



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

Name(s) Arav Shah	Project Number J1223
Project Title Face Time: Do Facial Parameters Change over Time?	
<p style="text-align: center;">Abstract</p> <p>Objectives The objective of this project is to determine if a person's facial parameters change over time. With increasing use of facial recognition as a method of identification, it is relevant to determine how its effectiveness might change over time as a person's face ages. This project tests the hypothesis that some key ratios of facial geometry do not change over time.</p> <p>Methods To test this hypothesis, before and after facial portraits from 16 subjects taken at least 5 years apart were analyzed. For each portrait, 6 unique facial feature distances - for example, eye-to-eye distance - were measured using Microsoft PowerPoint, and using these measurements, 15 unique key facial geometric ratios (FGRs) - for example, eye-to-eye distance to ear-to-ear distance - were calculated using Microsoft Excel. Next, for each of the 15 FGRs, ratio-of-ratios (RORs) were computed from the before and after portraits to quantify the relative change in the FGRs for that person. Finally, tolerance acceptance criteria were applied to determine which, if any, of the FGRs had changed over time.</p> <p>Results Based on the measurements and analysis, 4 of the 15 FGRs studied changed less over time compared to the other FGRs, as follows: 1. Eye/Eye-Eye 2. Eye-Eye/Ear-Ear 3. Eye-Eye/Nose-Mouth 4. Ear-Ear/Nose-Mouth</p> <p>Conclusions The results directionally indicate that certain FGRs change less over time compared to other FGRs, and may be useful in facial recognition techniques. However, a substantially larger number of samples, more accurate and/or automated measurement techniques, and tighter tolerances for acceptance criteria would be required to prove the hypothesis conclusively.</p>	
Summary Statement Based on measurements of pictures of subjects taken years apart, it was found that some facial geometric ratios change less over time.	
Help Received My dad helped me with using Powerpoint and Excel, and Mr. N Dalal, an expert data scientist, gave me guidance in establishing acceptance criteria.	