Effects of Template Aging on Facial Recognition

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Abstract

"Facial recognition revenues are projected to grow from $34.4m in 2002 to $429.1m in 2007 and are expected to comprise approximately 10% of the entire biometric market" (International Biometric Group, Facial Recognition Market, 2003). With biometrics becoming a more viable solution to today's verification and identification needs as "customers deploy it for criminal and civil identification applications" (International Biometric Group, Facial Recognition Market, 2003), it is increasingly important to understand all of the factors that affect performance of biometric systems. One factor is the changing of an individual's biometric template over time. The resolution of this factor is the goal of template updating. Template updating falls into one of two categories, template aging or template improvement. While template updating attempts to mitigate change and compensate for it in a biometric template (Jain, et al., 2003, p.3), it is not fully understood how it affects the performance of a biometric system. This research will attempt to answer the question to what extent does template aging affect biometric system performance in an unattended facial recognition identification setting.

Methodology

Software used:
- Acsys Facial Recognition System – Acsys Biometrics
- FaceVACS – Cognitech Systems

Participants are enrolled in the Acsys Facial Recognition System and a template is created. Once enrolled, participants may attempt to be identified by the facial recognition system.

Initial image collection and identification will be done using the Acsys Facial Recognition System. FaceVACS will then be used to evaluate the collected images through a similarity score.

Measurements evaluated:
- Similarity score over time
- Correlation between similarity score and time from enrollment
- Correlation between similarity score and number of pictures used in enrollment
- correlation of days from enrollment and similarity score when using 1, 2, or 3 pictures for enrollment
- difference between similarity scores when using 1, 2, or 3 pictures for enrollment

Analysis

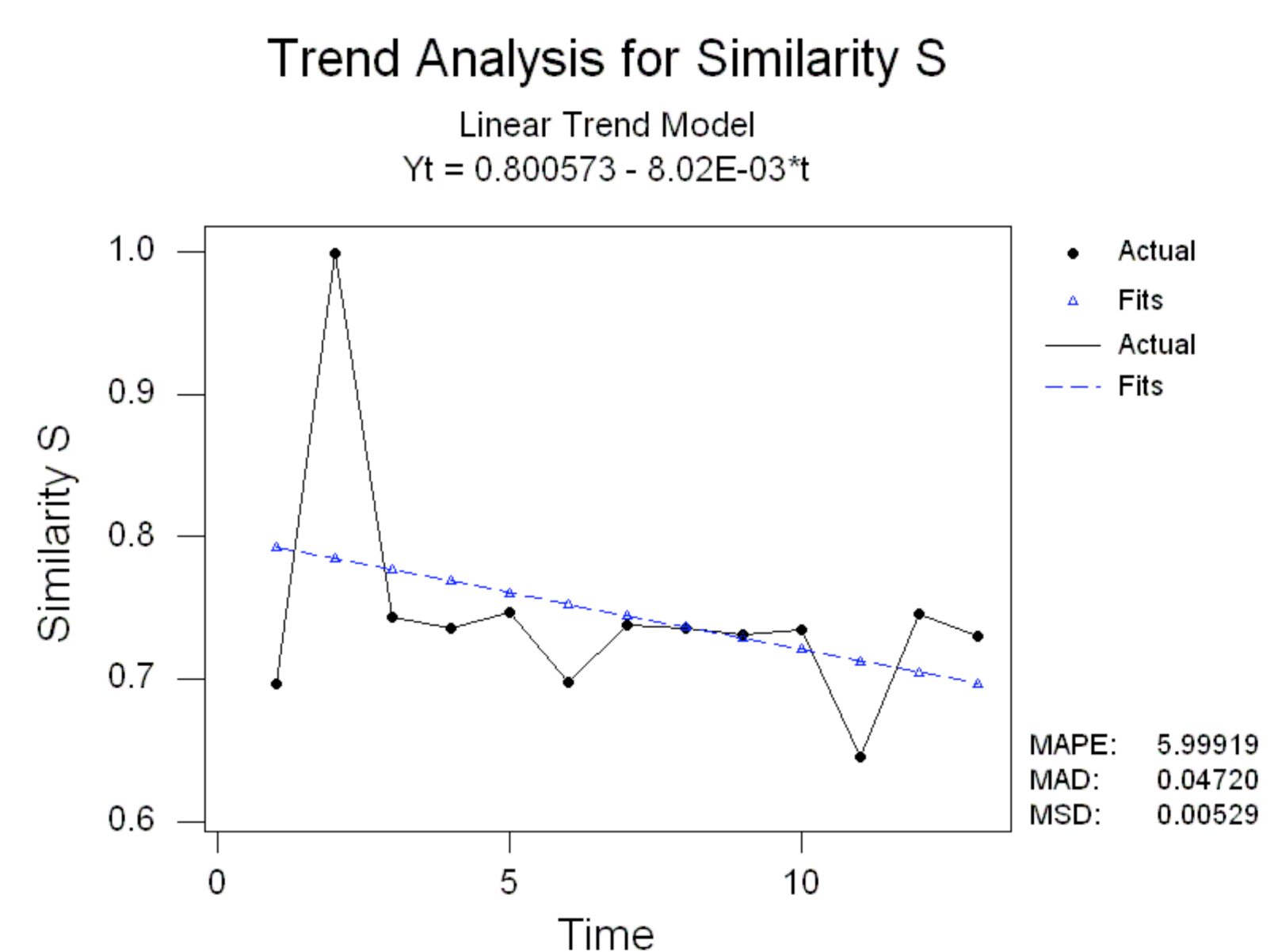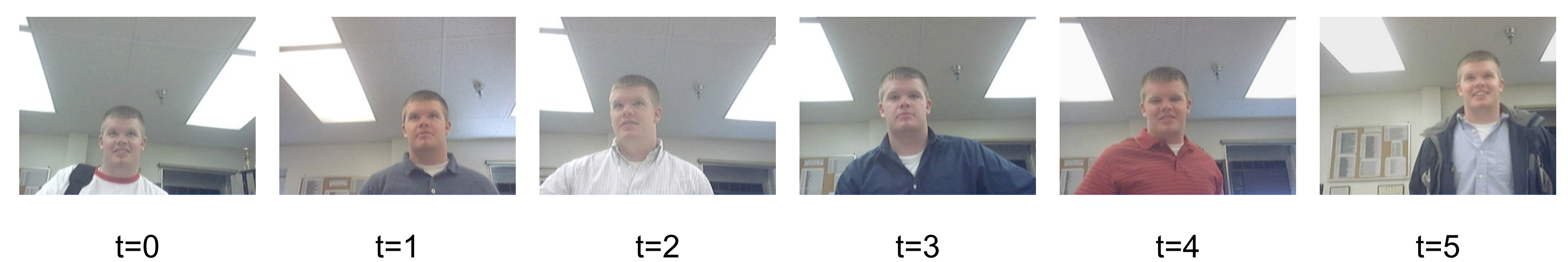t=0   t=1   t=2   t=3   t=4   t=5

Figure 1 – Trend analysis for Similarity Score v. Time

Setup

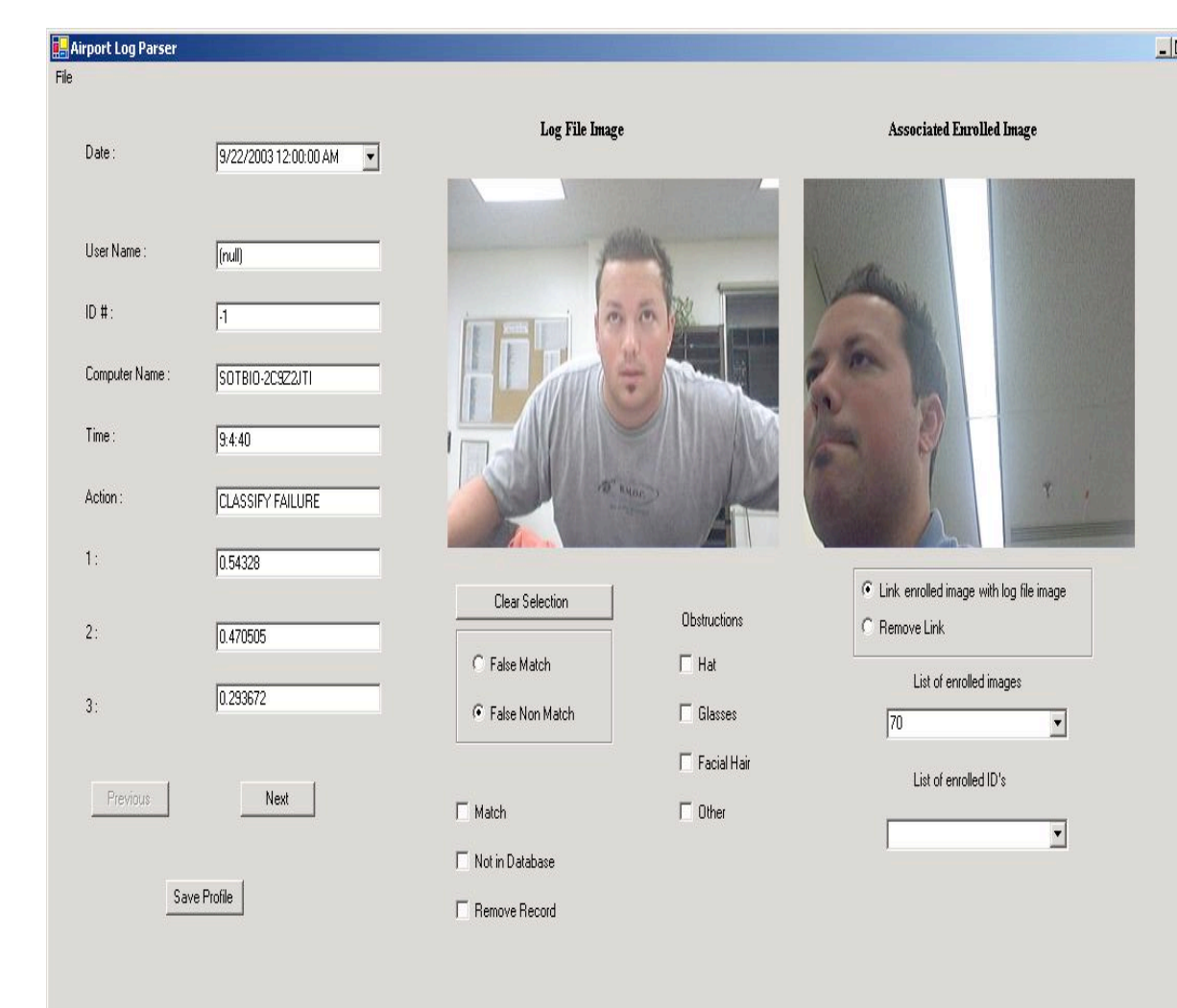Figure 2 – Facial Recognition Setup at Purdue University Airport

Figure 3 – Log parsing software used to evaluate log entries.