

Monocular 3D Person Tracking AIA Demographic Classification and Projective Image Processing

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Abstract : Object detection and localization has historically required two or more sensors due to the loss of information from 3D to 2D space, however, most surveillance systems currently in use in the real world only have one sensor per location. Generally, this consists of a single low-resolution camera positioned above the area under observation (mall, jewelry store, traffic camera). This is not sufficient for robust 3D tracking for applications such as security or more recent relevance, contract tracing. This paper proposes a lightweight system for 3D person tracking that requires no additional hardware, based on compressed object detection convolutional-nets, facial landmark detection, and projective geometry. This approach involves classifying the target into a demographic category and then making assumptions about the relative locations of facial landmarks from the demographic information, and from there using simple projective geometry and known constants to find the target's location in 3D space. Preliminary testing, although severely lacking, suggests reasonable success in 3D tracking under ideal conditions.

Keywords : monocular distancing, computer vision, facial analysis, 3D localization

Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development

Conference Location : Chicago, United States

Conference Dates : December 12-13, 2020