Results from the new Cambridge algorithms for iris recognition

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We wanted to explore what improvements in iris recognition are possible by new methods which depart from the methods described in the 1994 Daugman patent (US 5,291,560) that are used in current public deployments and that form today's core licensed technology. The new methods no longer use a polar coordinate system (which is the key Independent Claim 1 of the ,560 patent), nor do they encode the iris texture in the manner described in the Dependent Claims. Other new developments concern how artefacts like eyelashes are handled. We have found significant improvements in performance as a result:

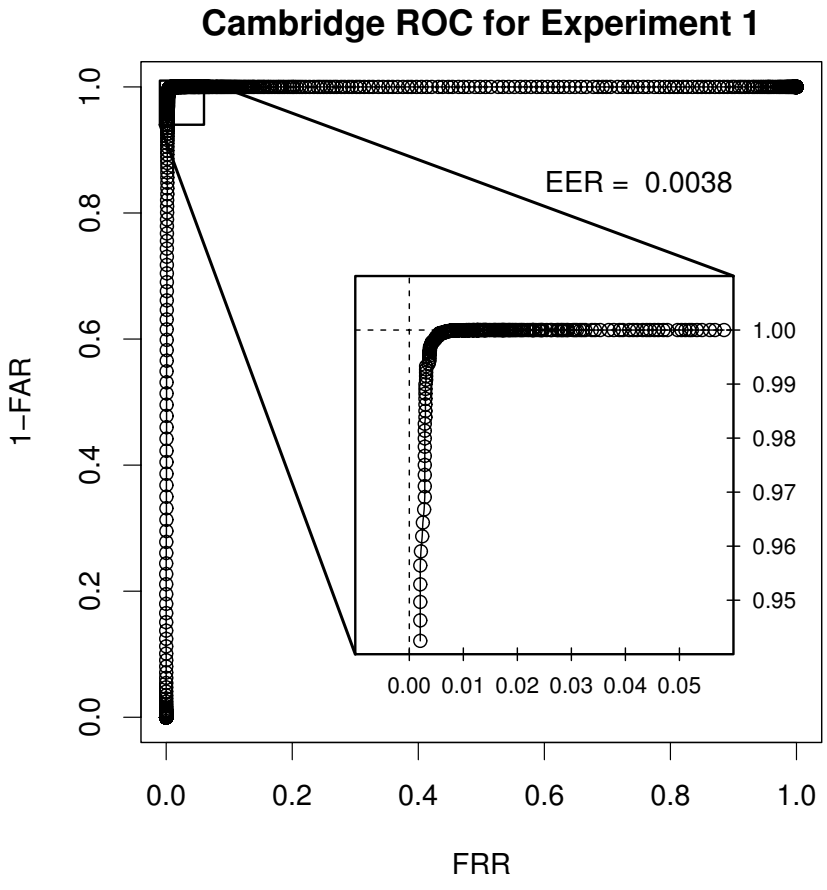
1. Execution speed for the entire process (from raw image input, including disk access time, to template output) is faster than 30 frames/second, and hence faster than the video frame rate. The entire ICE Experiment 1 gallery of 1,425 images is enrolled in less than a minute.

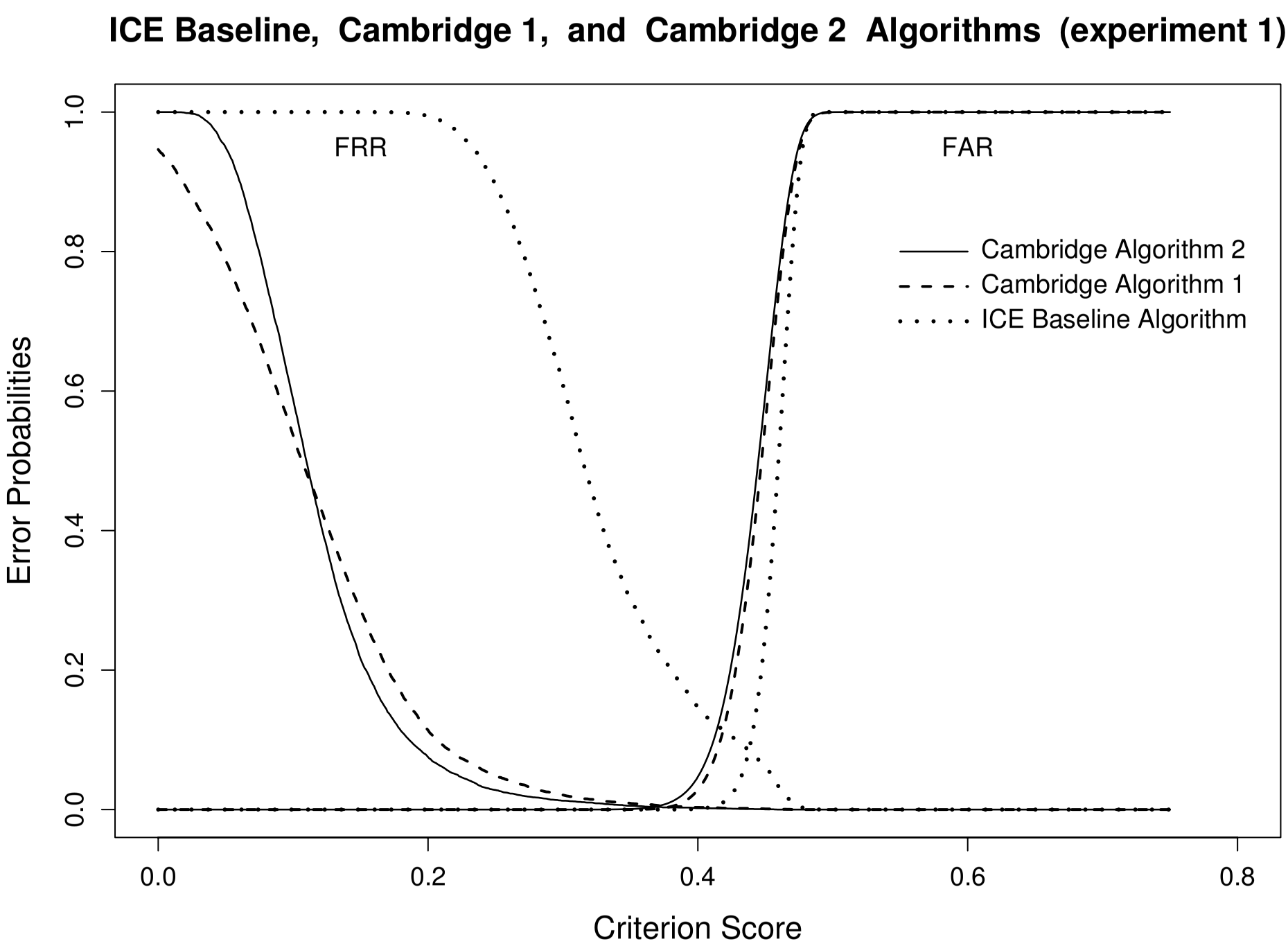
2. Our ROC for Experiment 1 is shown; the magnified inset displays just the region from 0.95 to 1.0 since otherwise no rounding is evident at the elbow in the full unit square.

3. Some ROC points: At FAR = 0, we have FRR = 0.013. At FAR = 0.0001, we have FRR = 0.008. Our Equal Error Rate for Experiment 1 is 0.0038.

4. Nearly half (48%) of False Rejects when FAR = 0 are caused by just 5 very poor images. Their disqualification in Experiment 1 would bring the FRR down to 0.007 when FAR = 0.

5. Finally, we discovered a "Ground Truth" error (a misclassified image) in the dataset. For person 289824, image 246260.tiff is misclassified as an image of this person's left eye. In fact this is an image of that person's right eye (as humans can confirm by noting the nasal canthus). Consequently images 239226, 240268, 240748, 241748, 242502, 243583, and 245124.tiff make matches with it that we believe are in fact correct.




ICE Baseline, Cambridge 1, and Cambridge 2 Algorithms (experiment 1)
FRR
FAR
Cambridge Algorithm 2
Cambridge Algorithm 1
ICE Baseline Algorithm
Error Probabilities
Criterion Score
0.0
0.2
0.4
0.6
0.8
1.0