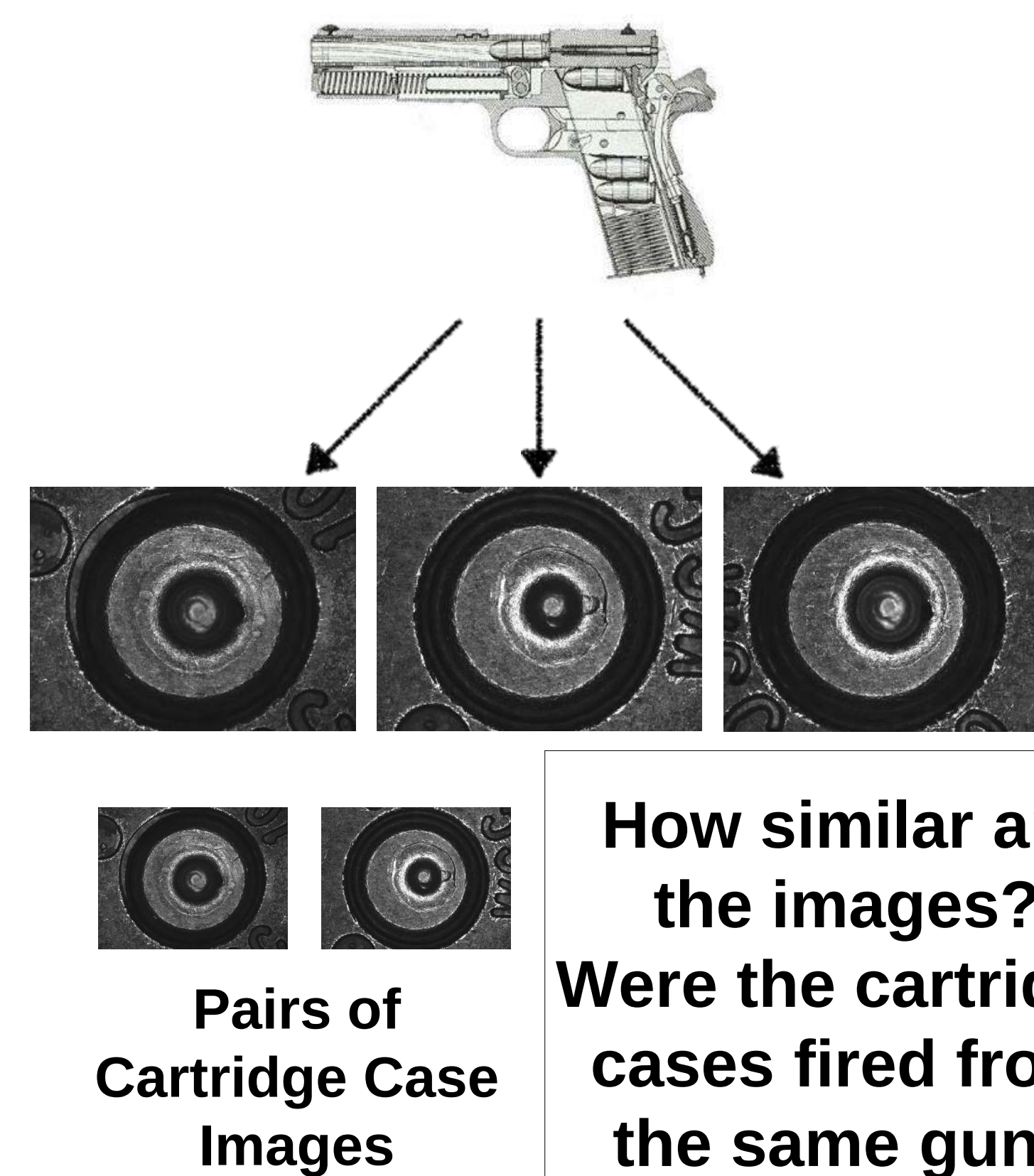
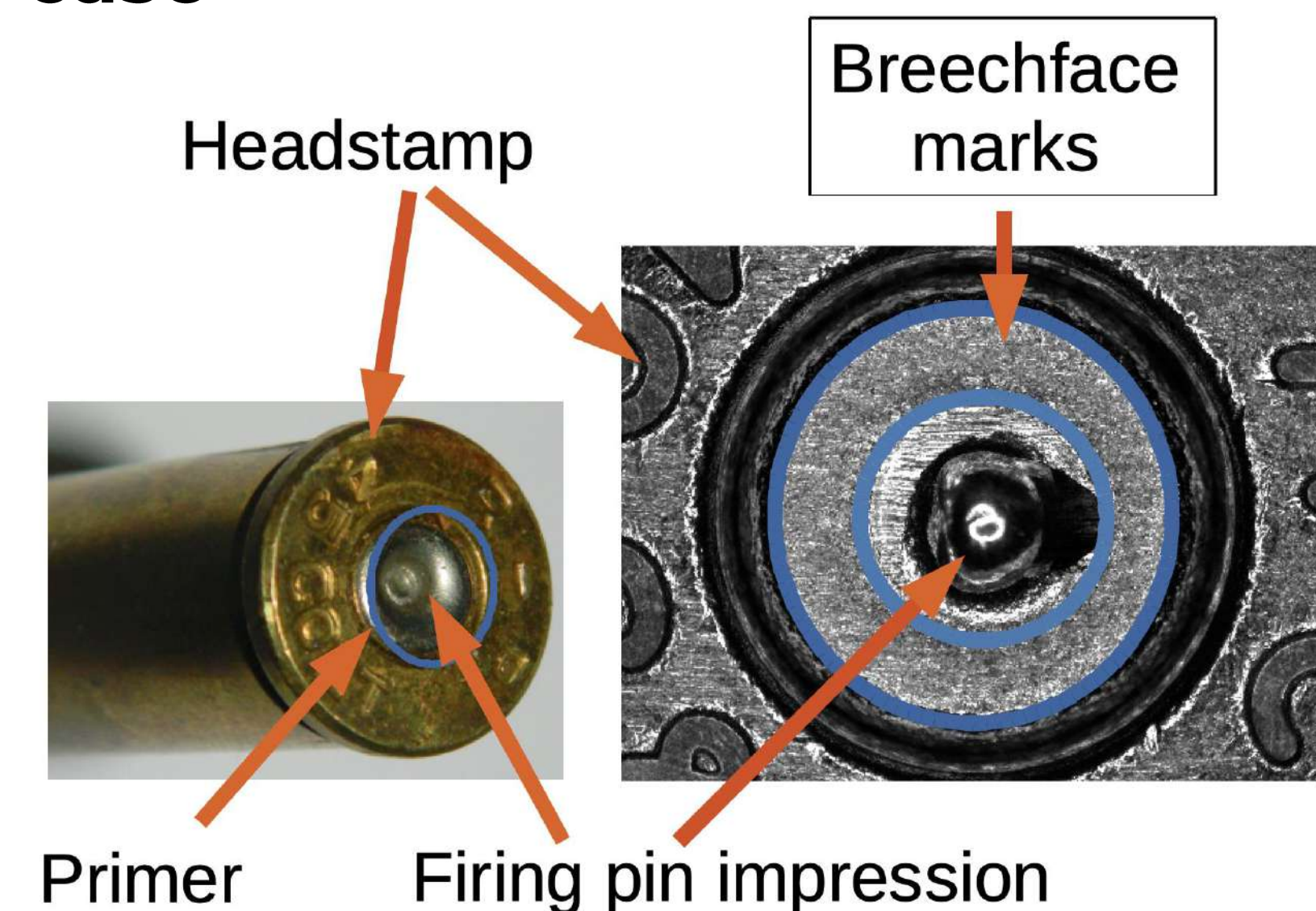


Project Rationale & Goals

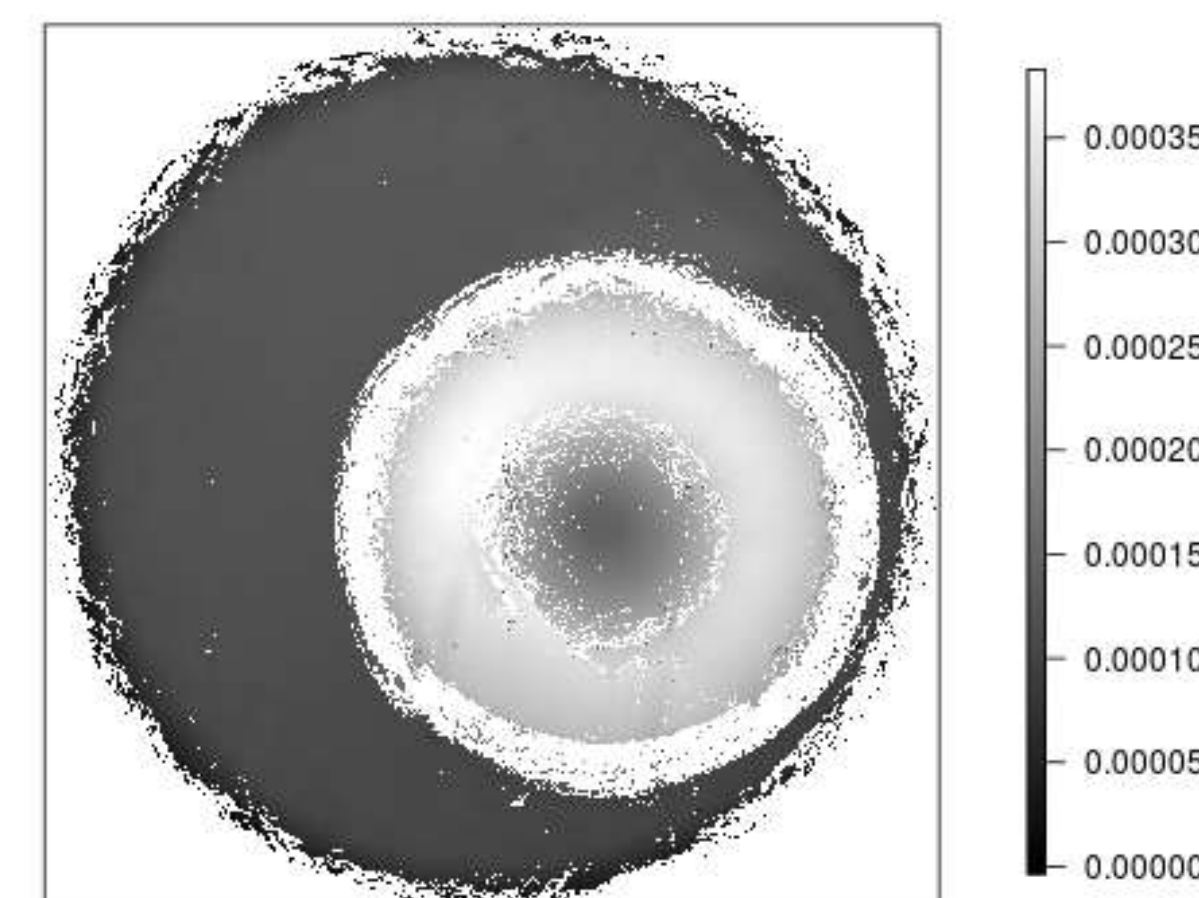
Guns produce marks on the bottom surface of the cartridge case



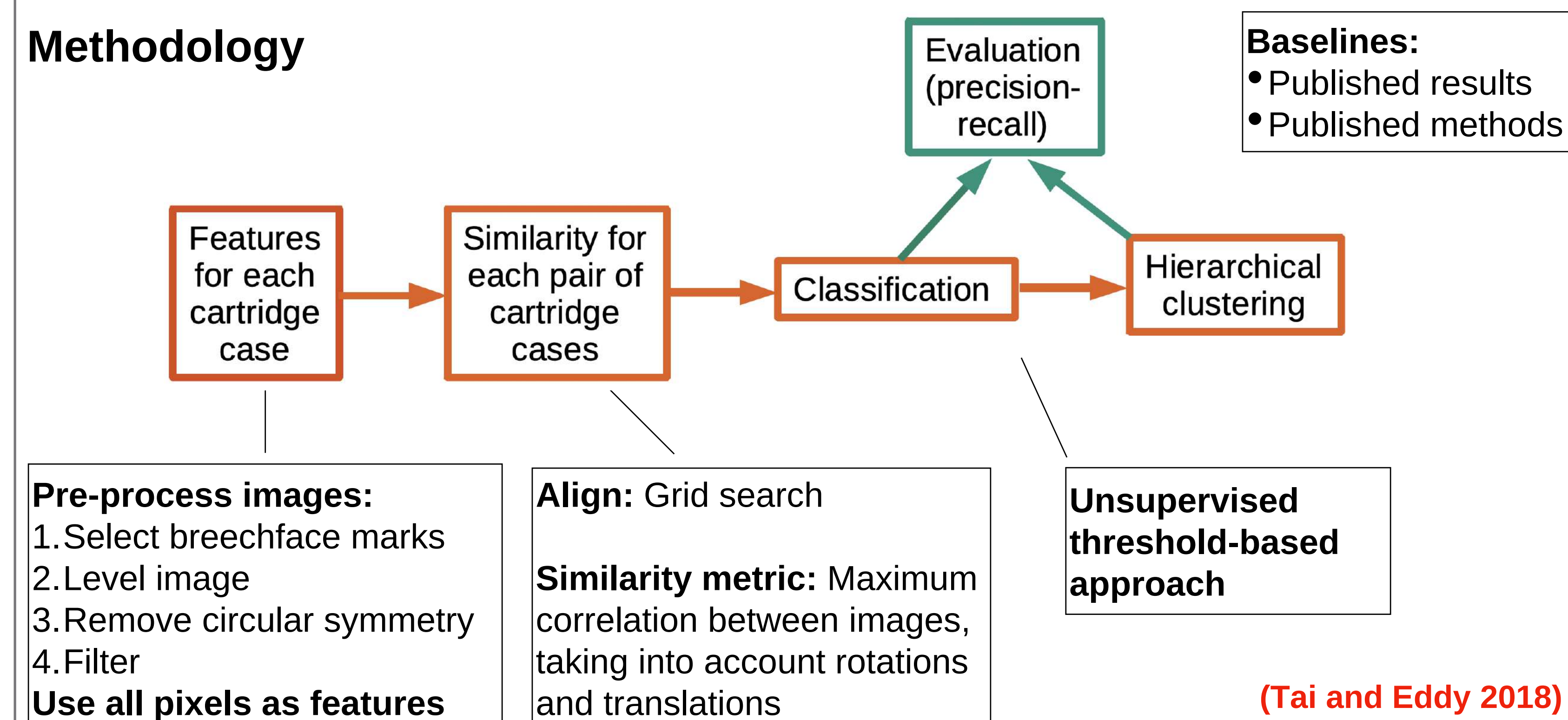
Materials & Methods

Reference Data

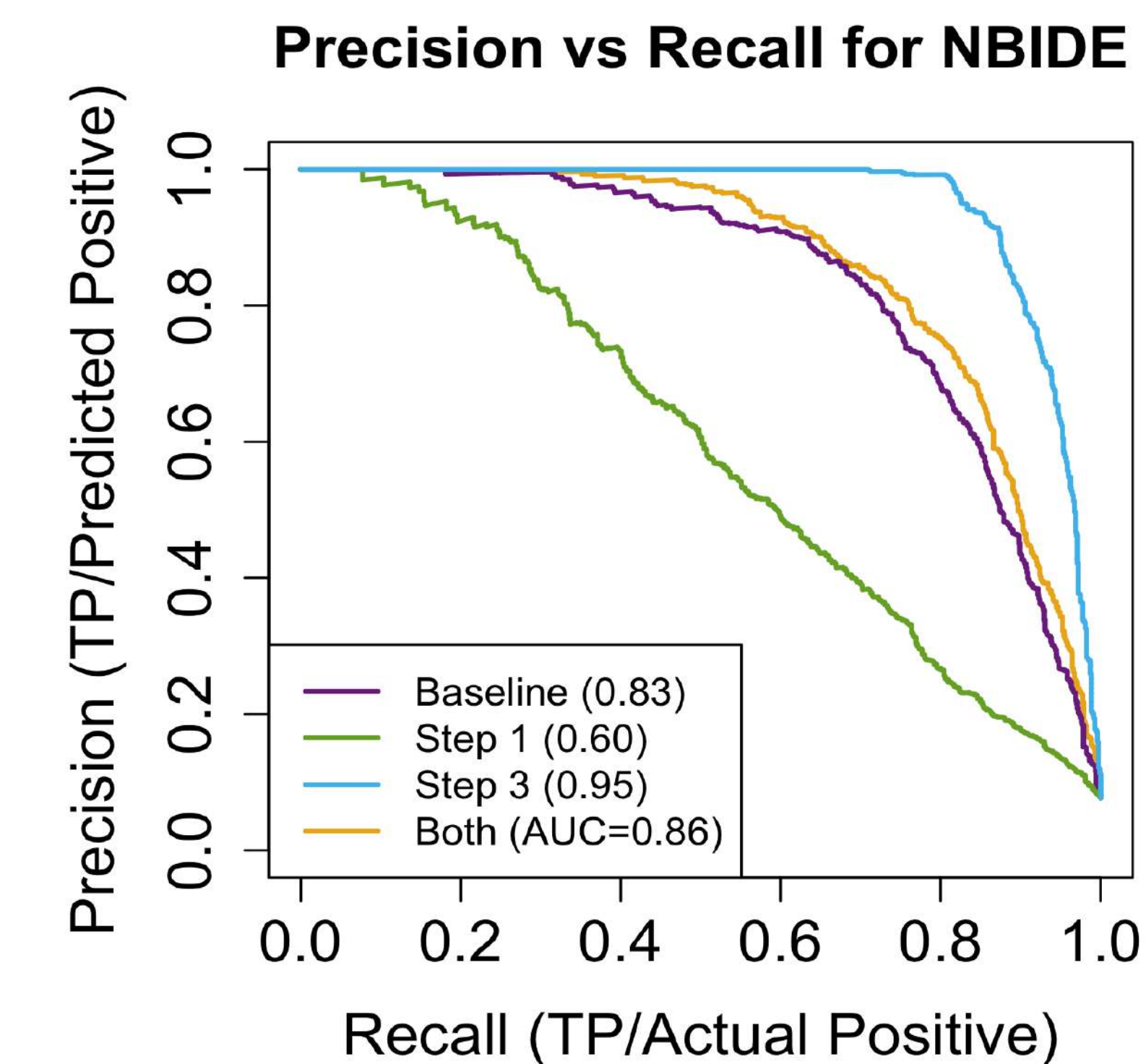
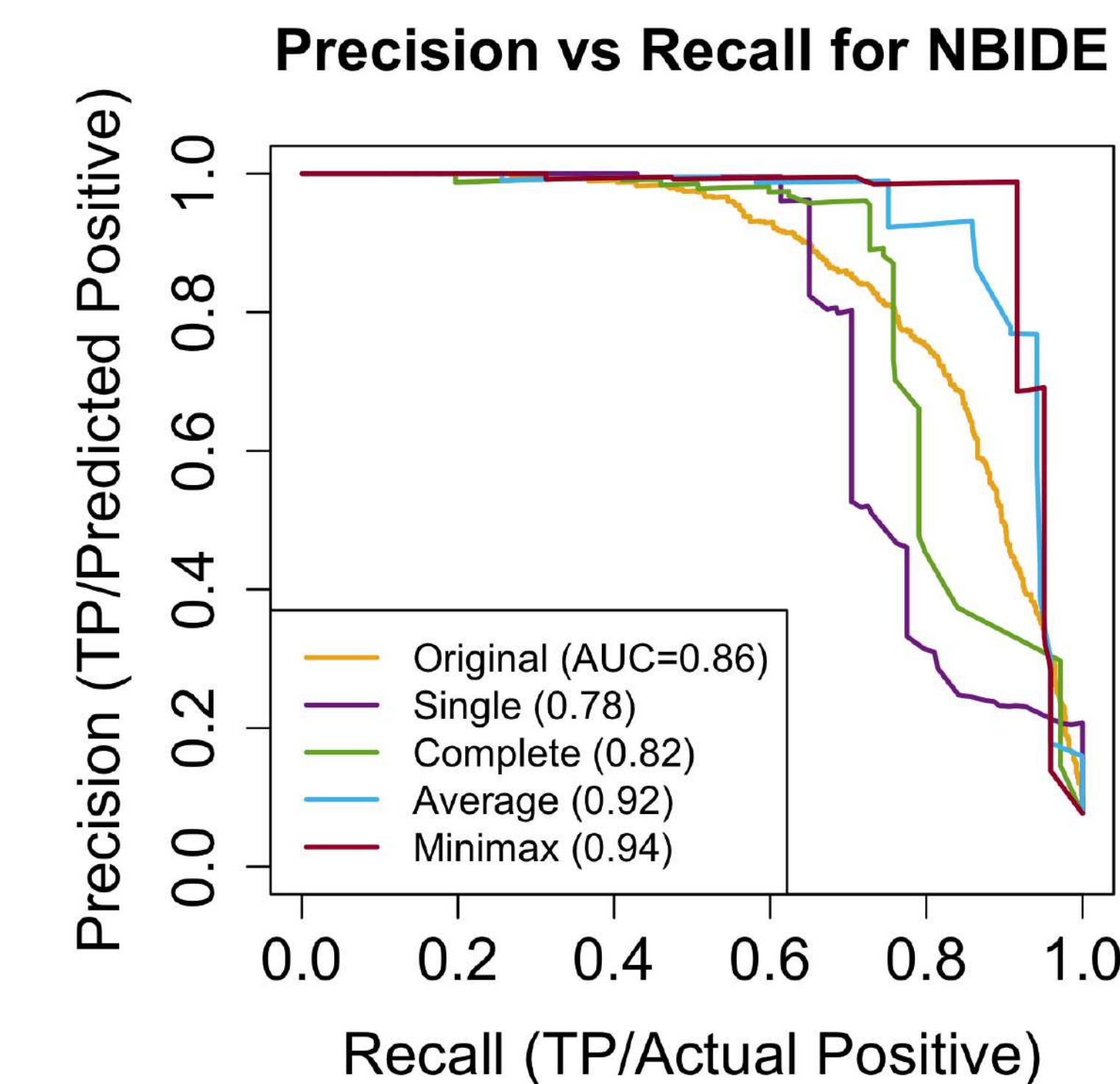
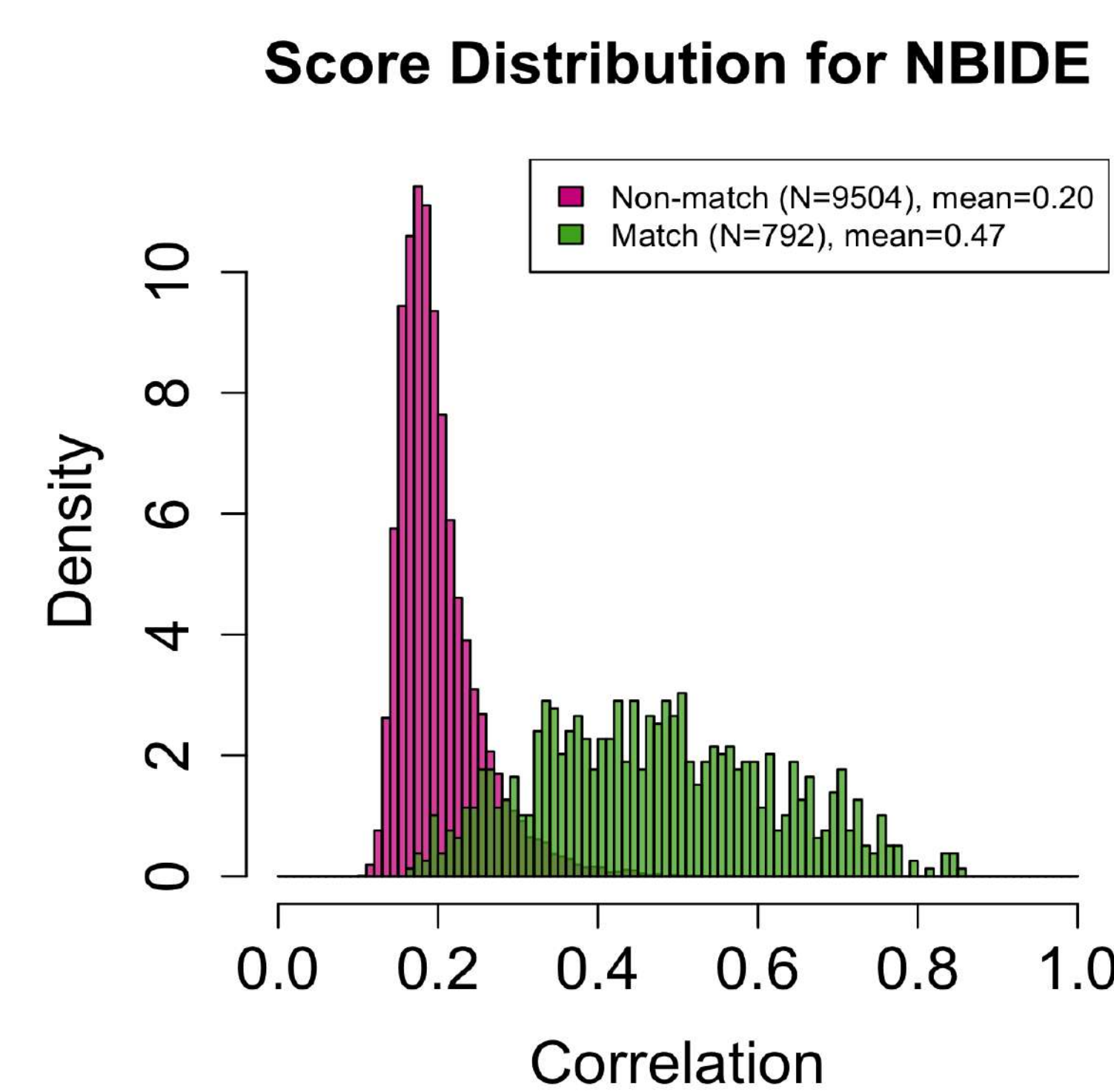
- NIST's Ballistics Toolmark Research Database (<https://tsapps.nist.gov/NRBTID>)
- 13 data sets of different guns and ammunition
- >1000 images of known origin
- 2D and 3D data
- e.g., 1200 x 1200, values are reflectance or depth in μm



Methodology



Results



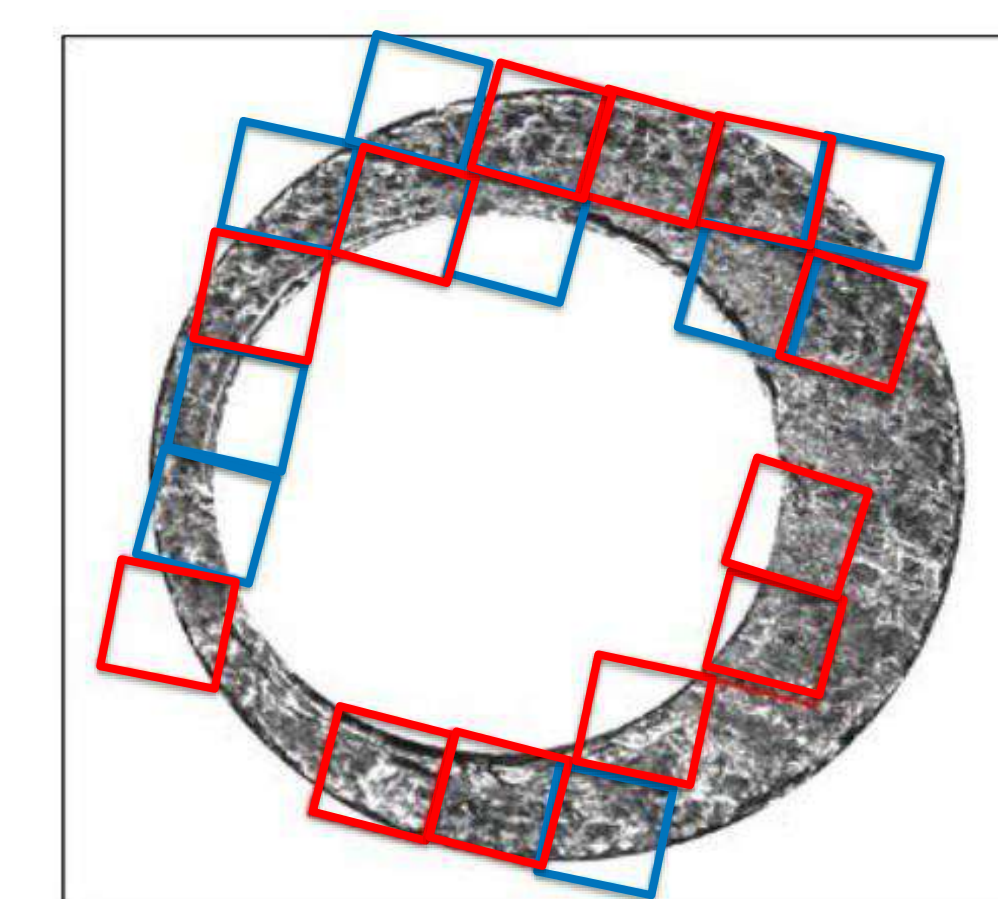
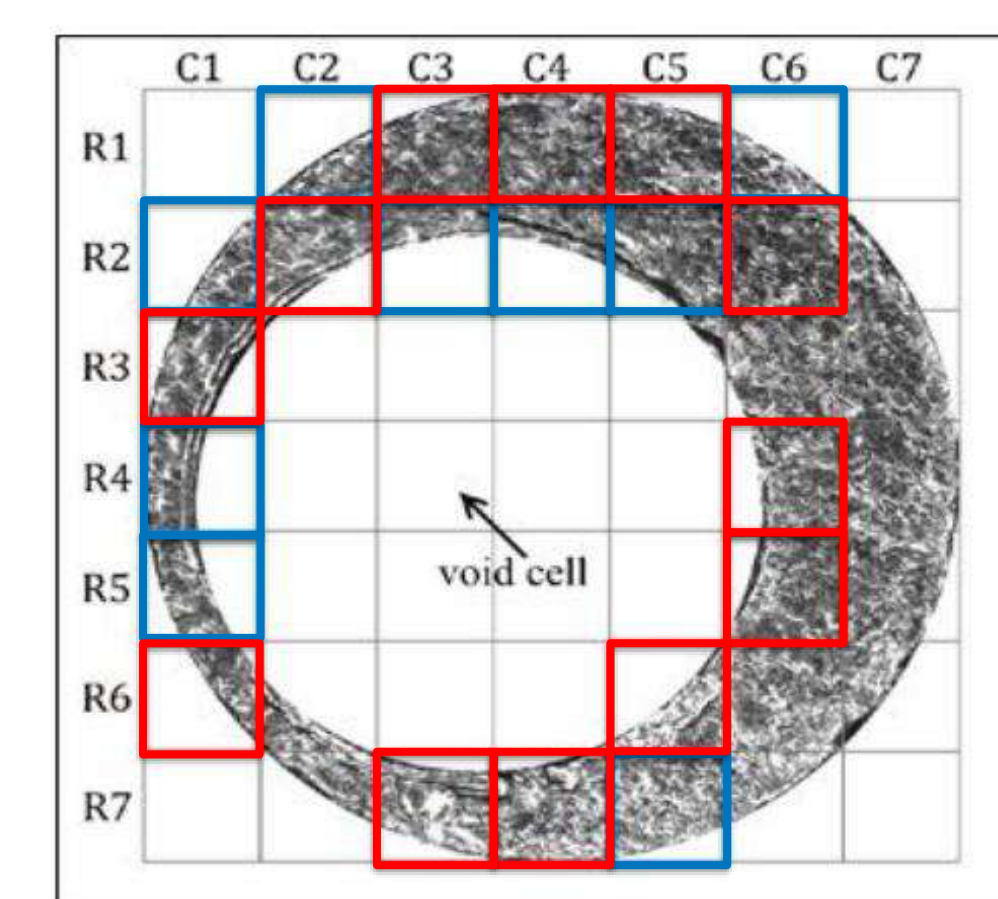
Discussion

- Performance on 3D data is better than 2D
- Clustering improves results for those with middling performance
- AUCs of over .9 for 9 of 13 data sets
- Results are comparable to in literature and an improvement over baseline of published methods

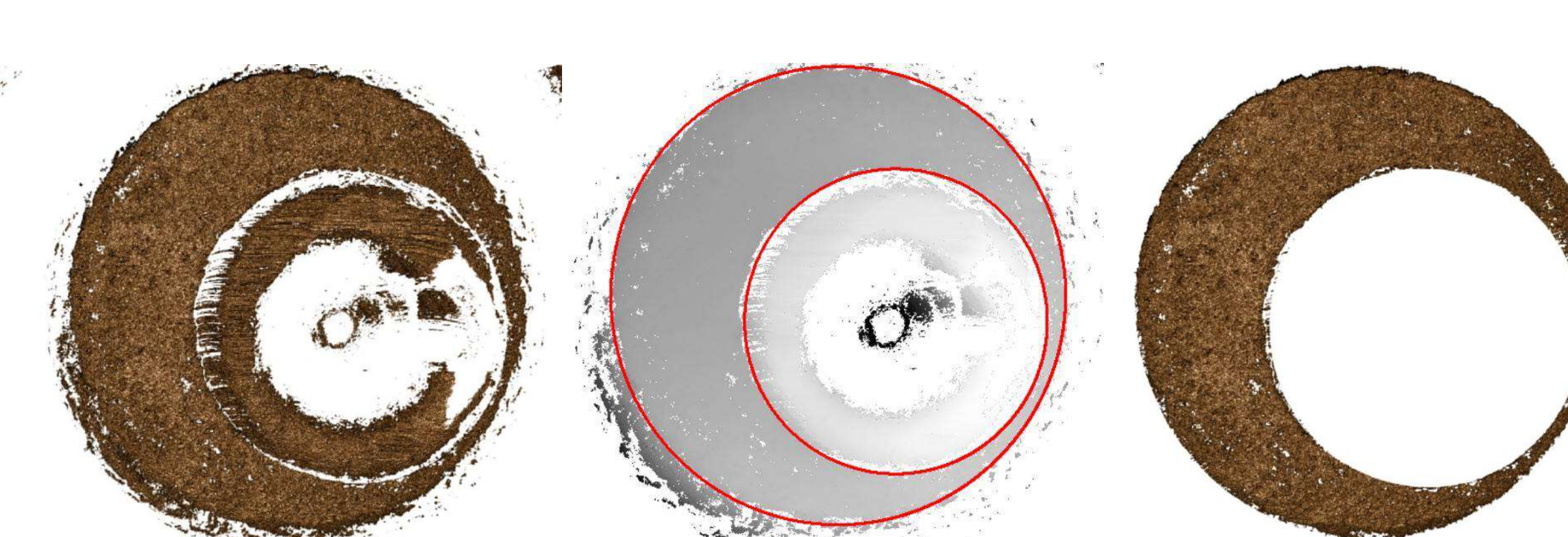
Conclusions

- Existing methods are not fully automatic and open source
- Proposed ways to get linked data set and standardize evaluation
- Comprehensively evaluate on >1000 images in 2D and 3D
- Automatic methods have potential but some way to go in terms of doing away with examiner testimony

Future Work



Implement Congruent Matching Cells Algorithm for comparison (Tong et. al 2015)



Incremental improvements (surface identification, computational efficiency, etc.)