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For our project, our group has chosen to do an artificial intelligence bot that distinguishes the emotions of the human face. In addition to this, we have integrated the web camera into the bot’s code so that the artificial intelligence can proceed in conducting its processes live rather than just having feeding the bot still images. At the current moment, the artificial intelligence bot has eight different emotions that it can distinguish, them being anger, contempt, disgust, fear, happiness, neutrality, sadness and surprise. The artificial intelligence utilizes a program known to the programming community as OpenCV and numpy.

First things first. What exactly is OpenCV and numpy? For OpenCV, according to the website opencv.org, OpenCV is an open source software library that contains computer vision and machine learning. OpenCV (also known as Open Source Computer Vision Library), was created in 1999, where the goal where the entirety of the computer science community am use a base infrastructure to be used for everyone’s specific need. According to Wikipedia’s entry on the subject, there was no need to “reinvent” the wheel, ie no need for each individual person(s) to create the entire library from scratch. The library contains over two thousands algorithms, all pertaining to the use of image based technology. Some of the examples the website covers is facial recognition, following eye movement, removing the red from the eyes of an image that utilized a camera flash, and so on. It is currently in use by a wide variety of companies such as Intel, Google, Microsoft, Sony, Toyota, and so on. For the government side of operations, it has been utilized for recognition and security, covering from product labels, to facial recognition, to equipment recognition, etc. OpenCV can support C++, Java, and Python, but for the sake of our project, Python is what we are currently utilizing. For numpy, or NumPy, (in terms of spelling) according to Wikipedia’s page on numpy, is a library for Python which can be used to support matrices and arrays that can be large and “multi-dimensional”. It is being employed by many companies, one notable one being Google, which incorporates this with TensorFlow. Now onto the project first hand.

The first thing we did was downloaded data that the artificial intelligence could use to train itself so it could recognized these emotions. Some of the data (ie pictures of faces) contained multiple people, with each person, hosting a small variety of emotions listed above. There was another training set that was downloaded that contained a set of images where the emotions of the faces were mixed, therefore giving the artificial intelligence a greater challenge in being able to distinguish one emotion from another. There was yet another training set, of not just one person, but of many people, each containing a single face of a single emotion. This way the bot has no reference to the same person as each image is a brand new “experience”. All the images could contain emotion (or emotions for that matter) ranging from being subtle to obvious to greatly exaggerated. For example, instead of pure “anger”, the image contain an image of a face expressing anger and also sadness and or disgust.

The artificial intelligence has to do a number of processes in order to achieve its final goal. First it must take the image and proceed to convert it to grey scale. Then it finds the outline of the face. From there it must attempt to pin down the features of the face such as the shape and curvature of the eyebrows, the mouth, the eyes, and lips. It then feeds these inputs of facial expressions into a neural network that the artificial intelligence bot has created in order to provide an output (all created from the training the artificial intelligence did against the download source images.) The output is are percentages of the emotions (them being, anger, contempt, disgust, fear, happiness, neutrality, sadness and surprise). The emotion with the highest percentage(s) is the one that the artificial intelligence chose based on the training it contained. Currently it is not as accurate as we would like due to a lack of training data so we provided the ability for you to create your own training data to help it out as well.