m17612: Estimation of temporally consistent depth maps using noise removal from video

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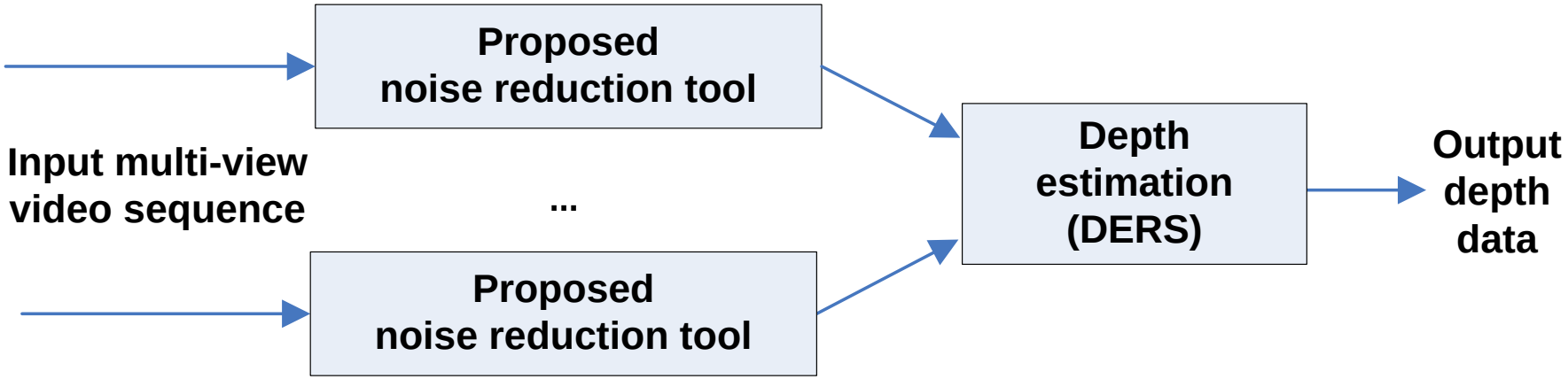
- A new tool for providing temporally consistent depth maps
- Temporal inconsistency results from noise
- Attack on noise suppreses temporal inconsistency

Idea of the proposal

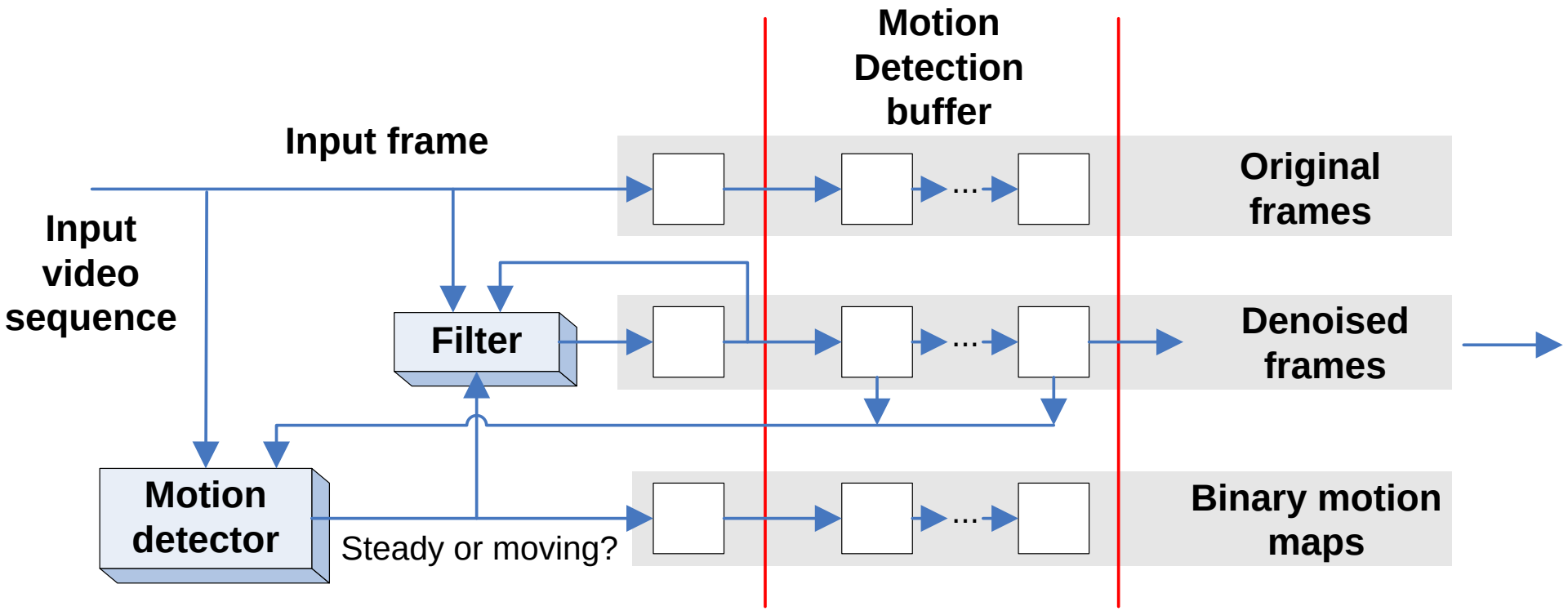
- Remove noise from input sequences independently
- Then estimate depth with any state-of-the-art technique



Noise reduction technique

- Some artifacts are allowed – results are not shown to the audience anyway
- Simple temporal noise reduction based on filtering
- Focus on steady fragments of the scene
  - Background
  - Stopping objects

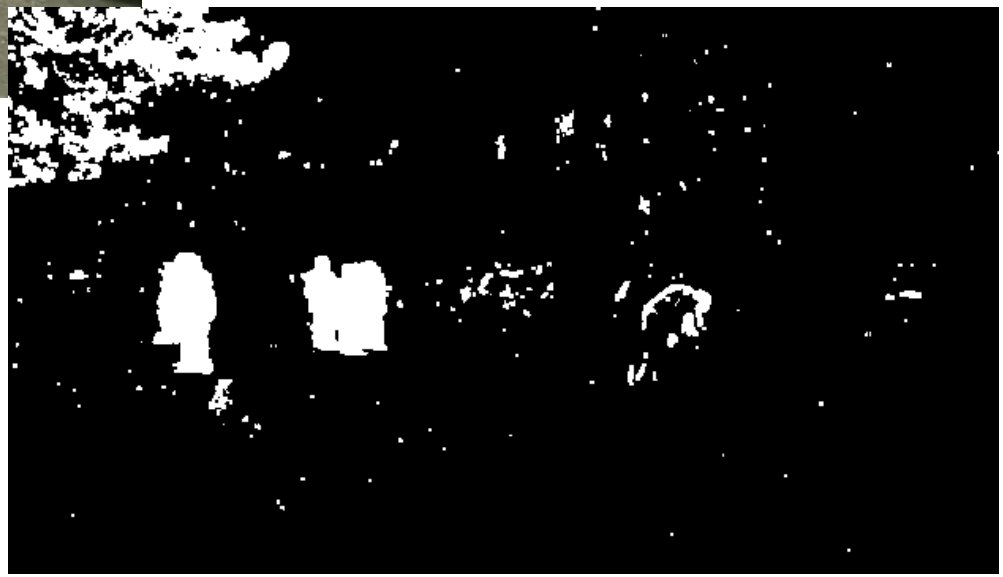
Scheme of the algorithm



Motion detector

- Classifies pixels from input frame as **moving** or as **steady**
- Outputs with **binary motion map**
- Consists of simple filtering
  - morphological
  - non-linear
  - 9x9 mask

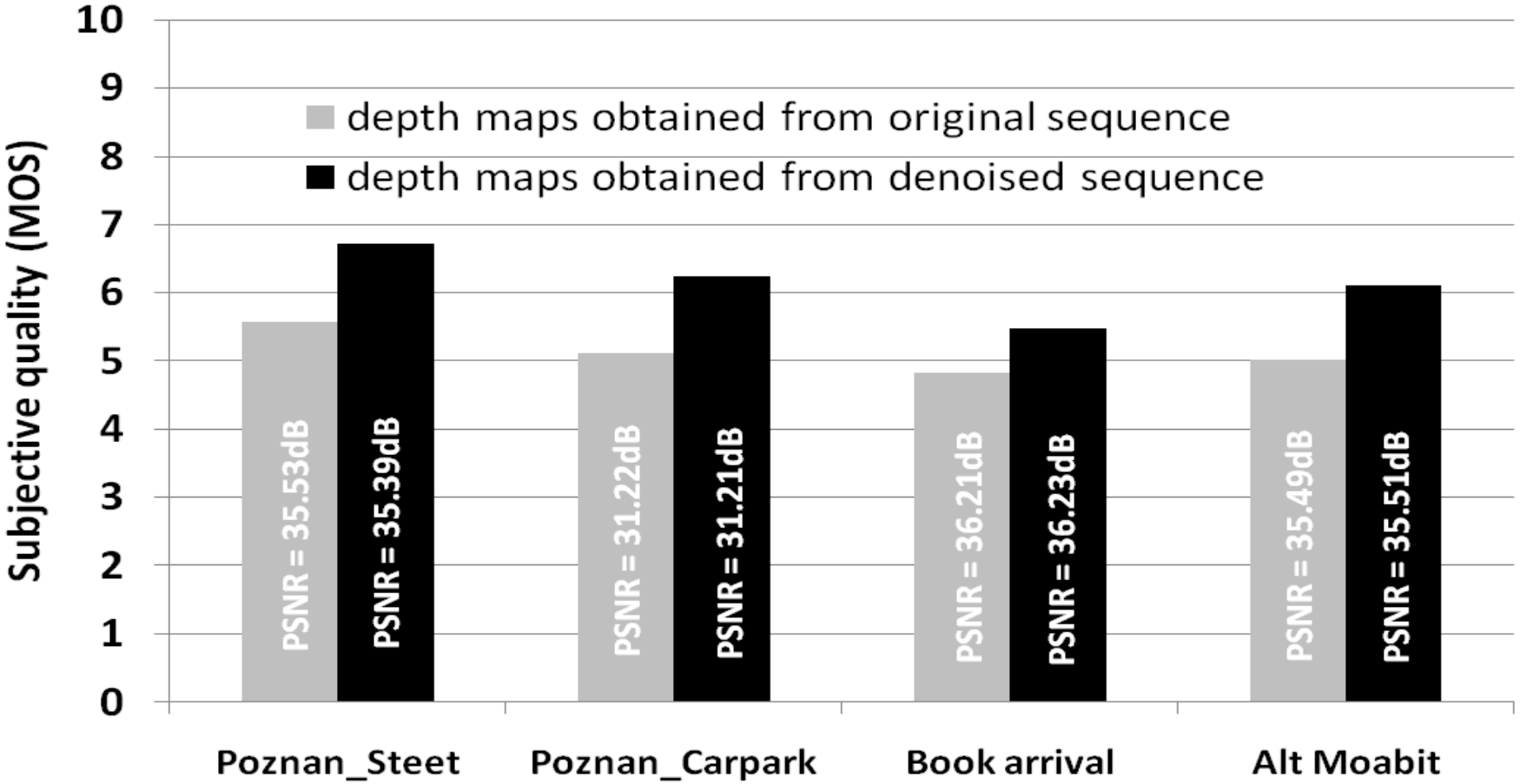
Motion map



Filtering

- Performs actual noise reduction
  - Short IIR (Infinite Impulse Response) filter
  - Almost linear phase
  - Computationally efficient
- Applied only on **steady** pixels
- **Moving** pixels are left unchanged

Experimental results




original
denoised
a)
b)
c)
d)

Conclusions

- A new tool aimed at providing temporally consistent depth maps.
- An alternative for Temporal Consistency in DERS (not exclusive!)
- The subjective gains are considerable, and range from about 0.7 to 1.2 in MOS (1-10) scale.

Recommendation

- To incorporate this new tool into DERS as an additional Temporal Consistency mode.

Thanks for your attention!

- Questions?