

16833: DTAM: Paper Summary

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1 Summary

The DTAM algorithm uses dense whole image alignment to a dense model to track camera motion at frame rate, which benefits by predicting occlusions, and multi scale operation. Interleaved, given the images from the tracked camera poses, it updates and expands the model by making and refining dense textured depth maps. The texture mapped scene model is composed of depth maps built using bundles of frames by dense and sub-pixel accurate multi-view stereo reconstruction. The photometric information is gathered sequentially, in a discrete projective photometric cost volume in key frames, and incrementally solved for regularized depth maps using a novel non-convex optimization framework called iterative minimisation, including accelerated exact exhaustive search. The algorithm is parallelisable and can be run in real time using GPU hardware. A key assumption is brightness constancy in all stages of reconstruction, and therefore the algorithm is not robust to global illumination changes that can occur. [1]

References

- [1] Richard A Newcombe, Steven J Lovegrove, and Andrew J Davison. “DTAM: Dense tracking and mapping in real-time”. In: *2011 international conference on computer vision*. IEEE. 2011, pp. 2320–2327.