Poster: Investigating TensorFlow for Airport Facial Identification

Extended Abstract

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CCS CONCEPTS

• **Computing methodologies** → *Computer vision*; *Neural networks*; • **Security and privacy** → Usability in security and privacy;

KEYWORDS

facial identification, TensorFlow, deep learning, airport security

Facial recognition is a rapidly developing application of machine learning. Face identification is specifically being adopted across security systems such as airports, perimeter security, and law-enforcement. In this poster, we describe a facial identification approach that can be deployed at airports. Our contributions include i.) facial identification software built on top of Google's TensorFlow [1] framework; ii.) a data collection scheme that can be implemented at airports nationally; and iii.) a user interface for collecting data.

Our airport booth: To simulate data collection as it would occur at an airport, we built a mock security booth and use it to record subjects' faces (see Figure 1). The booth consists of 10 gray panel boards organized in a 2×5 configuration, and a rail system on which a web camera is mounted. Three LED tube lights are positioned to provide three-point lighting in the booth. The lighting system provides uniform lighting across differing lighting environments. A web-based user interface enables security personnel to capture video of individuals in the booth. A fifteen second video consisting of a 180° scan of each person's face is recorded at a frame rate of 24 frames per second. The user interface automatically extracts individual frames from the video and stores them with a unique ID. We use our system to collect a dataset of 72 individuals, with approximately 400 images for each individual.

Facial Identification Approach: Collected data is split into three subsets. 85% of the data is designated for training, while separate subsets of 10% and 5% are reserved for testing and validation respectively. Our initial model implements a Softmax Regression algorithm [2] available in TensorFlow. The model minimizes its cross-entropy by using back propagation and gradient decent with a learning rate of 0.5. We use a preliminary dataset of 72 subjects with 340 images per person for training, 40 for testing and 20 for validation. We feed batches of 128 images at a time to the model for training and train for 3,000 total iterations. We augment our approach by adding one layer of a neural network. Experimentation on an NVIDIA Tesla K40P yields accuracies of 90%. We plan to augment our approach further by adding layers of a Deep Convolutional Neural Network [3].

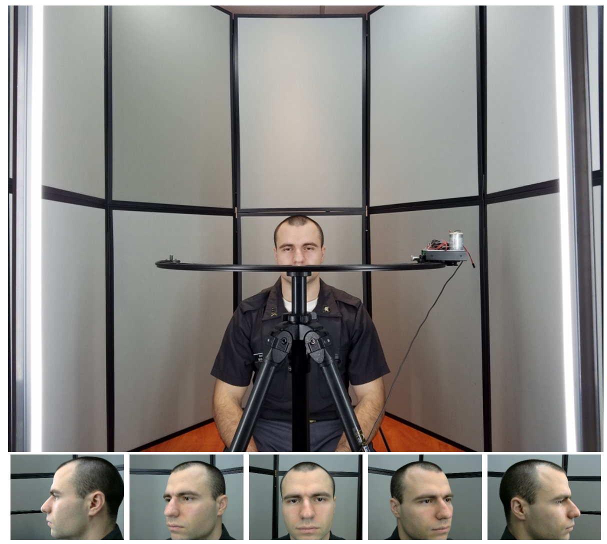

Figure 1: Data collection process

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