



We are Signality, a sports and artificial intelligence startup at the forefront of sports technology. We are building an open AI platform that enables leagues, federations, and clubs to create value from the awesome data that is being created in real-time as the games are being played. Our production pipeline can process several 4K streams per game in real time using a legion of neural networks on GPUs in the cloud. We were voted on to Ny Teknik's list of the 33 most promising new tech companies in Sweden.

Synthetic data from Video Games

Data collection and annotation is both challenging and time consuming, and crucial to the success of deep learning models. Challenges include making accurate annotations (3D-pose), making correct annotations (events) and picking the data most effective for the target model. Using synthetic data to help solve these challenges is a hot research topic and using video games is one of the possible solutions. This thesis would entail generating data from video games and evaluating the generalization properties on real data.

[1] *Playing for Benchmarks*, [2] *Playing for Data: Ground Truth from Computer Games*

Game highlights

A game generates a lot of raw data which is difficult to consume. The data needs to be processed and presented in a condensed format that still shows all of the important information in detail. One way of doing this is to generate video highlights. This thesis would entail generating game video highlights using video, audio and/or tracking data as input.

[3] *Leveraging Contextual Cues for Generating Basketball Highlights*, [4] *Summarization of User-Generated Sports Video by Using Deep Action Recognition Features*, [5] *Unsupervised Extraction of Video Highlights Via Robust Recurrent Auto-encoders*

Automatic camera calibration

We have camera setups on many different arenas and the camera calibration is an important part to be able to run our pipeline successfully. Today we calibrate the cameras manually and this is time consuming. The cameras might also shift over time, which means that the work needs to be redone. This thesis would entail developing an autonomous calibration step that estimates the camera parameters (including distortion). This would remove the manual labor and ideally increase accuracy.

[6] *An Iterative Optimization Algorithm for Lens Distortion Correction Using Two-Parameter Models*, [7] *code for [6]*

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[1] <http://vladlen.info/papers/playing-for-benchmarks.pdf>

[2] <http://vladlen.info/papers/playing-for-data.pdf>

[3] <https://arxiv.org/pdf/1606.08955.pdf>

[4] <https://arxiv.org/pdf/1709.08421.pdf>

[5] <https://arxiv.org/pdf/1510.01442.pdf>

[6] https://www.ipol.im/pub/art/2016/130/article_lr.pdf

[7] <https://github.com/alicevision/LensDistortionFromLines?files=1>