



THE WEIZMANN INSTITUTE OF SCIENCE
FACULTY OF MATHEMATICS AND COMPUTER SCIENCE

Vision and Robotics Seminar

Room 1 ,Ziskind Building
on Wednesday, Dec 04, 2019
at 11:15

PLEASE NOTE THE UNUSUAL DAY AND TIME

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WIS

Across Scales & Across Dimensions: Temporal Super-Resolution using Deep Internal
Learning

Abstract:

When a very fast dynamic event is recorded with a low framerate camera, the resulting video suffers from severe motion blur (due to exposure time) and motion aliasing (due to low sampling rate in time). True Temporal Super-Resolution (TSR) is more than just Temporal-Interpolation (increasing framerate). It also recovers new high temporal frequencies beyond the temporal nyquist limit of the input video, thus resolving both motion-blur and motion-aliasing. In this work we propose a "Deep Internal Learning" approach for true TSR. We train a video-specific CNN on examples extracted directly from the low-framerate input video. Our method exploits the strong recurrence of small space-time patches inside a single video sequence, both within and across different spatio-temporal scales of the video. We further observe (for the first time) that small space-time patches recur also across-dimensions of the video sequence - i.e., by swapping the spatial and temporal dimensions. In particular, the higher spatial resolution of video frames provides strong examples as to how to increase the temporal resolution of that video. Such internal video-specific examples give rise to strong self-supervision, requiring no data but the input video itself. This results in Zero-Shot Temporal-SR of complex videos, which removes both motion blur and motion aliasing, outperforming previous supervised methods trained on external video datasets.

* Joint work with Shai Bagon, Eyal Naor, George Pisha, Michal Irani