SketchScape
An AI-based Application for Enhancing Artistic Expression

Israfil Arman (2020-1-60-086)
Md. Habibuzzaman (2020-1-60-212)

Project Members

Shafia Hasnin (2020-1-60-209)
Samiu Esika Upoma (2020-1-60-082)

Background

Digital Tools,

- **Boost creativity**
- **Encourage diverse disciplines**
- **Enhances learning**
- **Foster social connections**
- **Enhance cognitive functions**

Motivation

- **Creativity stimulation & observation enhancement**
- **Machine learning integration using advanced tools**

Introduction

- Innovative software revolutionizing drawing with AI
- Advanced AI algorithms detect and identify sketched objects with 94% accuracy
- User-friendly tool making art accessible to everyone
- User-centered design
- Implementing a user interface for sketching objects

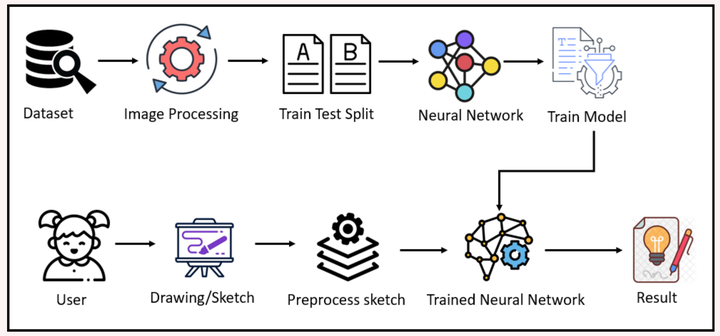
Objective

- **Detect and identify sketched objects.**
- **Measure the correctness of sketches.**
- **Implement a user interface for sketching objects.**

Materials Used

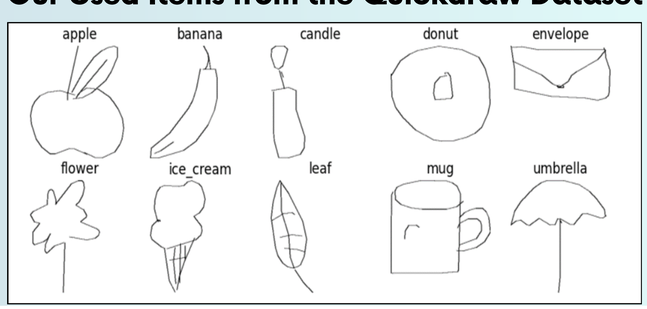
Dataset Collection: Kaggle, Quick Draw
Dataset Sampling: CNN, ReLU, softmax
Model Generation: TensorFlow, Keras
Dataset Processing: OpenCV (cv2), Pillow (PIL)
Research Environment: Jupyter Notebook
Python Libraries: NumPy, os, Adam, SGD, seaborn,imutils, matplotlib, pandas, rembg, LearningRateSchedule, ModelCheckpoint
Canvas Creation: Tkinter
Front-end Development: Flutter
Back-end Server: Django's REST Framework API

Methods



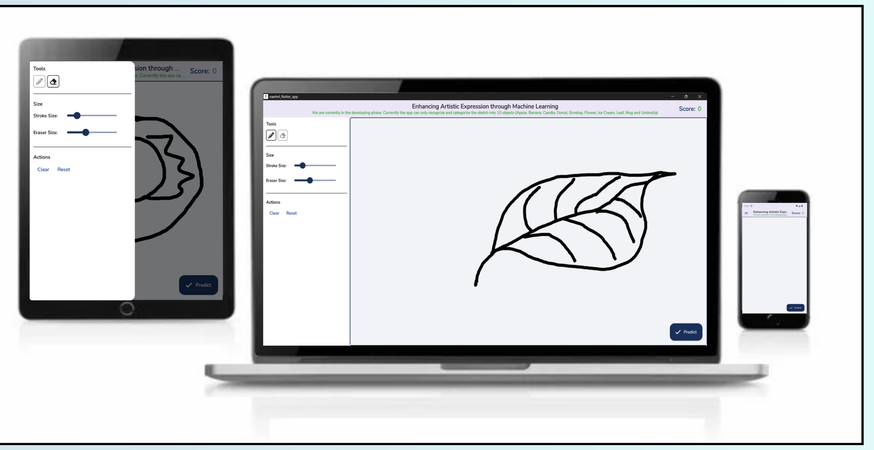
Dataset Collection:
Cybertron Sketches (250 items, PNG format) and QuickDraw Sketches (500+ items, NDJSON format).
Image Processing:
Grayscale Conversion using Luma Algorithm
Thresholding using Otsu's Thresholding Method
Image Resizing to 32x32 pixels by Interpolation
Train Test Split:
80% of both datasets were used for training, and 20% for testing the model.
Neural Network:
Utilized a CNN with 162,418 trainable parameters.
Preprocess Sketch:
Gray scaling, blurring, thresholding, and applying morphological operations.
Edge Detection & Contour Finding:
Utilized Canny edge detection to find contours.

Our Used Items from the Quickdraw Dataset



Application & Discussion

- Cross-platform drawing feedback system powered by a CNN
- CNN comprises 162,418 trainable parameters
- Achieved 94% accuracy on the dataset
- Meticulously evaluated both training and test datasets for reliability
- Confirmed correct dataset loading and labeling
- All parameters trainable, resulting in high accuracy, precision, recall, and F1 scores
- Effectively classifies input data across all classes



Usability

- **Unmatched Accuracy:**
  - 95% accuracy in identifying sketched objects
  - Powered by cutting-edge Convolutional Neural Networks (CNNs)
- **User-Centered Design:**
  - Intuitive interface designed for users of all ages
  - Making creativity accessible to everyone
- **Cross-Platform Compatibility:**
  - Available on iPhone, Android, and web browsers
  - Sparks creativity wherever you are

Conclusion

Cross-platform sketch recognition app combining ML algorithms with user-centered design principles, igniting creativity anywhere.