Design Intervention in the Context of Digital Automated Measurements of Qatari Facial Expressions **and Emotions: A Digital Application for Autism, Human Health and Development**

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Recent advances in computer vision have yielded automated techniques for investigating questions in social development relevant to psychologists. For example, facial expressions and gaze direction are important markers that describe the early emotion-related behaviors of children in early social interaction (e.g., mother and infant) [1, 2]. Efficient measurement of these markers is necessary for understanding the functioning of early social communicative behaviors of children. An instructive area of deficit is Autism Spectrum Disorder (ASD), which involves qualitative impairments in nonverbal social interaction, emotional expressions, and visual gaze attention.

The increase in the number of children diagnosed with autism in the world (e.g., one in every 150 children in the United States diagnosed with ASD) makes studying the early interaction of autistic children and examining the sources of deficits in their communication essential. The laborious quality of manual measurement and coding techniques represents a challenge for large-scale analysis and detailed measurement of human expressivity. While computer techniques have achieved some success in automated quantification of human facial expressivity and gaze direction under controlled conditions, they are still far from being deployed for real world applications.

This research focuses on the measurement of expressive actions and visual attentions especially relevant to early emotional communication. We aim to develop automated computer vision techniques and utilize them to understand social behavioral development of children (especially those who are at-risk for autism) in Qatar and discover whether social factors such as ethnicity, language, and culture have effects on ASD development.