

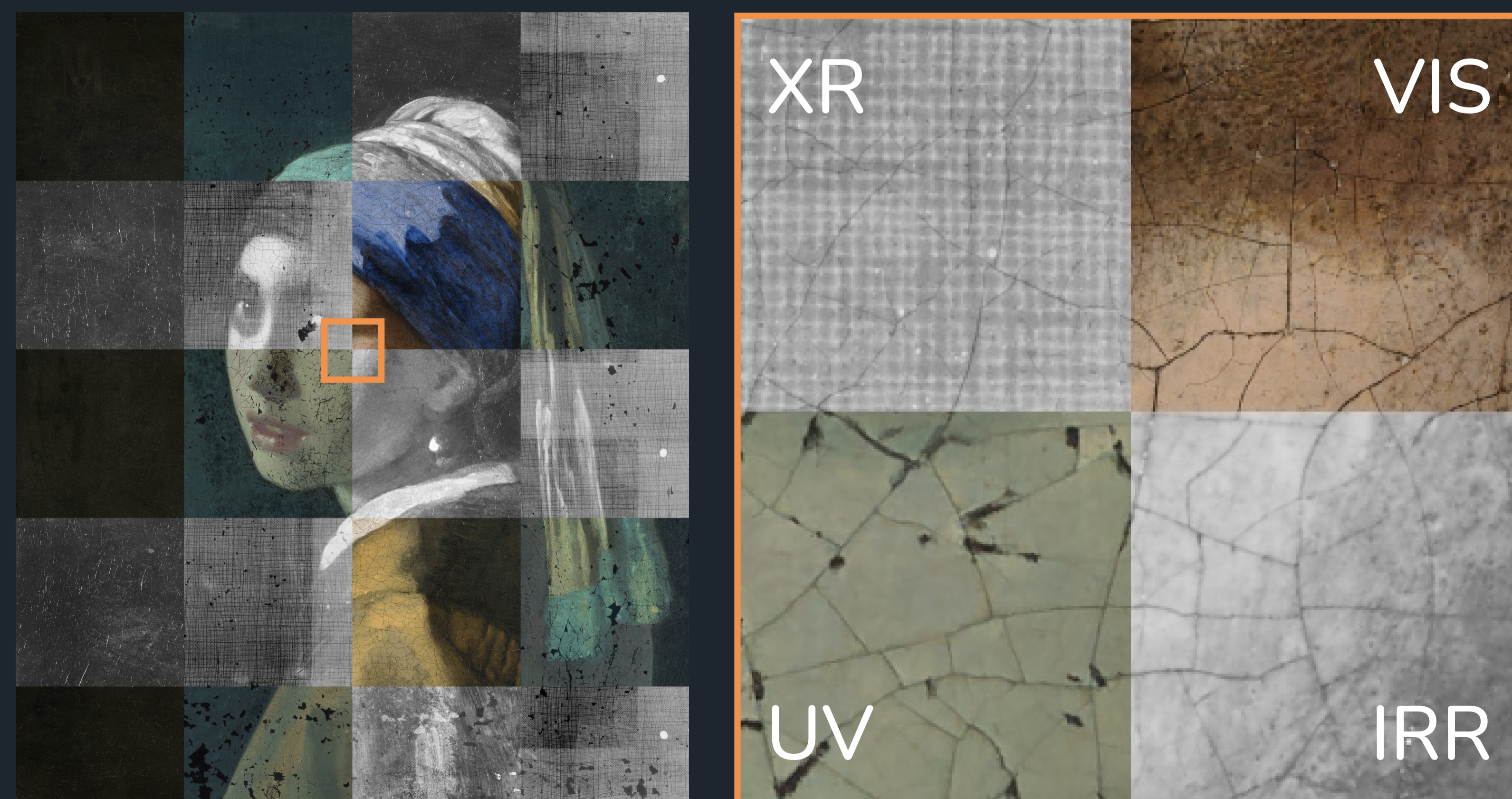
A New Baseline for Feature Description on Multimodal Scans of Paintings

1. Background

- **context** art conservators need to align multimodal painting scans to precisely cross-reference paint regions
- **problem** manually aligning is inhibitive time-consuming, however classical feature-based image registration algorithms achieve low performance on multimodal painting scans [1, 2]
- **objective** investigate registration performance improvement when using more recent feature descriptors

2. Dataset

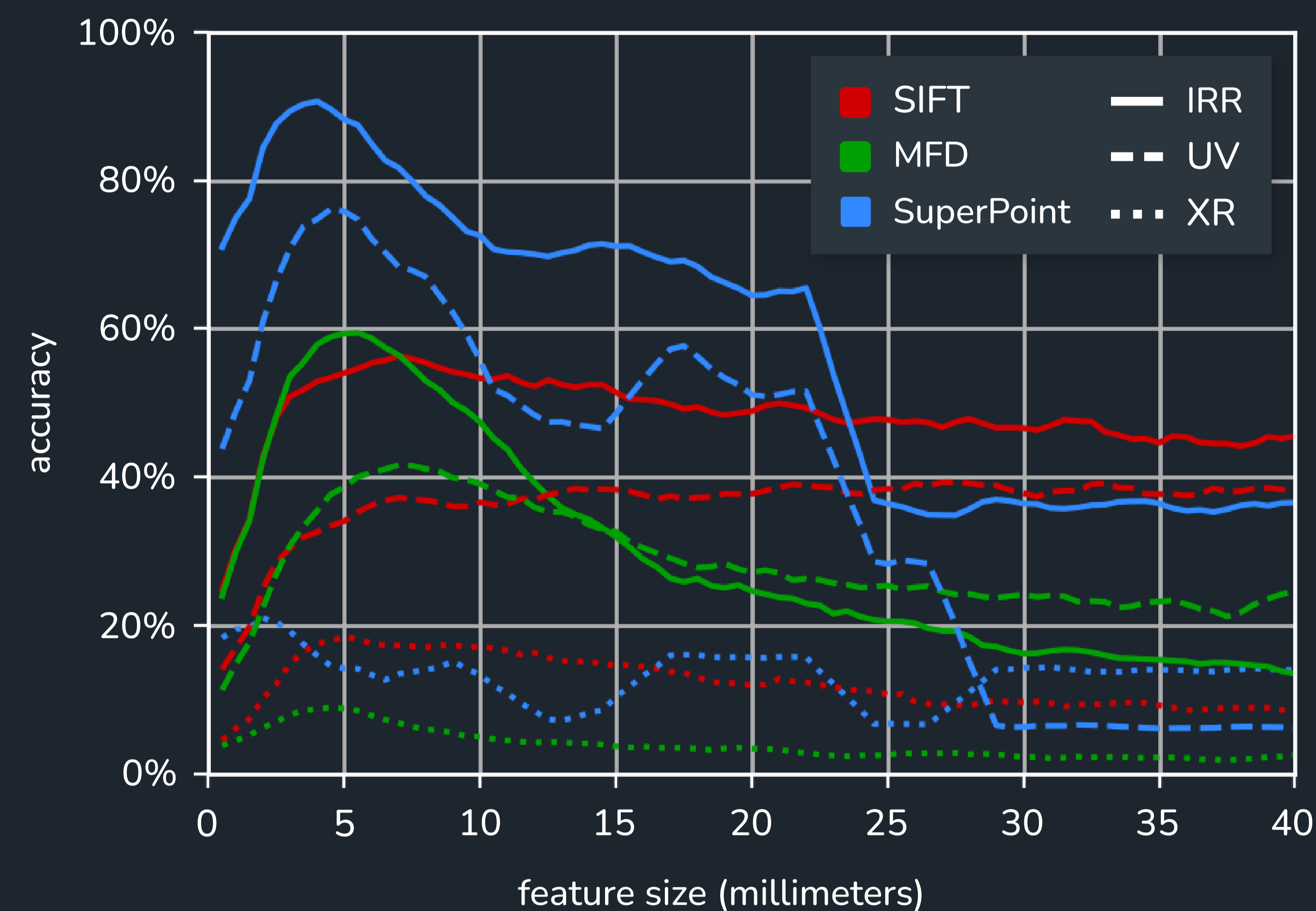
- manually created pixel-precise registered ground truth of three different modalities: **IRR** infrared **UV** ultraviolet **XR** x-ray
- generated craquelure segmented masks with crack segmentation network



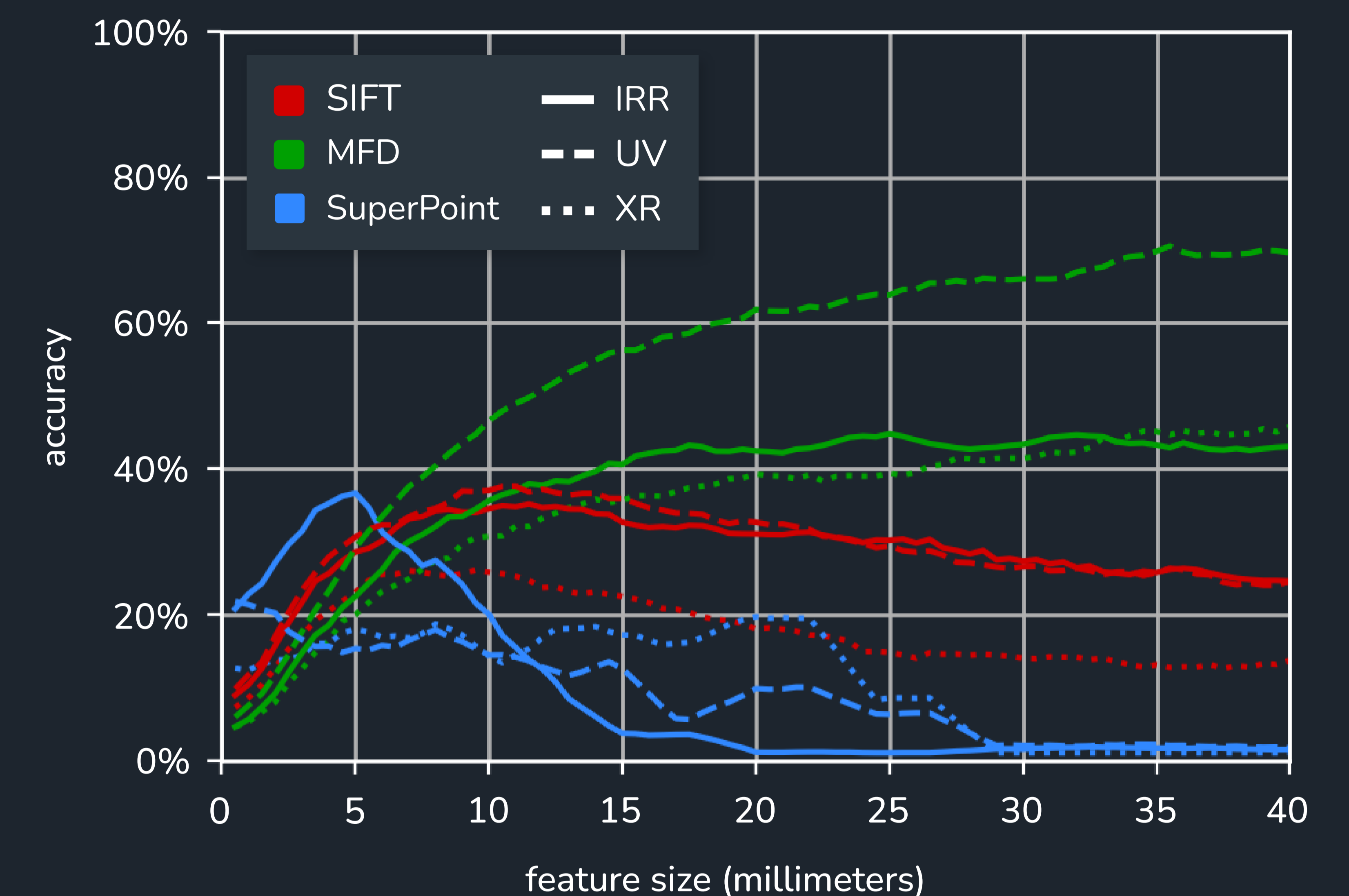
3. Experiments

- baseline: classical **SIFT**, more recent: multimodal **MFD** and learned **SuperPoint**
- description matching accuracy over feature size range of 0 to 40 millimeters

I. Original Scans



II. Segmented Scans



- low performance on XR by all descriptors
- **SuperPoint** achieves 40% accuracy improvement over **SIFT** for IRR and UV

- **SuperPoint** performance degrades
- **MFD** achieves 45% accuracy on XR, twice as high as best accuracy on original scans

4. Conclusion

- **SuperPoint** starkly increases description matching accuracy by 40% for modalities with little modality-specific artefacts
- For modalities with many modality-specific artefacts, using **MFD** on craquelure segmented scans significantly improves matching performance

5. References

- [1] A. Zacharopoulos et al., "A method for the registration of spectral images of paintings and its evaluation", in Journal of Cultural Heritage 29 (2017)
- [2] A. Mirhashemi, "Configuration and Registration of Multi-Camera Spectral Image Database of Icon Paintings", in Computation 7 (2019)

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