

Sketchify – A Quick, Draw! drawing classifier

Project Proposal by Mahnoor Sheikh

+ Problem Domain:

The project focuses on classifying digital drawings or doodles by identifying the object or category they represent.

+ Dataset:

The [Quick Draw Dataset](#) is a collection of 50 million drawings across 345 categories, contributed by players of the game [Quick, Draw!](#). It has been compiled by Google Creative Lab to help developers train new neural networks, help researchers see patterns in how people around the world draw, and help artists create things we haven't begun to think of.

The simplified dataset consists of drawings recorded as timestamped vectors, tagged with metadata. It includes the following features: **word** (category of the drawing), **countrycode** (player's country), **timestamp**, **recognized** (indicating whether the model successfully classified the drawing), **key_id**, and the **drawing array**. The drawing array contains **x** and **y** pixel coordinates and **t**, which represents the time in milliseconds since the first point. The dataset has 345 output classes, each representing a distinct drawing category, i.e. the object that has been drawn.

For this project, I will primarily use the drawing vector as my feature set, extracting meaningful features to distinguish between classes/categories. To develop a base model, I will train it on 3-5 categories, each containing 1000 observations.

+ Problem Statement:

Since I will be working with digitally hand-drawn images with vastly different bounding boxes and number of points, preprocessing will include:

- Aligning and scaling all images for standardization
- Resampling all strokes for standardized pixel spacing

* Since the raw dataset is so vast, a preprocessed version is available to download (as are other versions). The [simplified drawing files](#) version constitutes top-left corner alignment, uniform scaling of 255 maximum value, resampled strokes with 1 pixel spacing, and simplification of all strokes using the Ramer–Douglas–Peucker algorithm with an epsilon value of 2.0. I could directly use this dataset.

- Dimensionality Reduction (PCA, SVD, Autoencoders)
- Creating visualizations (if applicable)

- Feature engineering (edges, contour/shape, corners, patterns in strokes, CNN-based features, Skeletonization for simplified structure)

The classifiers I'll be testing are Singular Value Decomposition (SVD), Recurrent Neural Networks (RNNs) (following a [tutorial](#)), and Random Forests. Additionally, I will build a Bayesian Classifier using the techniques learned in class.

Model training and evaluation will constitute k-fold cross validation and bagging techniques, along with experimenting with different training sample sizes across various categories.

+ **Outcome of the project:**

The goal is to develop a model capable of classifying images as they are drawn in real time. This project will serve as a base model for classifying pre-drawn images without additional complexity.

+ **References:**

https://github.com/tensorflow/docs/blob/master/site/en/r1/tutorials/sequences/recurrent_quickdraw.md

<https://github.com/googlecreativelab/quickdraw-dataset?tab=readme-ov-file#projects-using-the-dataset>