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# Design and Analysis

There are different possibilities in developing any applications projects which also involves implementing a GAN model. Depending on the methodology used for the development it may also involves deciding the different technologies used and specified for the development. This chapter can also help gather solutions for developing a project that can generate artworks as well as implementing a GAN model with generator and discriminator. The four main components will be analysis, design, requirements, and prototype. Each area will have the necessary details to describe the topics, such as potential solutions, other solutions, strengths, weaknesses, physical constraints, software and hardware limitations, and other information. The purpose of this system is to provide an on-demand art generation tool using AI. The used will be able to instantly get artwork powered by AI. The artwork will be of a fixed-size image format. The AI will be trained using real historical paintings from famous artists and it will then be able to generate new artwork inspired by the training dataset on demand.

## Analysis

Prior to the project's development It is important to keep in mind that some elements are necessary for the project's execution. The likelihood of a project's successful development may be increased by examining a wide range of potential technologies, methodologies, and components. The following guidelines are taken into account before designing:

1. **GAN model**: How each player will take a shot from the game board.
2. **Generator:** Deciding of how and where the ships will be placed.
3. **Discriminator:** to provide challenges to the player in a single player match or to itself in an A.I. player match when successfully trained and added to the project after the development of the game.
4. **Internet Connectivity:** depending on the design, access to the network can be supplied by a USB-dongle stick through the 4G network or WIFI technologies.
5. **Available IT Technologies**: At this stage, selecting and researching appropriate technology will help you avoid a number of problems. Depending on the design requirements, IT technologies should be carefully chosen.

## Software Requirements

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Type | Version | Purpose |
| Python | Program Language | 3.1 | contains many libraries and it is more simple |
| TensorFlow | FrameWork | 2.7.0 | Useful to implement AI |
| Visual Studio Code | IDE | 1.62 | Supports many languages, git and libraries |
| Github | Repository | None | To store the project |
| Jupyter Notebooks | Web Application | 6.4.5 | use to create and share documents that contain live code, equations, visualizations, and text. |

## Description of business problem being solved/purpose of system.

The purpose of this system is to provide an on-demand art generation tool using AI. The used will be able to instantly get artwork powered by AI. The artwork will be of a fixed-size image format. The AI will be trained using real historical paintings from famous artists and it will then be able to generate new artwork inspired by the training dataset on demand.

## Classes of All system users

1. Administrator (admin):

The administrator is responsible for training and maintenance duties for the AI model.

1. User:

The user’s main functionality is to request and receive artwork from the trained AI model on demand. The user also should be able to save the generated artwork image.

## Numbered/Ordered List of All main user functions

1. Admin
   1. Train:

Train the AI model to generate fine artwork using the gradient descent learning algorithm.

1. User
   1. Request Painting:

Request a new artwork from the trained AI model.

* 1. Save:

Save the generated image to the desktop so that the user can view it later.

## Logical Architecture Diagram

Generator

Discriminator

Real Paintings

Optimizer

Update weights

Update weights

Admin

**GAN Training**

User

Trained Generator

**GAN Deployment**

## Preliminary Database Design

The database consists of historical masterpiece paintings created by different famous artists. This will not be a relational database. These paintings will be of fixed-size pixel image format.

## Number/Ordered list – detailed specification

 Action (describe what happens when item is selected).

1.0 Administrator Functions

1.1 Train :

**Type:** Jupyter notebook

**Location:** Training notebook

**Action:** Administrator will train the GAN AI model using real paintings in the form pixel images. The admin should specify all training parameters (Optimized, Optimizer parameter, generator and discriminator architectures).

2.0 User Functions

2.1 Request paining:

**Type:** Button

**Location:** Main Page

**Action:** User will be able to request painting from the generator model. The painting will be generated instantly on-demand.

2.2 Save paining:

**Type:** Button

**Location:** Main Page

**Action:** User will be able to save the generated painting to the desktop so that user can retrieve it later.

## Page Navigation Diagram:

Request painting

Save painting

Home Page

**Home page**

## Conclusion

The stance process for the design and analysis document's requirements, chosen methodology, and necessary tools, such as the IDE, programming languages, and frameworks, are among its most difficult steps. The requirements and tools listed in this document were chosen for the project's development; however, some requirements and tools may change during the project's implementation phase depending on its progress.