

Spatio-Temporal Visualisation of Reflections from Building Integrated Photovoltaics

Supplementary Material

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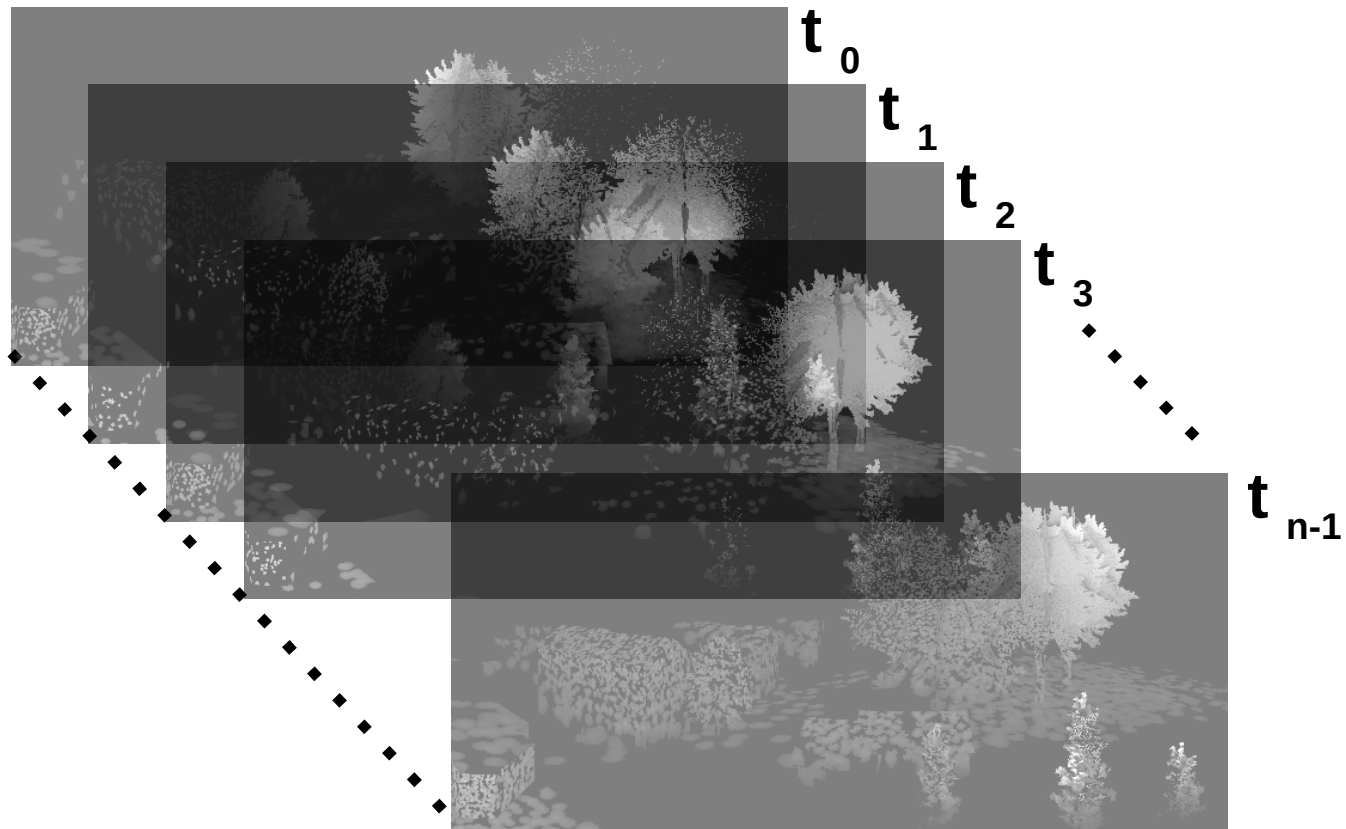
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CR Energie GmbH

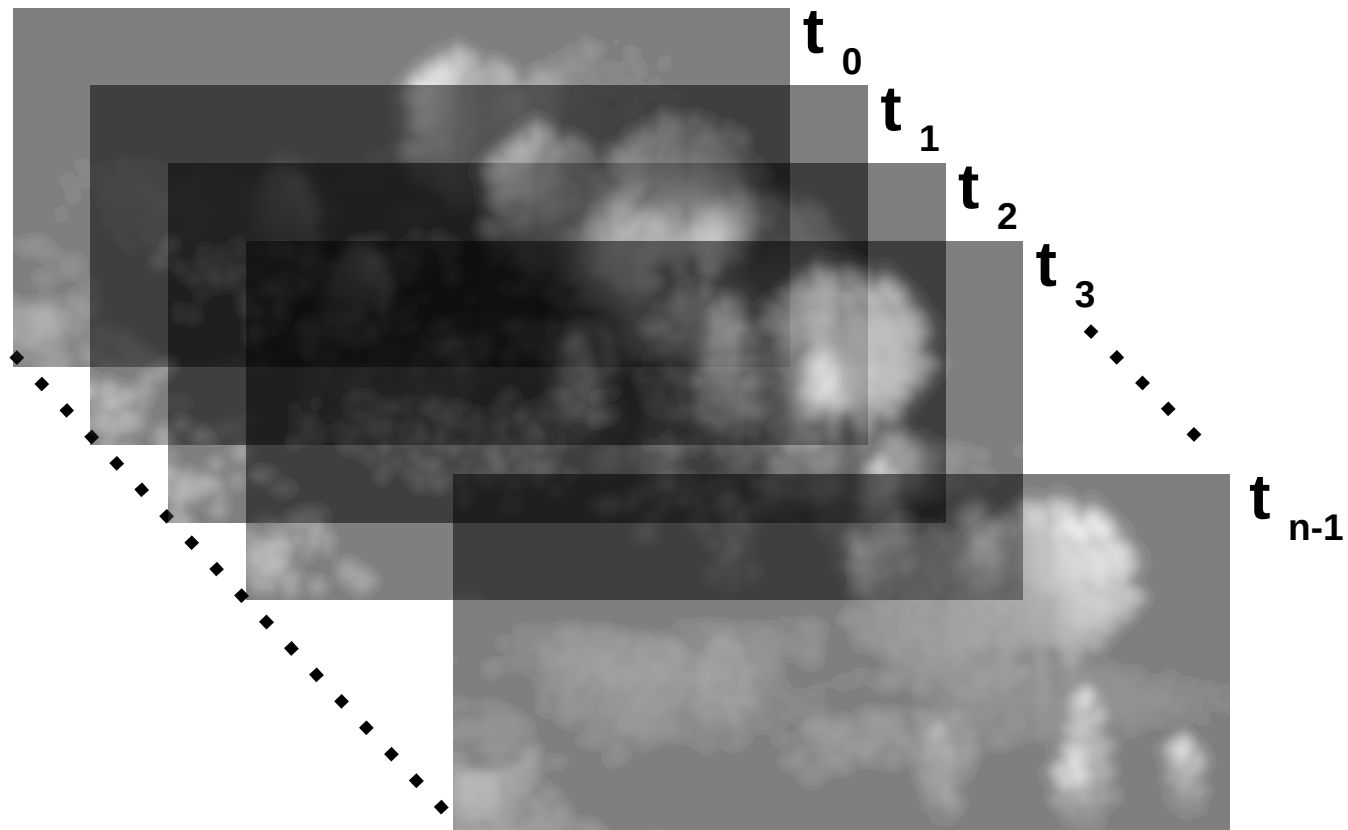
2018 International Radiance Workshop
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Spatio-Temporal Analysis 1: Irradiance Maps



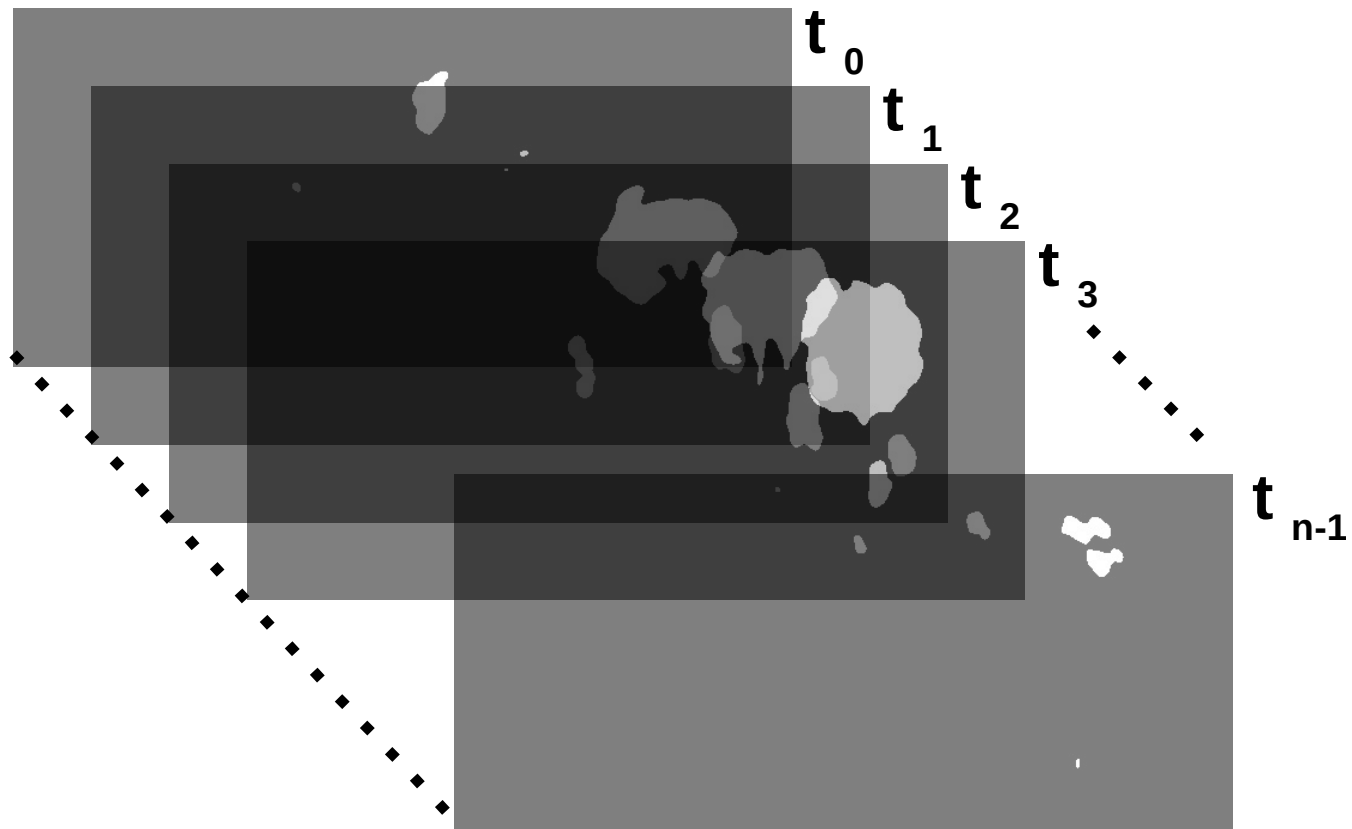
2D irradiance maps at times $t_0 \dots t_{n-1} \rightarrow$ 3D spatio-temporal volume

Spatio-Temporal Analysis 2: 3D Gaussian Filter



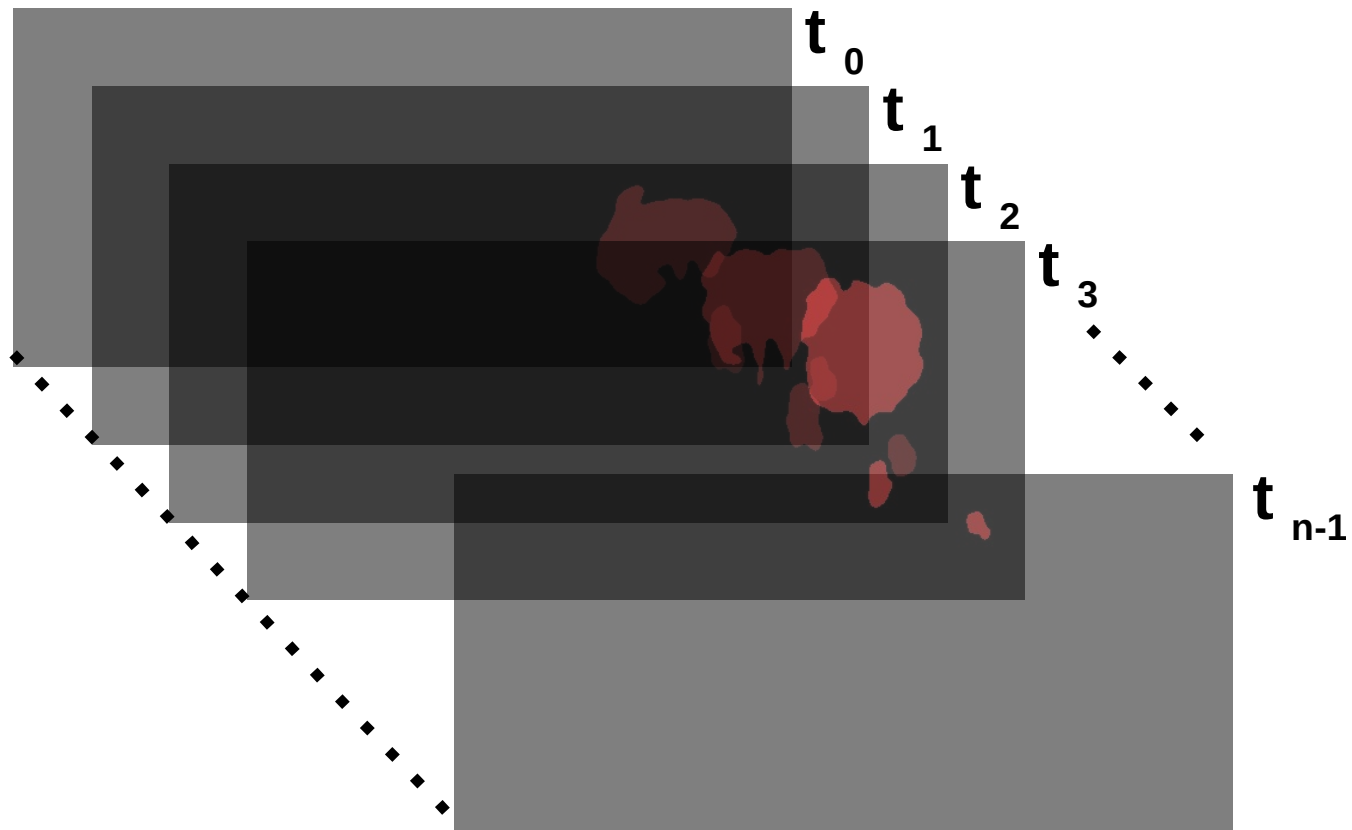
Removes noise, reduces temporal fluctuation during thresholding

Spatio-Temporal Analysis 3: Threshold Against τ_E



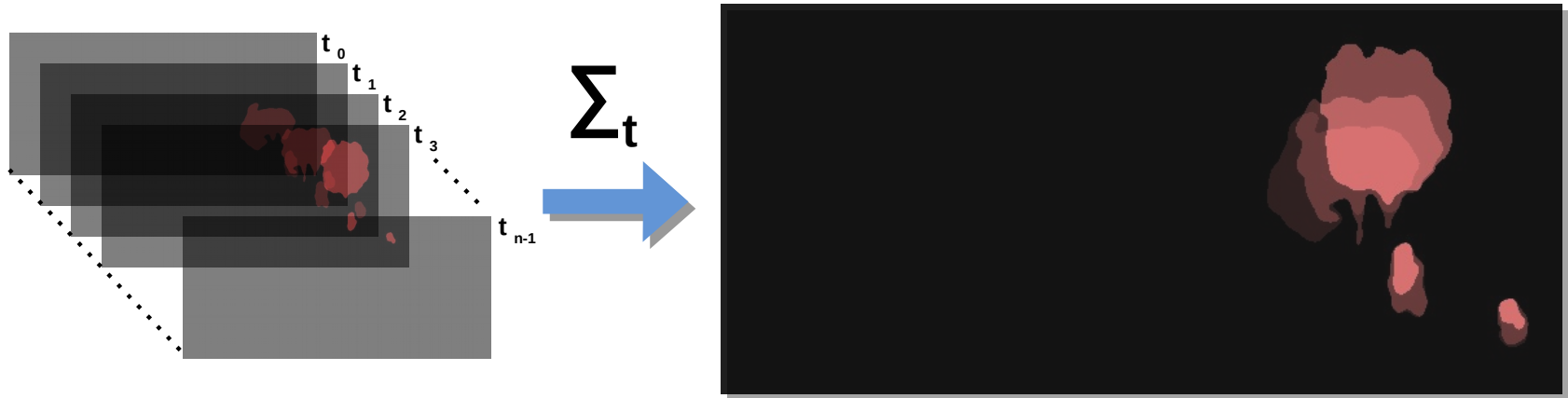
Binary pixel values: $<\tau_E \rightarrow$ black, $>\tau_E \rightarrow$ white

Spatio-Temporal Analysis 4: 3D Feature Labelling



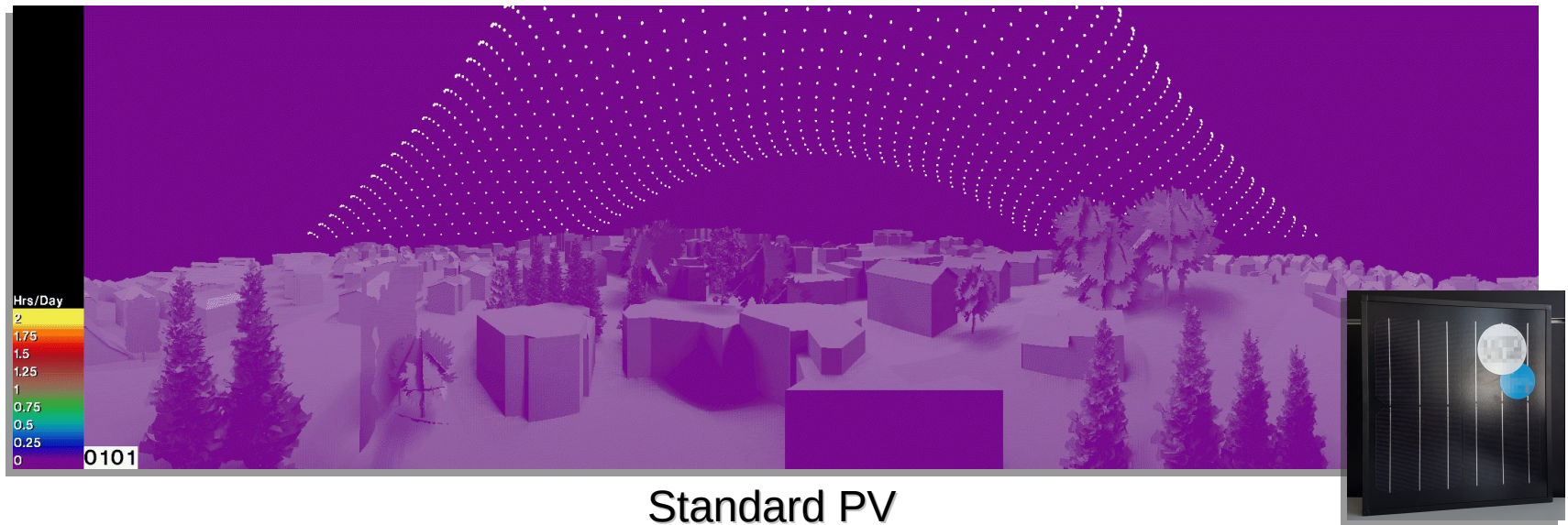
Nonzero values (labels) in contiguous pixels along spatial and temporal axes

Spatio-Temporal Analysis 5: Sum Nonzero, Reduce to 2D



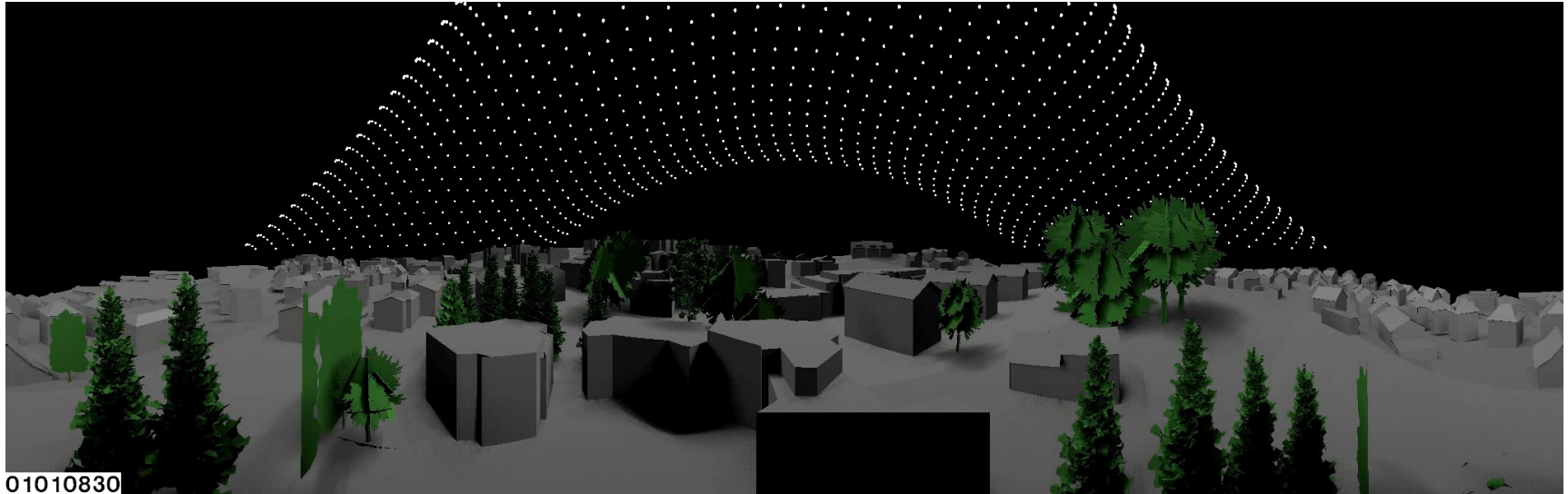
- Sum number of neighbouring nonzero pixels (labels) along temporal axis \rightarrow reduce to 2D image
- Accumulate maxima if features overlap \rightarrow multiple glare events in same region, e.g. from several PVs.
- Multiply by temporal increment (0.25h) to get sustained glare duration

Max. Daily Sustained Glare Duration ($\tau_E = 10 \text{ W/m}^2$)



- 0.25h increments / day
- 7-day increments / month
- 6 months / year

Video: Time-Series Irradiance Maps (Plan View)



Standard PV

- 0.25h increments / day
- 7-day increments / month
- 6 months / year

Thank you for your attention!

Our website: <http://www.hslu.ch/cc-ease>

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