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Automated Facial Symmetry Analysis Judith Ijeoma Nwaiwu- The Impact of Diet and Traumatic Brain Injury on Long-Term Neurological Health

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Facial nerve disorders are common and can have various causes, from medical conditions to injuries. Assessing the function of the facial nerve is crucial for tracking recovery, and while several grading scales exist, they often rely on subjective evaluation. This subjectivity can lead to inconsistencies, making it harder to accurately monitor a patient's progress. To address this, researchers have been working on automating facial symmetry assessments using facial landmark coordinates. However, there is still limited data on the expected range of symmetry indices. This study explores how facial symmetry changes during different facial expressions, focusing on the forehead and mouth regions. We recorded videos of 20 participants (15 men, 5 women, aged 22-37) performing eight facial movement tests. Using an automated system, we identified key facial landmarks and calculated symmetry indices. The goal was to determine which expressions provide the most reliable symmetry measurements. Our findings suggest that the most consistent symmetry indices come from the "eyebrow raising" and "eye squeezing" tests for the forehead, and the "smile," "forced smile," and "lip stretching" tests for the mouth. These expressions showed the least variation in symmetry, making them the best candidates for objective assessments of facial nerve function. By improving the accuracy and reliability of facial nerve assessments, this approach could help doctors track recovery more effectively and provide patients with clearer insights into their progress. Automating this process also reduces human error, making evaluations more consistent and accessible.