TJHSST Computer Systems Project Proposal
Application of Neural Networks in Face Recognition
2009-2010

Kyle Ferris

October 27, 2009

1 Purpose and Scope of Study

The purpose of this project is to develop an a neural network to recognize biometric features for security purposes. In the modern world, sensitive data or access to buildings can be protected by more than just a key or a password. Biometric data unique to every human can be used to allow or deny access. The purpose of this project is to be able to create a "key" for any person who wishes to use the program. An image of the client's face will be taken and used as the base biometric key. When the client wishes authorization, a new picture of their face will be taken and compared to the base image. The program should be able to recognize the client and authorize him or her, while denying access to those not recognized. There are also possible expansions into fingerprinting and other areas.

2 Background and review of current literature and research

Several groups have worked on projects similiar to mine. The framework for my project is based off of a lesson for Computer Science students at Carnegie Mellon. Neural networks are the most efficient method of face

recognition. Several alternatives have been explored, including various mathematical transformations in an attempt to change the visual data into a more easily comparable format. However, the best method is to analyze the data with a neural network.

3 Procedures and Methodology

There are several tasks that need to be completed for this project. The first is developing a neural network program that can be trained to recognize faces. The second phase is training the network to recognize a specific face. The final phase is testing, resdesigning and refining the network until it can achieve fast, accurate results. Not much specialized equipment is needed for this project. However, a webcam might be a useful tool in demonstrating the capablities of the program and creating image files for use in training. The code will be written entirely in python.

Input data will be a training set of images of the user's face. These images will probably be collected with a webcam taking frames of a video. Alternatively, these images could be obtained with use of a standard digital camera, although many pictures would need to be taken in order to ensure a suffienciently large training set. Displaying the calculations and information my program uses may be difficult. The calculation is mostly internal. I could display the error of the neural network as it makes it's calculations, as well as displaying sample inputs and what evaluation the program gives them as to how they compare to the learned images.

Neural networks have a built in error evaluation. Therefore there is no need to write additional code once the neural network is up and running. The program will improve it's efficiency and accuracy as it takes in more test cases and spends more time evaluating.

4 Expected Results and Value to Others

Hopefully if next year's seniors have an interest in neural networks and/or computer vision, they will be able to use my project as a starting point and look at my methodology. When this program is completed, it will be able to be implemented into any security system with fairly basic equipment. While there are no doubt professional programs that perform similar functions,

these programs cost thousands of dollars. My program would be able to be combined with something as simple as a web cam, and could be used to create a very secure authorization process.