

# Reverse Image Search Based on AutoEncoders for the MNIST Dataset

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# GENERAL CONTEXT

# Project Presentation

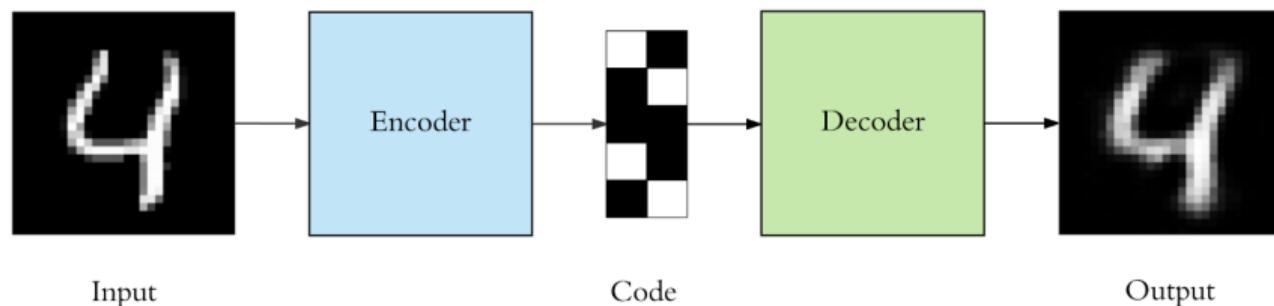
The goal of the project is to create an end-to-end reverse image search engine. that utilizes an auto-encoder to achieve it.

# Objectives

- Find a suitable architecture for the model.
- Train the model.
- Search through the embedding using a searching technique.
- Build a user interface.
- Utilize big data and MLOps to optimize the application.

# Proposed solution

# Auto-encoder Architecture



# Auto-encoder Architecture

```
Model: "sequential"
```

| Layer (type)                    | Output Shape       | Param # |
|---------------------------------|--------------------|---------|
| <hr/>                           |                    |         |
| conv2d (Conv2D)                 | (None, 28, 28, 16) | 160     |
| max_pooling2d (MaxPooling2D )   | (None, 14, 14, 16) | 0       |
| conv2d_1 (Conv2D)               | (None, 14, 14, 8)  | 1160    |
| max_pooling2d_1 (MaxPooling 2D) | (None, 7, 7, 8)    | 0       |
| conv2d_2 (Conv2D)               | (None, 7, 7, 8)    | 584     |
| max_pooling2d_2 (MaxPooling 2D) | (None, 4, 4, 8)    | 0       |
| flatten (Flatten)               | (None, 128)        | 0       |
| <hr/>                           |                    |         |

```
Total params: 1,904
```

```
Trainable params: 1,904
```

```
Non-trainable params: 0
```

# Auto-encoder Architecture

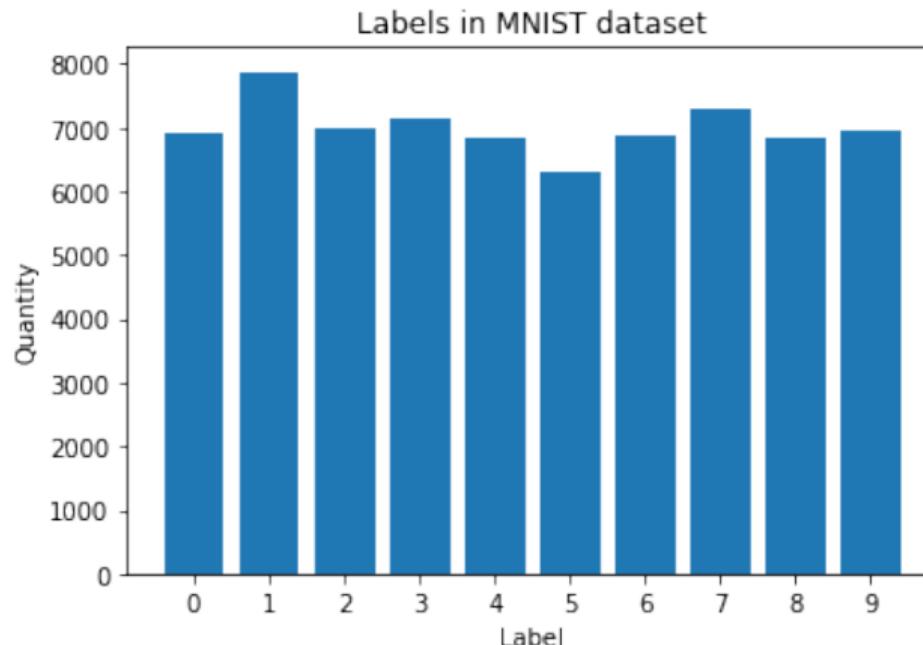
```
Model: "sequential_1"
-----  
Layer (type)          Output Shape         Param #  
=====  
reshape (Reshape)      (None, 4, 4, 8)       0  
conv2d_3 (Conv2D)      (None, 4, 4, 8)       584  
up_sampling2d (UpSampling2D (None, 8, 8, 8)       0  
)  
conv2d_4 (Conv2D)      (None, 8, 8, 8)       584  
up_sampling2d_1 (UpSampling2D (None, 16, 16, 8)     0  
                (None, 28, 28, 16)       0  
conv2d_5 (Conv2D)      (None, 14, 14, 16)      1168  
up_sampling2d_2 (UpSampling2D (None, 28, 28, 16)     0  
                (None, 28, 28, 1)        145  
-----  
Total params: 2,481  
Trainable params: 2,481  
Non-trainable params: 0
```

# Dataset

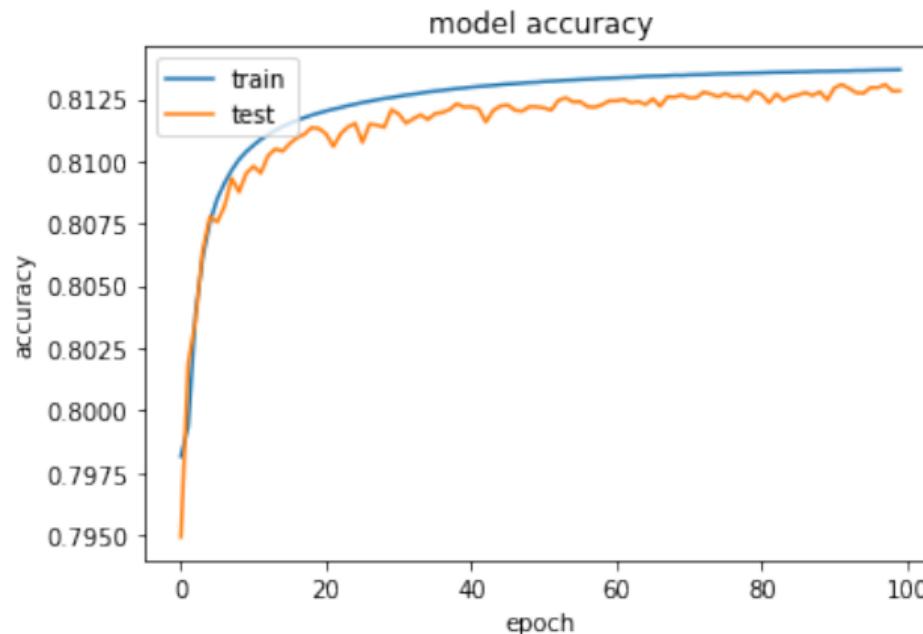


Dataset contains of 70000 labeled handwritten images.

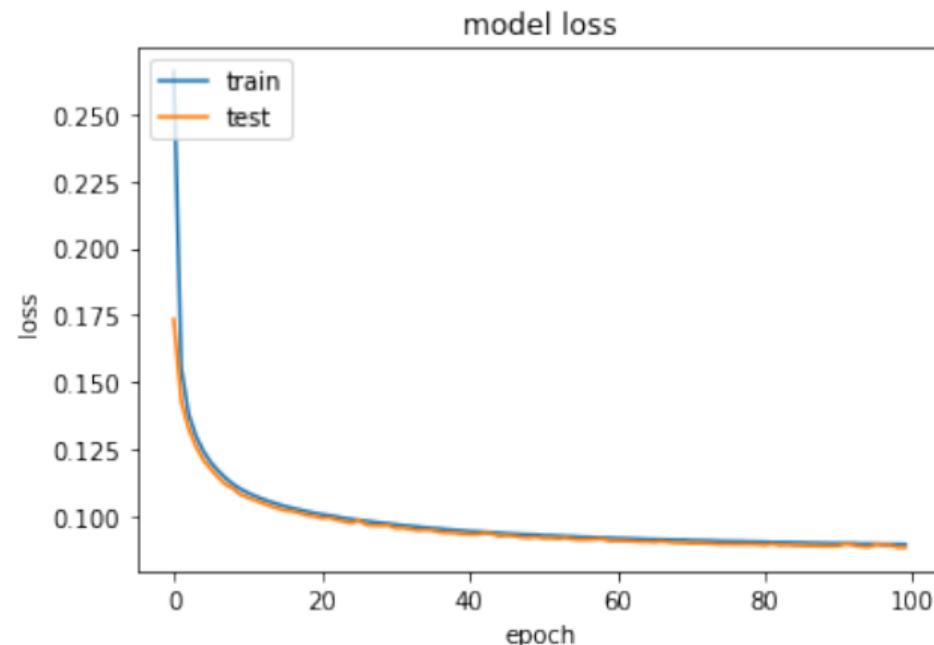
# Dataset



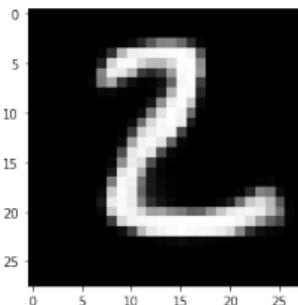
# Model Training



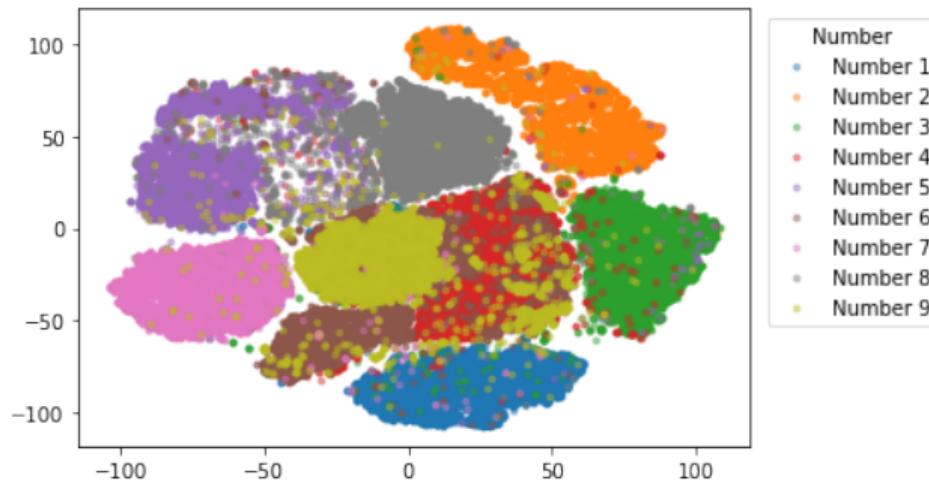
# Model Training



# KdTree Search



# T-SNE Distribution of our dataset



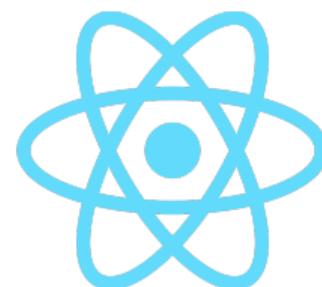
# WEB APPLICATION

# tools



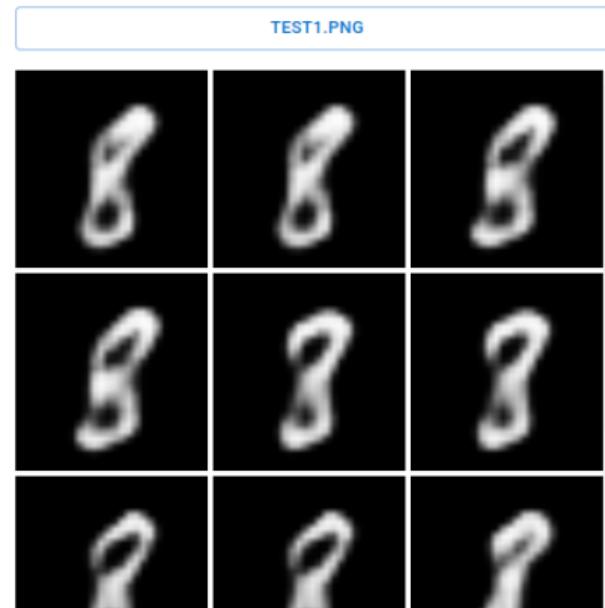
# tools

 FastAPI



# Search Results

8



# CONCLUSION