

SmileDetector is a machine learning project that detects smiling faces in photos through facial mapping. Our new method detects smiles by analyzing the user's facial features. Traditional models process raw image data which is noticeably less efficient. Our model can perform smile detection with an average of 1.4147 ms needed per image. This is fast enough to process live video data up to 706.9 FPS. Our accuracy when tested on our dataset of 4,000 images was: 93.33%.

Our training process consists of Building Data, Training the Model, and Checking Accuracy. To build the data, we take in a directory of training images and a text file with values (1=smiling, 0=not smiling) for each image. We then run each image through a function to generate a map of points on the face in the image and then localize the points to account for head rotation. This data is saved to a file on which the model is then trained. We use Dlib's 68-point facial landmark detector for facial mapping and a C-Support Vector Classification model on the localized vectors which are generated from the landmark detection. We then check the accuracy at the end of the training by running a testing dataset through the model. The model can be passed images or a video and analyze each of its frames. It can predict at a rate of 706 images per second. The images passed to the model are first run through the facial landmark detector and then the generated vectors are localized and sent to the SVC which produces the output (1=smiling, 0=not smiling).

Our model produces similar accuracy to current models, but at faster speeds even when tested on older computers. The paper *Embedded Implementation of a Deep Learning Smile Detector* (arXiv:1807.10570) lists speeds for its model as well as other current models, which we compared the data of our model to.