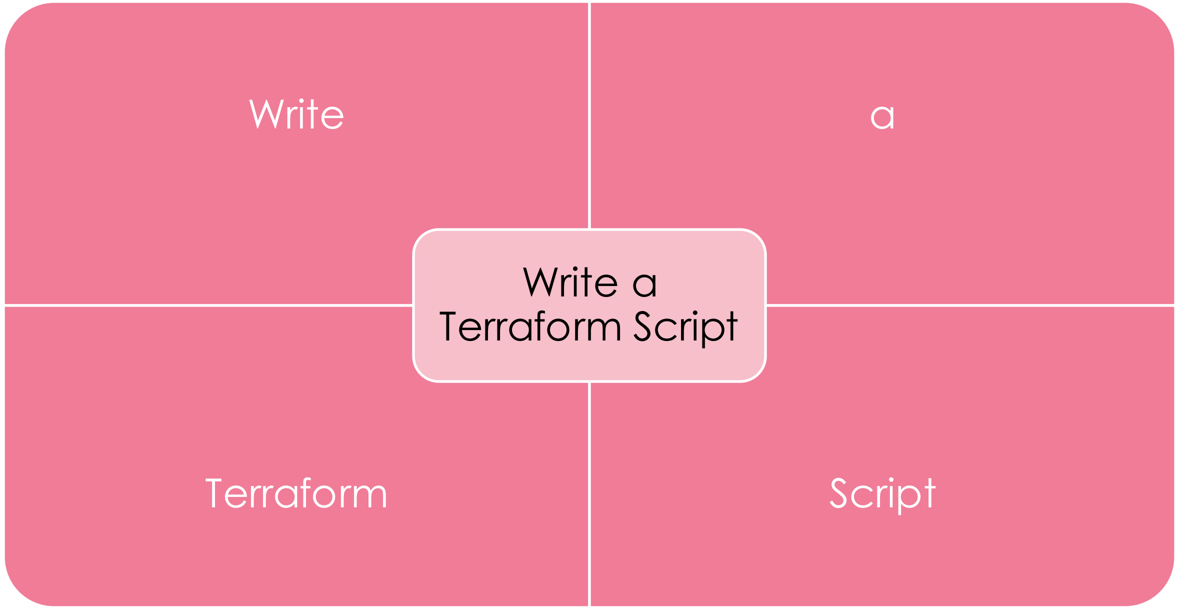
Tokens & Embeddings

Tokens

Tokens are basic units of text in AI. AI models breaks text in units called tokens



Write a Terraform Script

Write

a

Terraform

Script

Word level

Tokens

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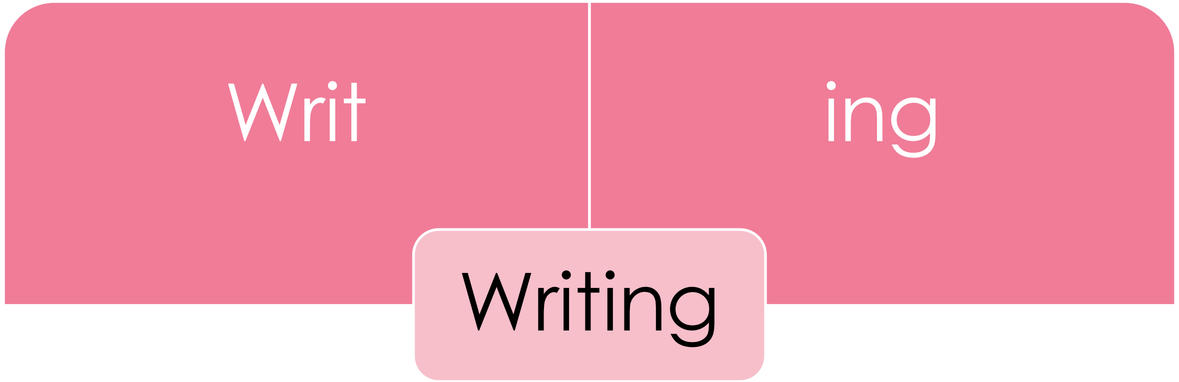

Writ

ing

Writing

Subword level

Tokens

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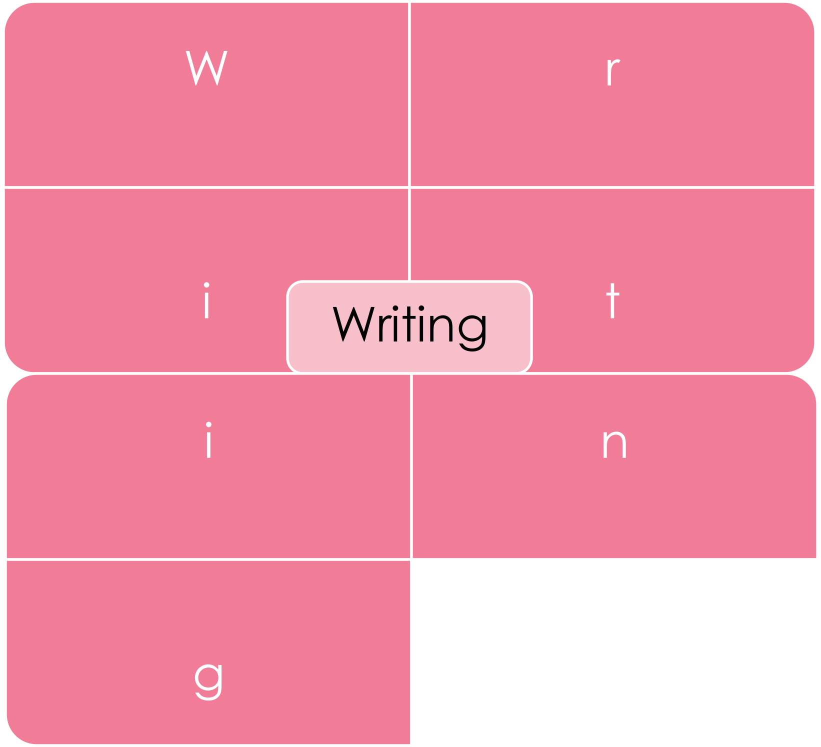


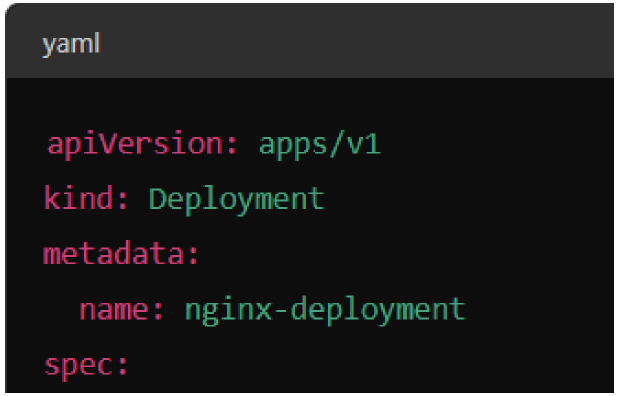
Character level

Tokens – Example with ChatGPT

Input Text: "Create a Kubernetes deployment with 3 replicas running an Nginx container."

Tokens: ["Create", "a", "Kubernetes", "deployment", "with", "3", "replicas", "running", "an", "Nginx", "container", "."]

Output:



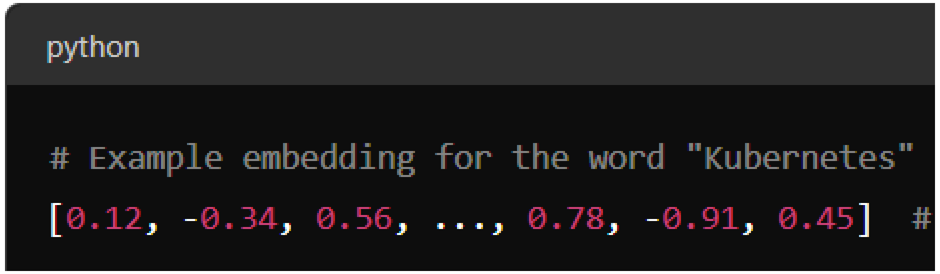
yaml

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: nginx-deployment
spec:
```

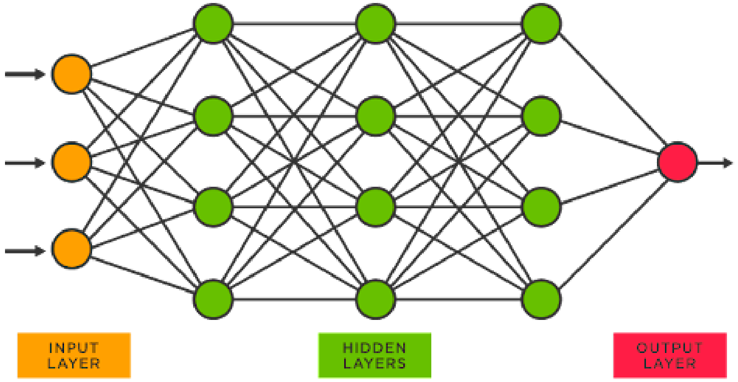
Embeddings

Embeddings are numerical representations of real-world objects that machine learning (ML) and artificial intelligence (AI) systems use to understand complex knowledge domains like humans do

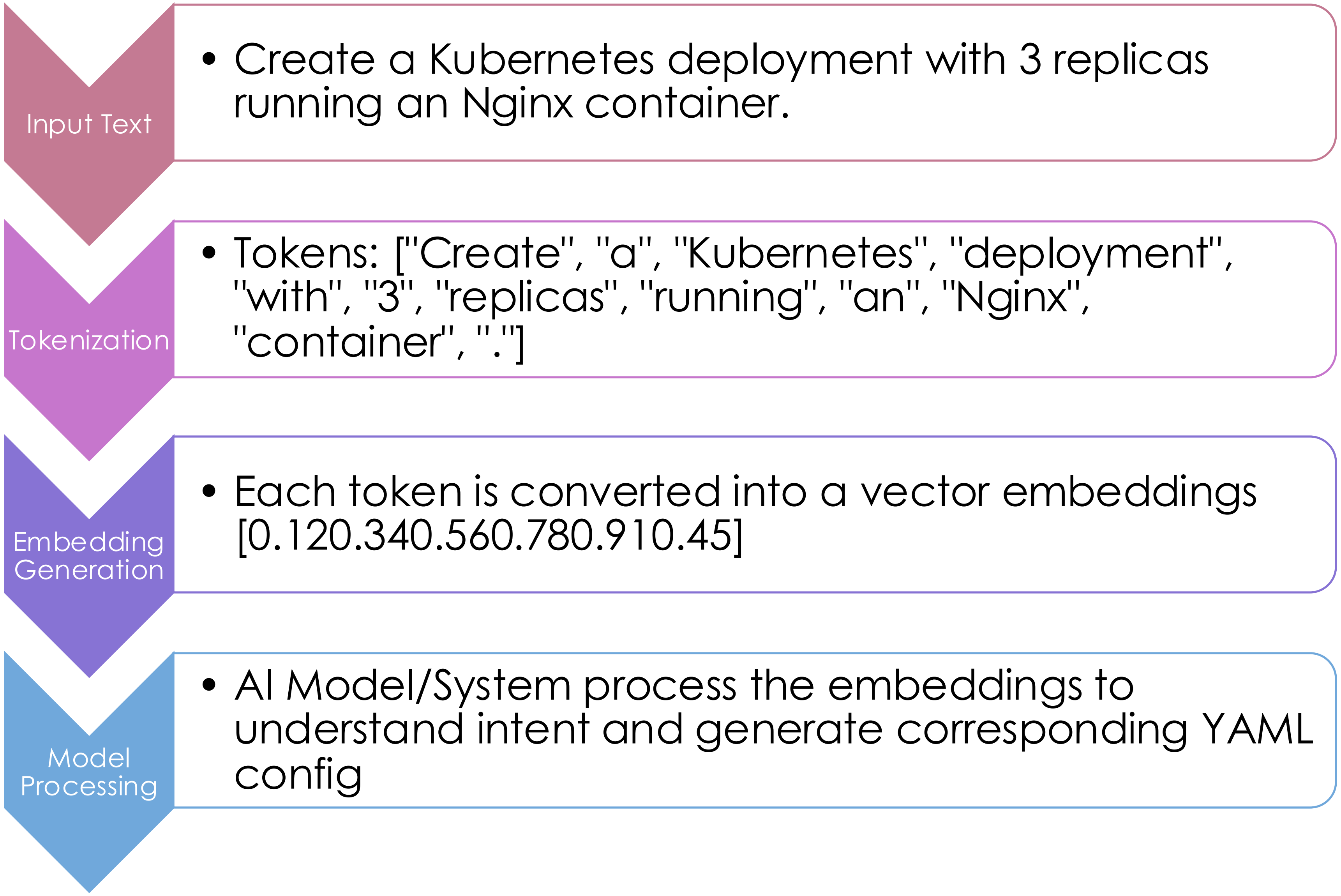
Kubernetes



```python
# Example embedding for the word "Kubernetes"
[0.12, -0.34, 0.56, ..., 0.78, -0.91, 0.45]  #
```



Let’s now understand Tokens and Embeddings together



Input Text

- Create a Kubernetes deployment with 3 replicas running an Nginx container.

Tokenization

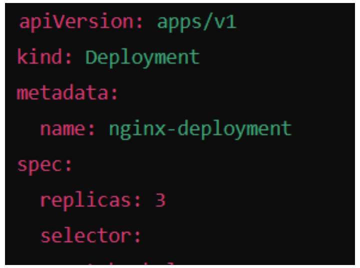
- Tokens: ["Create", "a", "Kubernetes", "deployment", "with", "3", "replicas", "running", "an", "Nginx", "container", "."]

Embedding Generation

- Each token is converted into a vector embeddings [0.120.340.560.780.910.45]

Model Processing

- AI Model/System process the embeddings to understand intent and generate corresponding YAML config



```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: nginx-deployment
spec:
  replicas: 3
  selector:
```

Prompt Engineering

PE is the art of carefully crafting inputs designed to get a specific response or behavior from an AI system

ChatGPT - Write a deployment yaml file for kubernetes

Text Generation

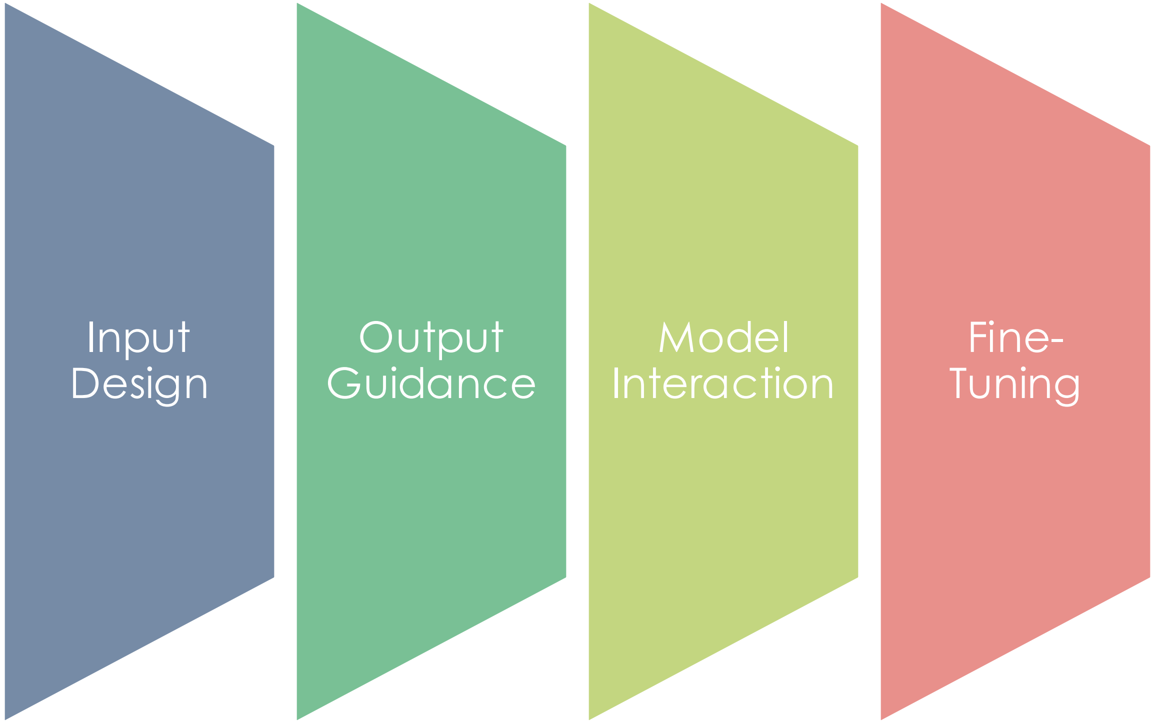
Dall-E - Create an image of a Web App Architecture Diagram

Image Generation

Copilot - Write code to Dockerize an application

Code Generation

Key Aspects of Prompt Engineering



Input Design

Output Guidance

Model Interaction

Fine-Tuning

Strategies in Prompt Engineering

Zero Shot

- AI Model asked to perform task without example.

One-shot

- AI Model is given an example before it performs task.

Few-shot

- The model is given several examples to establish pattern.

Chain of Thought

- Prompts that encourage model to generate detailed steps and explain the reason for each step.

Strategies in Prompt Engineering

Zero Shot

- Write Terraform script to create an EC2 in AWS

One-shot

- Given this example where a Python script checks for null password entries (if password is not None), identify security flaws in the following Python login script

Few-shot

- Here are some examples of Terraform scripts with marked security improvements. Now, analyze this new Terraform script and suggest security enhancements

Chain of Thought

- Explain step-by-step how you would debug a failing Kubernetes pod based on these error logs and system statuses

Strategies in Prompt Engineering – Demo with ChatGPT

Zero Shot

- Write Terraform script to create an EC2 in AWS

Strategies in Prompt Engineering – Demo with ChatGPT

One-shot

- Given this example where a Python script checks for null password entries (if password is not None), identify security flaws in the following Python login script

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Few-shot

- Here are some examples of Terraform scripts with marked security improvements. Now, analyze this new Terraform script and suggest security enhancements

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Chain of Thought

- Explain step-by-step how you would debug a failing Kubernetes pod based on these error logs and system statuses