Computer Science
Seminar

Learning Movement Representations of Small Humans with Small Data

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Abstract: Closely tracking the development of motor functioning in infants provides prodromal risk markers of many developmental disruption such as autism spectrum disorder (ASD), cerebral palsy (CP), and developmental coordination disorder (DCD), among others. Screening for motor delays will allow for earlier and more targeted interventions that will have a cascading effect on multiple domains of infant development, including communication, social, cognitive, and memory. However, only about 29
While there are several powerful human behavior recognition and tracking algorithms, however, models trained on large-scale adult activity datasets have limited success in estimating infant movements due to the significant differences in their body ratios, the complexity of infant poses, and types of their activities. Privacy and security considerations hinder the availability of adequate infant images/videos required for training of a robust model with deep structure from scratch, making this a particularly constrained "small data problem". To address this gap, in this talk I will cover: (i) introduction of biomechanically-constrained models to synthesize labeled pose data in the form of domain-adjacent data augmentation; (ii) design and analysis of a semantic-aware unsupervised domain adaptation technique to close the gap between the domain-adjacent and domain-specific pose data distributions; and (iii) development and analysis of an AI-human co-labeling technique to provide high-quality labels to refine and adapt the domain-adapted inference models into robust pose estimation algorithms in the target application. These contributions enable the use of advanced AI in the small data domain.¡br¿¡br¿
Zoom Option: https://emory.zoom.us/j/95719302738

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