

ABCPhDOPENTalks2023

Reconstruction and registration of textureless and non-rigid 3D shapes

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Sagi Filin received his B.Sc. and M.Sc. degrees in Geodetic Engineering from the Technion, and his Ph.D. degree in Geodetic Sciences from The Ohio State University. Since 2004, he has been a faculty member of the Faculty of Civil and Environmental Engineering, Technion.

This talk addresses two 3D modeling-related challenges. The first concerns shape reconstruction of specular, textureless, and elastic objects. The second involves the registration of non-rigid and non-isometric forms. For the reconstruction, existing solutions have been driven by active sensors, utilizing either multiple illumination sources or laser-based ones. Even when successful, they are complex to apply and do not always capture object dynamics. Here, we describe how the polarization state of reflected light allows reconstructing objects shape. Then, we develop designated models for that purpose. We show that a single image suffices for the reconstruction and demonstrate this on heritage assets and plant phenotyping applications. Turning to the registration, conventional paradigms, which involve the extraction and matching of key features and a globally consistent transformation, are inapplicable in cases where the shape displays non-isometric deformations. To address that, we study locally consistent keypoint detection, the establishment of global and local correspondence, and the registration and interpolation of non-rigid forms. When applied to track the dynamics of plant organs, our results demonstrate vast improvement compared to state-of-the-art.

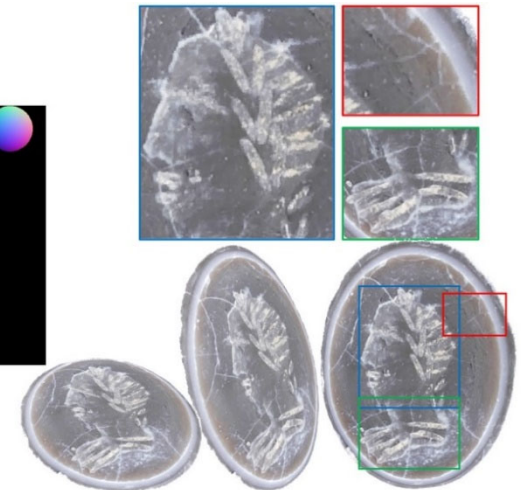
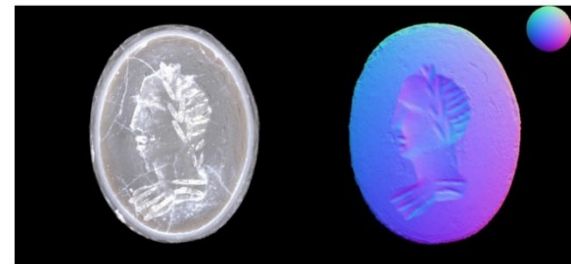
Monday November 27, 2023, H: 17.00

Politecnico di Milano,

Room Volterra, building 5, piazza Leonardo Da Vinci 32, Milano

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Shape from polarization



Temporal registration of plants non-rigid 3-D structures

