The paper “An Efficient LDA Algorithm for Face Recognition” discusses several important facts about LDA that correlate with face recognition. In the paper it discusses the problem with null space, the algorithm that is derived from it, and the real-time system that was made to help in identifying the images.

The LDA algorithm in the paper was designed for a number of reasons. One of them is that the traditional LDA algorithms have issues with SW because of the null space associated with it. Another reason, is to develop the combination of dimensionality reduction and sub-space mapping, which can help get rid of the null space. The steps for this include removing the null space from Sb and diagonalize that space. The second step is to diagonalize SW, this will maximize the ratio of between scatter and within-scatter. The third part is to utilize the LDA transformation which is used for Fisher's criterion. The fourth part is to form the data in a spherical shape.

In the paper, the researchers experimented with the algorithm. In it, they used face images from the Olivetti-Oracle Research Lab (ORL). This database had 10 images each for 40 different individuals. These images were varied in facial-expressions, lighting, and other non-biometric features. There were two experiments that the researchers conducted. The first one they tested the recognition accuracy vs the dimensionality reduction. They first used five images for training and the last five for testing. Based on the results plot, these results seemed to be fairly accurate. The second experiment used the number of dimensions of 39 and tested recognition accuracy vs number of training samples. They then conducted ten runs for 10 different training samples (1-9). However, this procedure didn’t give very accurate results as did the first one.

Based on these experiments, a real-time face recognition system was developed. They used a video camera to track the face in real-time and then recognize the face. Therefore, the image tracks at many frames per second. This, however, lowers accuracy. A database was used for socket communication to help with optimizing the face recognition. Face extraction was an important part of this real-time system. One of the features of it is recognizing skin color. It can also take the skin color and update accordingly to allow for more accurate results. It also offers other advantages such as identifying location of eyes, nostrils, and mouth. The importance of this is that a bounding box is used to track these characteristics. This will promote accuracy even if the subject is rotating.

Ultimately, the paper presents a new LDA algorithm that is used for face recognition. This proves advantageous because it avoids losing important dimensions that are taken in by the null space created. And with this, it was used to develop a real-time face recognition system by video recording and a database architecture.

Personally, this paper was very interesting. I feel this is a good paper in terms of learning how dimensionality reduction works with LDA for a real-world application. Also the real-time recognition system was interesting. However, I feel the authors could have addressed more about the results of their two experiments. They just displayed two plots and didn’t really give an analysis or a numerical figure for the accuracy and success of the experiments. Also, I feel the latter part of the paper was more of an advertisement of the real-time system than a technical analysis of their research. However, the paper was overall good and interesting.