# CRIMINAL SUSPECT'S FACE GENERATION

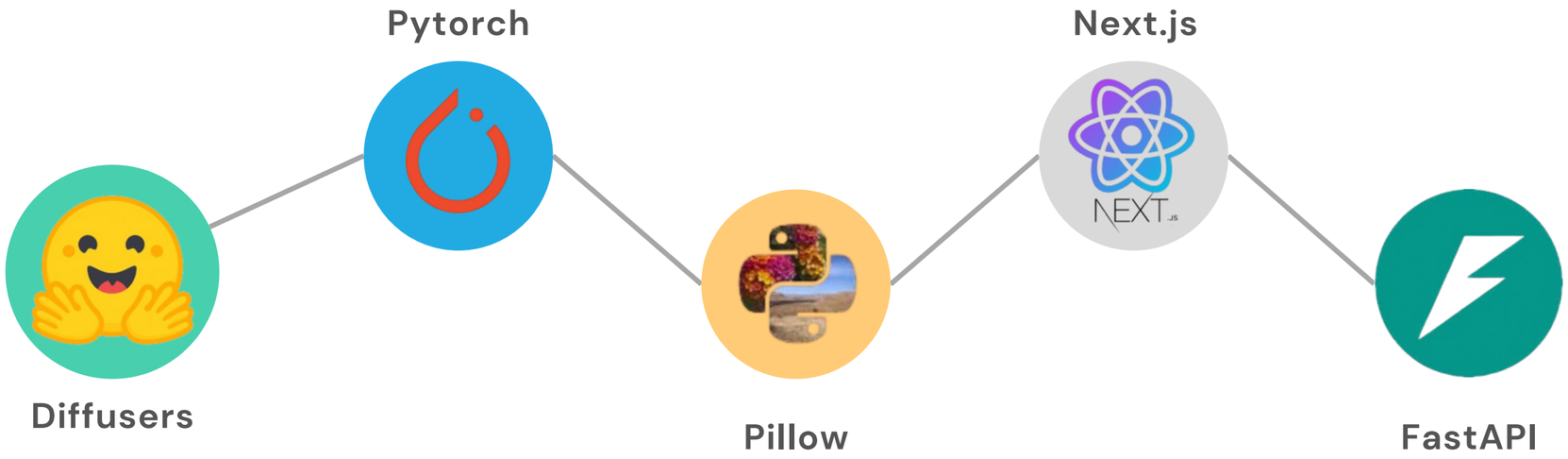
# PROBLEM STATEMENT

Identification of the Face of a Criminal Suspect using a custom fine tuned Stable Diffusion model with the description of the eyewitness statements.

# DESCRIPTION

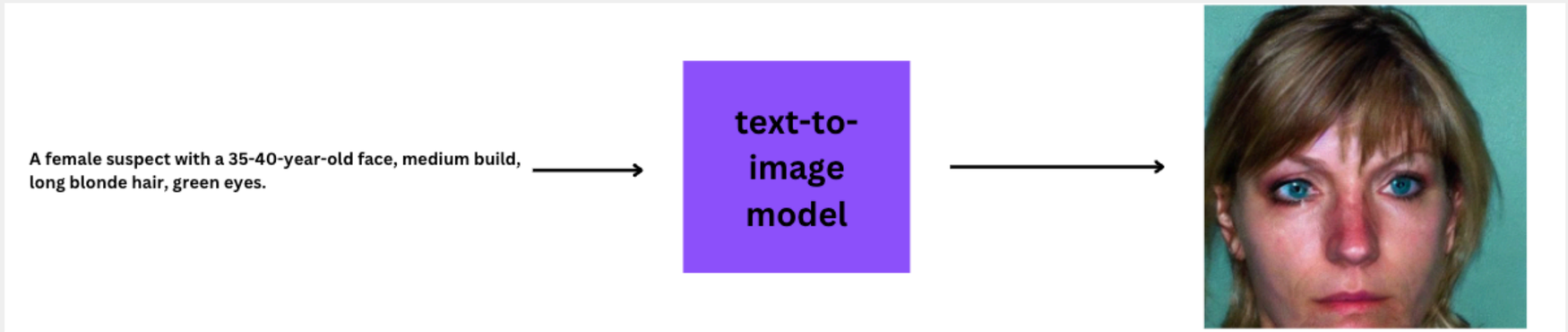
**Identifying the face of a criminal suspect using our custom fine tuned stable diffusion model based on eyewitness statements is a complex problem that combines the fields of computer vision, natural language processing, and machine learning. The challenge involves creating a realistic and accurate facial image of a criminal from verbal descriptions provided by witnesses, which can be highly subjective and variable.**

# TECHNOLOGIES USED

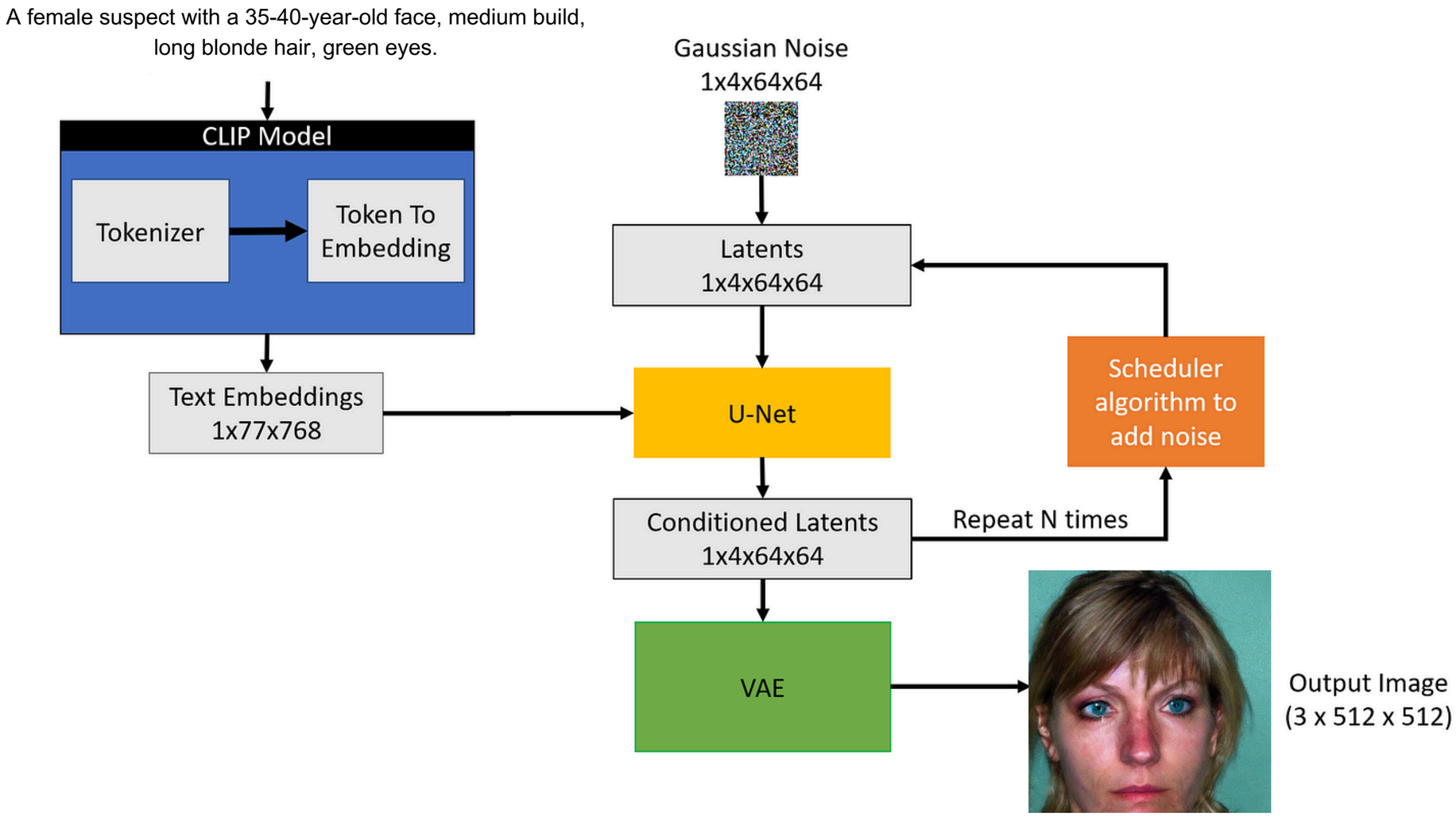


# SOLUTION

To address the problem of identifying and generating the face of a criminal suspect based on eyewitness descriptions, we utilized a custom fine-tuned Stable Diffusion model. Initially, we collected detailed eyewitness descriptions, focusing on specific facial features such as shape, hair color, eye color, and any distinctive marks. These descriptions were standardized to ensure consistency and accuracy. Alongside, we compiled a diverse set of facial images representing various ages, ethnicities, and facial features to create a robust training dataset.



# PIPELINE


A female suspect with a 35-40-year-old face, medium build, long blonde hair, green eyes.
CLIP Model
Tokenizer
Token To Embedding
Text Embeddings 1x77x768
Gaussian Noise 1x4x64x64
Latents 1x4x64x64
U-Net
Scheduler algorithm to add noise
Conditioned Latents 1x4x64x64
Repeat N times
VAE
Output Image (3 x 512 x 512)

# HOW IT WORKS?

```
from diffusers import StableDiffusionPipeline
```

This imports the StableDiffusionPipeline class from the diffusers library. This class is used to load and interact with Stable Diffusion models.

```
PIPELINE = STABLEDIFFUSIONPIPELINE.FROM_PRETRAINED("FACE_MODEL_FINETUNED")
PIPELINE.TO("CPU")
```

loads a fine tuned stable diffusion model named "face_model_finetuned". This model should be designed to generate images based on textual descriptions.

```
PROMPT = "A FEMALE SUSPECT WITH A 35-40-YEAR-OLD FACE, MEDIUM BUILD, LONG BLONDE HAIR, GREEN EYES."
GENERATED_IMAGE = PIPELINE(PROMPT).IMAGES[0]
```

Prompt contains the textual description used to generate the image.Pipeline(prompt) processes the prompt and generates an image based on it,images[0] retrieves the first image from the output. The pipeline may return multiple images, but here we are interested in just one.

# HOW IT SOLVES

- Model Loading: By loading the model and moving it to the CPU, the script prepares the Stable Diffusion model for use on a machine without a GPU.

- Saving and Displaying: Finally, the script saves the generated image to disk and displays it, allowing you to view and use the generated content.

- Image Generation: The model interprets the textual prompt and generates an image that matches the description. This is a direct application of text-to-image synthesis.

# IMPACT

- Traditional methods of creating facial composites (e.g., sketch artists) rely heavily on the skill of the artist and the accuracy of the witness's memory. Stable Diffusion can potentially generate more precise and detailed facial images, improving the chances of identifying the suspect.
- More accurate facial reconstructions can reduce the risk of wrongful accusations and convictions, which are often caused by unreliable eyewitness testimonies.
- Faster and more accurate suspect identification can expedite investigations, leading to quicker apprehension of criminals. This reduces the time and resources spent on investigations.

# WHY IT NEED'S TO BE SOLVED

- Current methods for creating facial composites are often imprecise and subject to human error. They also depend heavily on the availability and skill of sketch artists, which can be a bottleneck in time-sensitive investigations.

- Improving the accuracy of criminal identification has significant social and ethical implications. It can lead to fairer justice systems, protect the rights of individuals, and foster trust in law enforcement agencies.

- Eyewitness testimonies can be highly subjective and influenced by various factors such as stress, lighting conditions, and memory decay. Using Stable Diffusion to translate these subjective descriptions into objective, detailed images can mitigate these issues.

# THANK YOU