

SYNCHRONIZATION OF SLIDES WITH A VIDEO RECORD-ING OF A LECTURE

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1. Automatic slide annotation

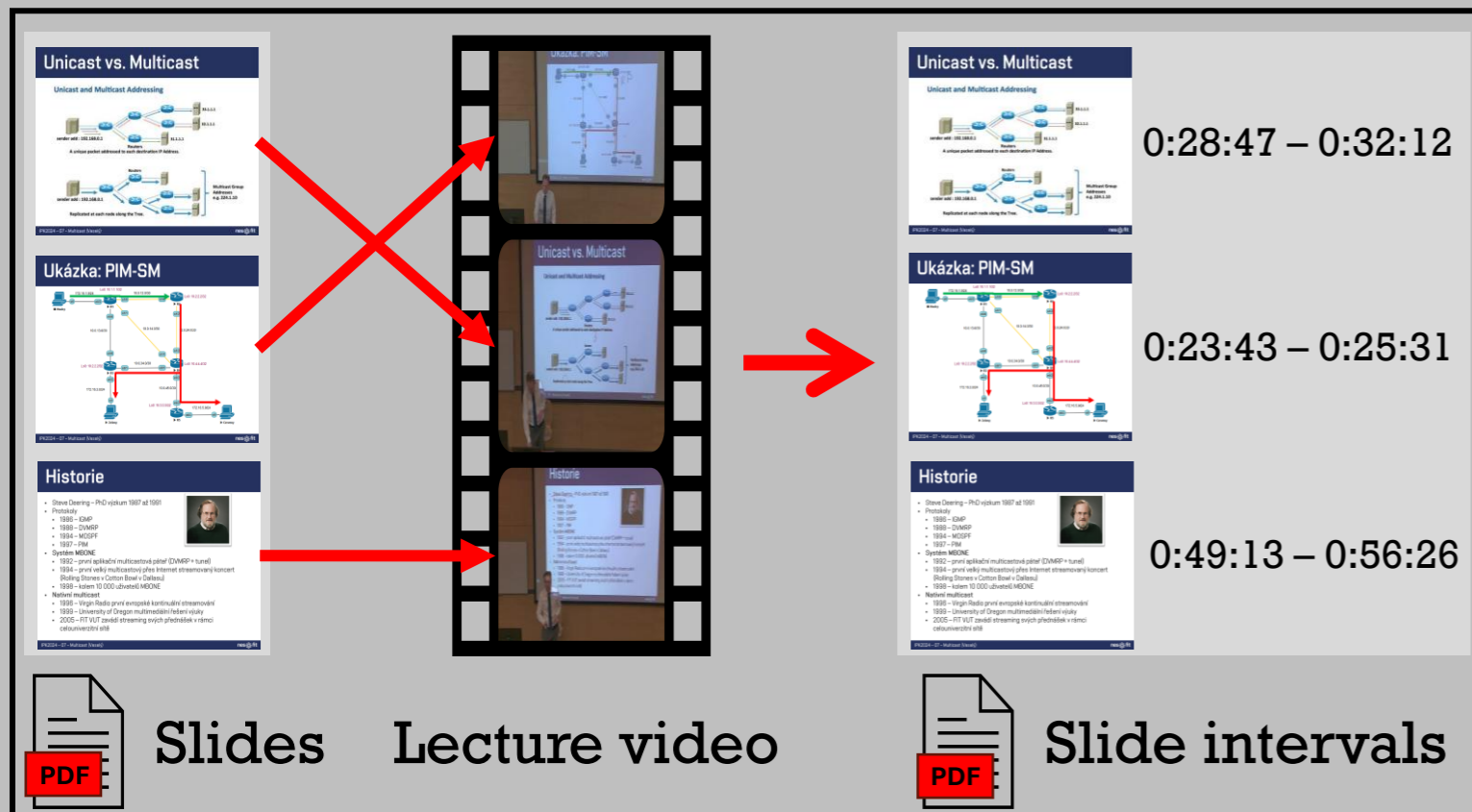


Fig. 1

Video frames are matched to slides in presentation and video intervals are stored in PDF file

2. Slide-frame matching

1. Feature matching

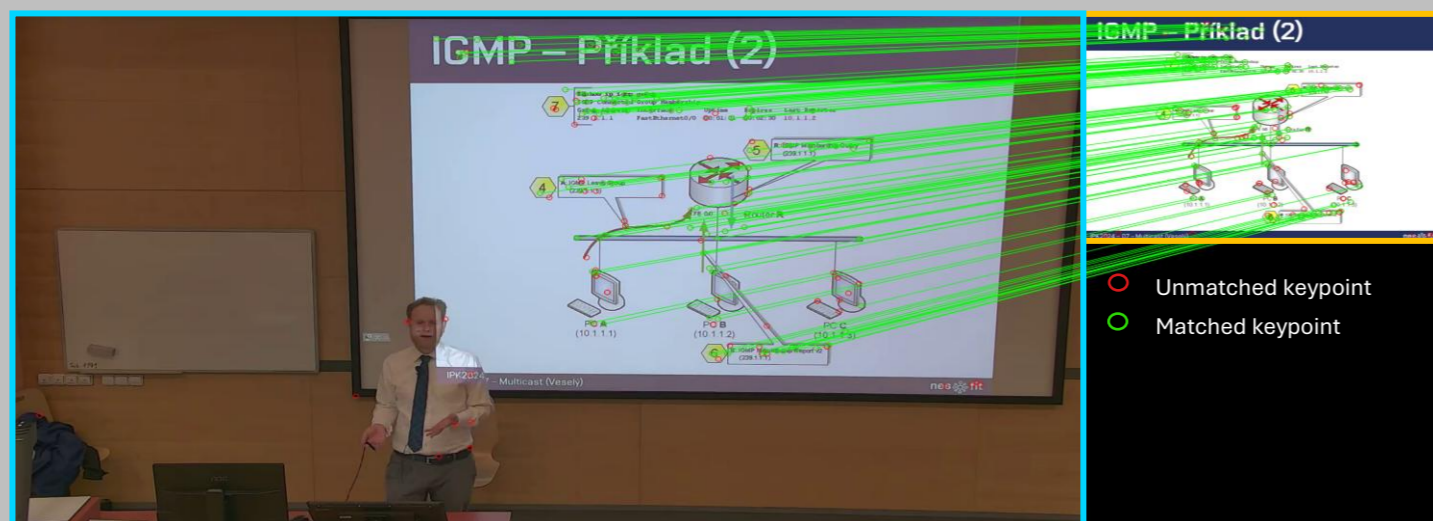


Fig. 2

2. Homography transformation and verification

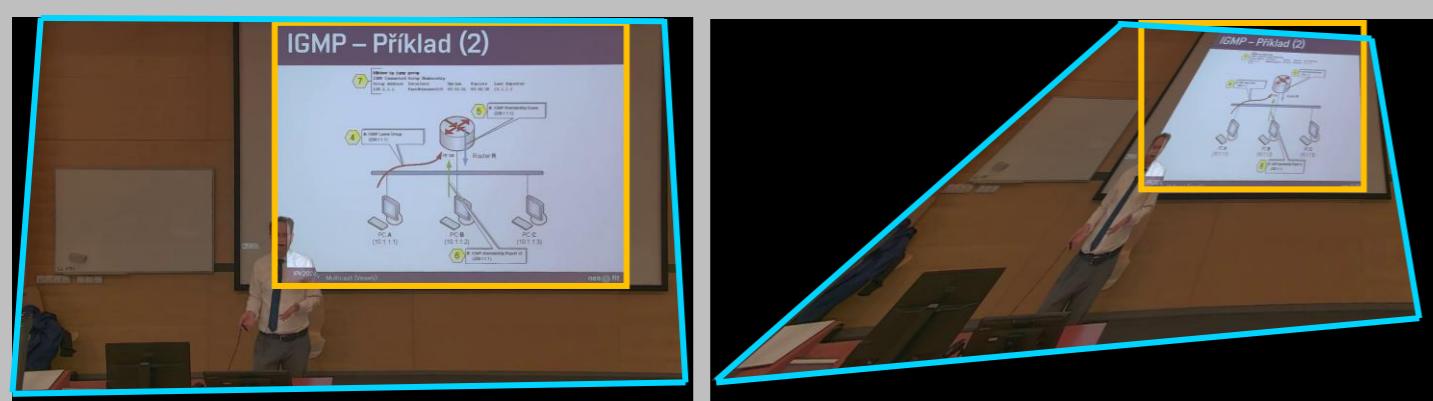


Fig. 3a

Fig. 3b

3. Second feature matching and Cosine Similarity evaluation

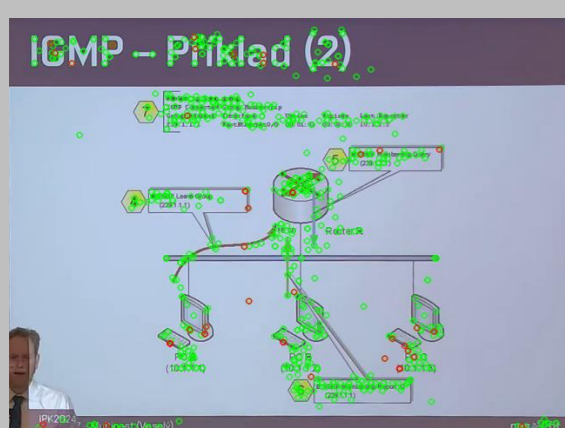


Fig. 4a

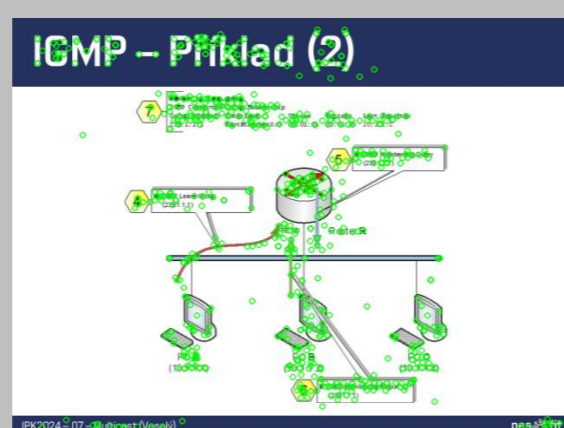


Fig. 4b

1. Scale Invariant Feature Transform (SIFT) features are detected and matched. Homography transformation is estimated with RANSAC.
2. Homography is verified by testing if slide boundaries stay in frame after transformation.
3. SIFT features are calculated for the second time and compared using Cosine Similarity with slide features to find the best match

3. Test evaluation

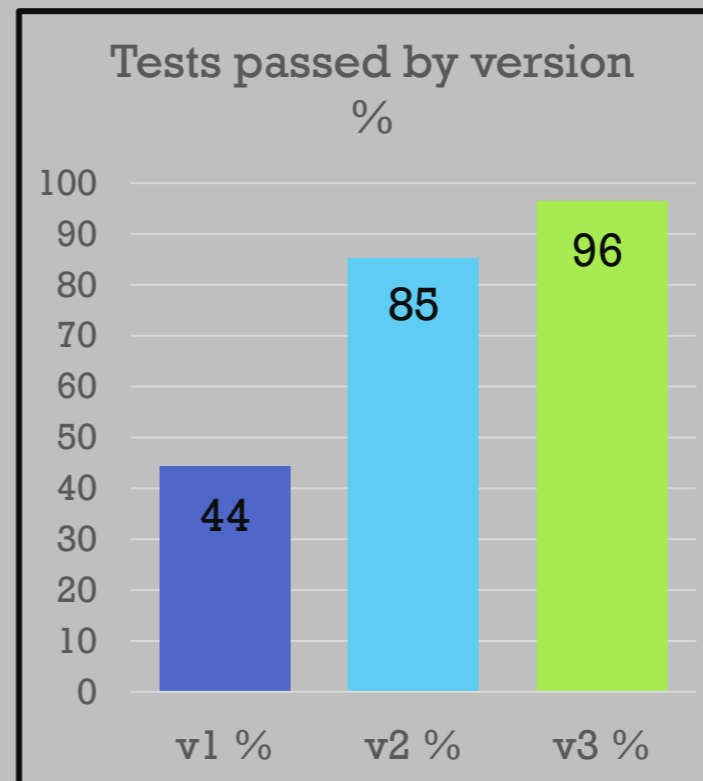


Chart 1

- Version 1
 - Feature matching
 - Naive scoring
- Version 2
 - Homography verification
 - TF-IDF weighting
 - Cosine Similarity
- Version 3
 - TF-IDF removed

4. Viewer application



Fig. 5

- Skip to relevant part of lecture
- Automatic slide scrolling to match video
- Easily sharable annotations stored in PDF file



<https://github.com/DanValnicek/slide-lecture-sync>