

VISUAL SEARCH ENGINE

USING

VISUAL LANGUAGE MODEL

AI-Powered Image Retrieval Using Vision-Language Models

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Project Report Template (Problem 7)

Introduction

This project focuses on building a visual search engine using Vision-Language Models (VLMs). The system retrieves semantically and visually similar images based on text or image input, enabling efficient image search for large datasets. It has applications in e-commerce, digital asset management, and content-based retrieval systems.

Project Overview

Problem Statement

Develop a visual search engine that leverages vision-language models (VLMs) to retrieve relevant images based on textual queries or sample images. The system should embed both text and images into a shared representation space, allowing users to search via keywords, natural language descriptions, or example images.

Technologies Used

List all major tools, libraries, and frameworks. For example:

- **Programming Language:** Python
 - **Framework:** PyTorch / TensorFlow / Scikit-learn
 - **Data Processing:** Pandas, NumPy, SciPy, PIL
 - **Visualization:** Matplotlib, Seaborn
 - **Web Framework :** Streamlit
 - **Version Control:** Git & GitHub
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Implementation

1 Data Collection / Preprocessing

- Source of the dataset : [Flick 30k Dataset](#)
 - Cleaning or transformation steps
 - Splitting into training/test sets
-

2) Feature Engineering or Model Building

- What model/algorithm did you use?
 - How did you train it?
 - Any hyperparameter tuning?
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3) Evaluation

- Accuracy / Precision / Recall / F1-Score
 - Confusion Matrix
 - ROC-AUC (if classification)
-

4) Interface / Deployment (if applicable)

- Implemented a Streamlit web UI for interactive image selection and similarity search.
 - Model loading & prediction
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Project Structure

Visual Search Engine using VLMs

```
|— 📁 data/      # Dataset
|— 📁 models/    # Saved model files
|— 📜 main.py     # Main script
|— 📜 front_end.py # Web UI
|— 📜 requirements.txt # Dependencies
|— 📜 README.md   # Documentation
```

Setup & Installation

1) Clone the Repository

```
git clone https://github.com/Krishnandu-Halder/Visual_Search_Engine_using_VLM.git  
cd Visual_Search_Engine_using_VLM
```

2) Create and activate virtual environment

Windows

```
python -m venv venv  
venv\Scripts\activate
```

Linux / macOS

```
python3 -m venv venv  
source venv/bin/activate
```

3) Install dependencies

```
pip install -r requirements.txt
```

4) Run the Application

```
streamlit run app.py
```

5) Deactivate

```
deactivate
```

Preview

Deploy ⚙

AI-Powered Image Similarity Search

Upload or search an image to discover visually similar images powered by deep learning.

[Upload Image](#) [Search by Name](#)

🔍 Search by Image Name

Enter the image name (without extension):
Doggy

 Image Found in Database

[Query image](#)

⌚ Top 5 Similar Images

    

Deploy ⚙

[Upload Image](#) [Search by Name](#)

📤 Upload an Image

Choose an image to find similar ones

Drag and drop file here
Limit 200MB per file • JPG, PNG, JPEG

 Image Uploaded and Processed

[Browse files](#) [X](#)

[Uploaded Image](#)

⌚ Top 5 Similar Images

    

Upload Image Search by Name

🔍 Search by Image Name

Enter the image name (without extension):

Image Found in Database

Query Image

🕒 Top 5 Similar Images

727854458.jpg 3035949542.jpg 7812870472.jpg 6910820943.jpg 146330493.jpg

📌 Future Improvements

- ◆ Integrate CLIP/DINO models for enhanced accuracy.
- ◆ Deploy to Cloud (AWS/GCP) for scalability.
- ◆ Optimize database storage for large-scale image retrieval.
- ◆ Add more interactivity in UI
- ◆ Use more advanced algorithms

Author-

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🚀 Thank you for exploring the Visual Search Engine!