

# Deliverable 1

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## Choice of Dataset

We will be using the Tensor Flow CELEBA data, equipped with over 30,000 pictures of celebrity faces from various sources. These images have been pre-normalized in aspect ratio, resolution, and dimension ( $1024 \times 1024$ ). There have also been 'safe-search' filters applied denoting undesirable samples (e.g. face has blood on it because its from a movie). All of these factors will limit how much time we spend preprocessing the data, maximizing time spent on tuning the model.

## Methodology

- Data Preprocessing
  - Most preprocessing has already been done for this particular dataset. We will not utilize the entire dataset, as it is not feasible given our available compute power. We will also filter out the data marked violent/medical/adult etc. as our model will be specialized for general human faces. We may consider converting images to grayscale, though it is not the immediate plan.
- ML Model
  - An autoencoder packages an image into a smaller, more manageable representation to be 'decoded' later. Our model will take a slightly destroyed version of the original image (provided in the dataset) and attempt to recreate the non-damaged image. It will then compare the original image to its attempted recreation and learn, based off of our evaluation metric.
- Evaluation metric
  - After doing some research, we discovered that the peak signal-to-noise ratio would be optimal for our model. It works by first calculating the mean squared error (MSE) of the model's prediction of the target. Then the maximum value for a pixel is found and using the formula online, the peak signal-to-noise ratio could be calculated.

## Application

The model will be hosted on a website. The user will input a single blurry image of a face. The image can be uploaded from the user's computer as an acceptable file type (png, jpg, etc). The model will then output its higher resolution version of the user input. A preview of the denoised image will be displayed, with an option to download the new image.