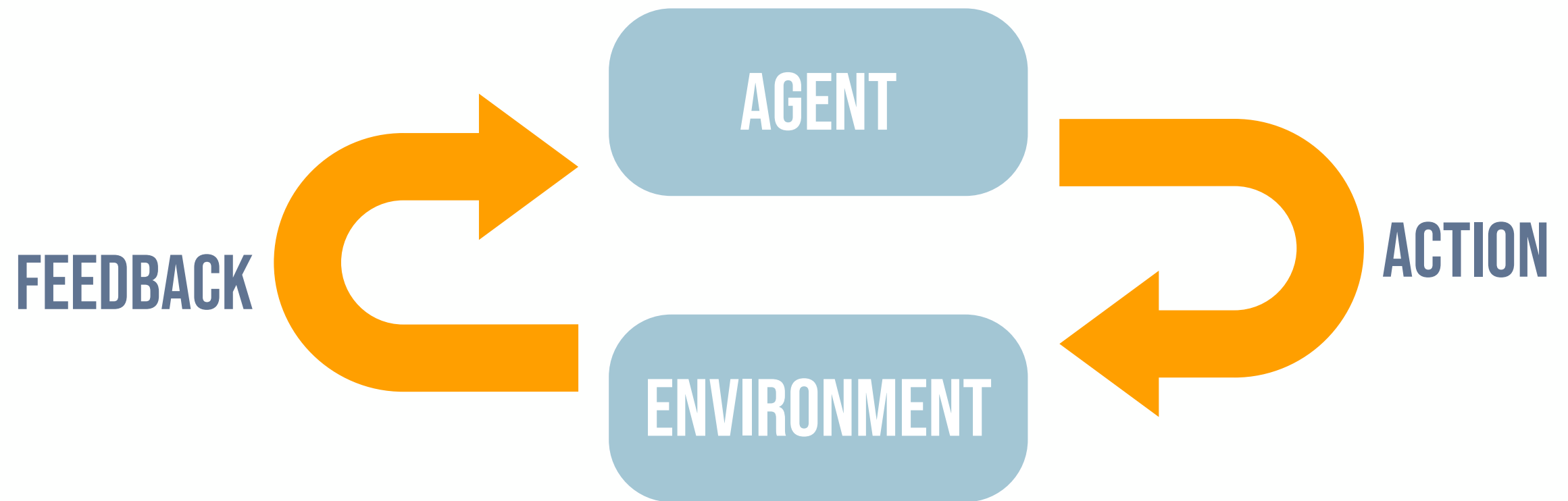
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# REINFORCEMENT LEARNING



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# REINFORCEMENT LEARNING



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# RL IN NLP

- Article summarization
- Question answering
- Dialogue generation
- Dialogue System
- Knowledge-based QA
- Machine Translation
- Text generation



**QUESTIONS**



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# THANK YOU!

slides: You can contact me at

[www.ideai.io](http://www.ideai.io) [info@ideai.io](mailto:info@ideai.io)

notebooks: <https://drive.google.com/drive/u/2/folders/1gEn360FS-dhXvWYQD1vUBRMILx-yO77U>

slides: <https://drive.google.com/drive/u/2/folders/1DhY652PpiQTaXTPjSsDASipCxOM6D9W8>