

SPiRE-EIT|2019



Summer Program for Interdisciplinary Research and Education – Emerging Interface Technologies (SPiRE-EIT)



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Quality assessment of 3D scans

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The ISU Center for Statistics and Applications of Forensic Evidence (<https://forensicstats.org/>) uses cutting edge statistics and engineering to investigate forensic evidence. In this project, we'll use scans of bullets and cartridge casings from high-resolution microscopy. These kind of scans are used in crime labs to determine if a bullet or cartridge case found at a crime scene comes from a suspect's firearm. We are envisioning a (web-based) tool that allows us an assessment of basic features for individual scans, such as e.g. the number of missing values in a scan, or when lightning is not sufficient, so that the microscope operator can immediately re-scan. The location of grooves in the scans vary and only experienced operators can distinguish groove engraved areas and land engraved areas. An automatic quality assessment of the length of a land that compares the observed length with a 'normally observed' length would be helpful. In order to assess "what is normal," we need to extract machine learning features from our body of (about 5000) scans. This will provide us with empirical distributions for each of the extracted features. These empirical distributions can be displayed in a graphical user interface to provide immediate visual feedback to the operators about the quality of a scan. We anticipate that the quality score of a scan will be useful as weights in a downstream analysis of similarity.

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