



**Hochschule
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Multi-View Stereo

Problem statement

- 3D view of object
- Reconstructing 3D geometry
- Image based 3D reconstruction algorithms to estimate most likely 3D shape from photographs
- Estimation of true 3D geometry is ill posed problem

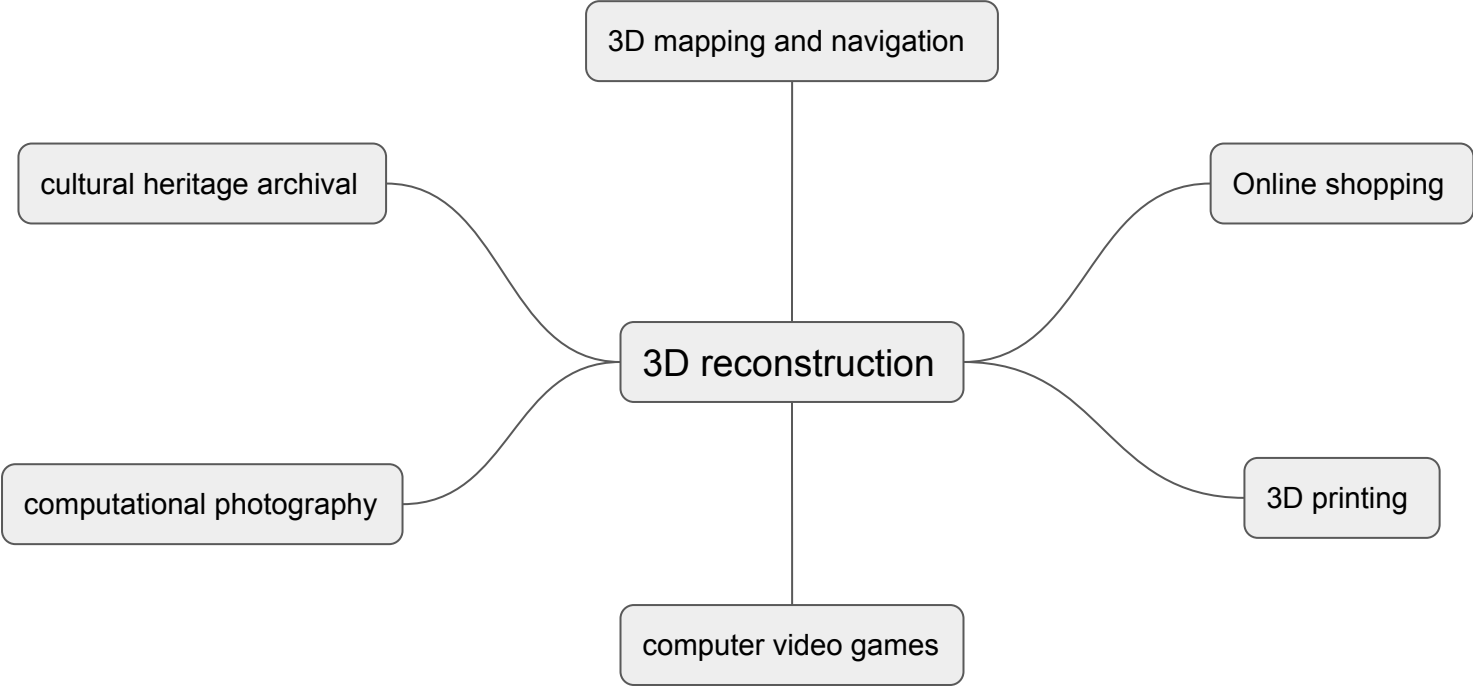


Fig 1. 3D reconstruction from multiple image and poses

Courtesy: <https://google.github.io/mediapipe/solutions/objectron.html>



Application areas



State of the art

- Classical approach
 - COLMAP
- Deep learning era
 - MVS temporal non parametric fusion
 - MVSNet
 - DeepMVS
 - MVDepthNet
 - DeepTAM
 - DPSNet

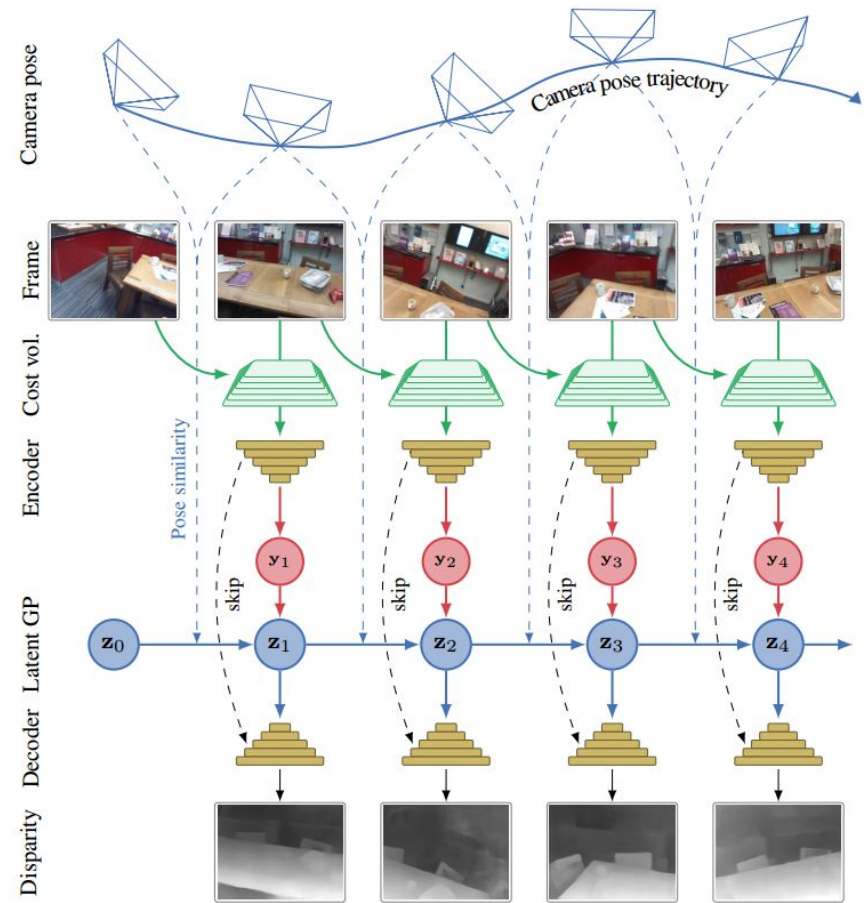


Fig 2. MVS depth estimation architecture

Courtesy: Multi-View Stereo by Temporal Nonparametric Fusion, Yuxin Hou, Juho Kannala, Arno Solin, Department of Computer Science, Aalto University, Finland, firstname.lastname@aalto.fi



Research questions

- RQ1 : Robustness MVS approaches
- RQ2 : Functionality testing using different cost volume, gaussian process
- RQ3 : Cross application of MVS approach

Things to do

- Noise injection into the data to predict the model performance
- Replacement for the gaussian process
- Research on extension of depth estimation architecture to segmentation
- Introduction of confidence measure to penalize wrong predictions
- Performance analysis with different cost volume computation
- Experiments to find the parameter that the model fails such as textured image, high contrast image and suggest a solution
- Experiment with different dataset
- Research on robustness of the model

Development

- Original paper deployed the depth estimation in the iOS device
- Deploy the code in the android device



Milestones

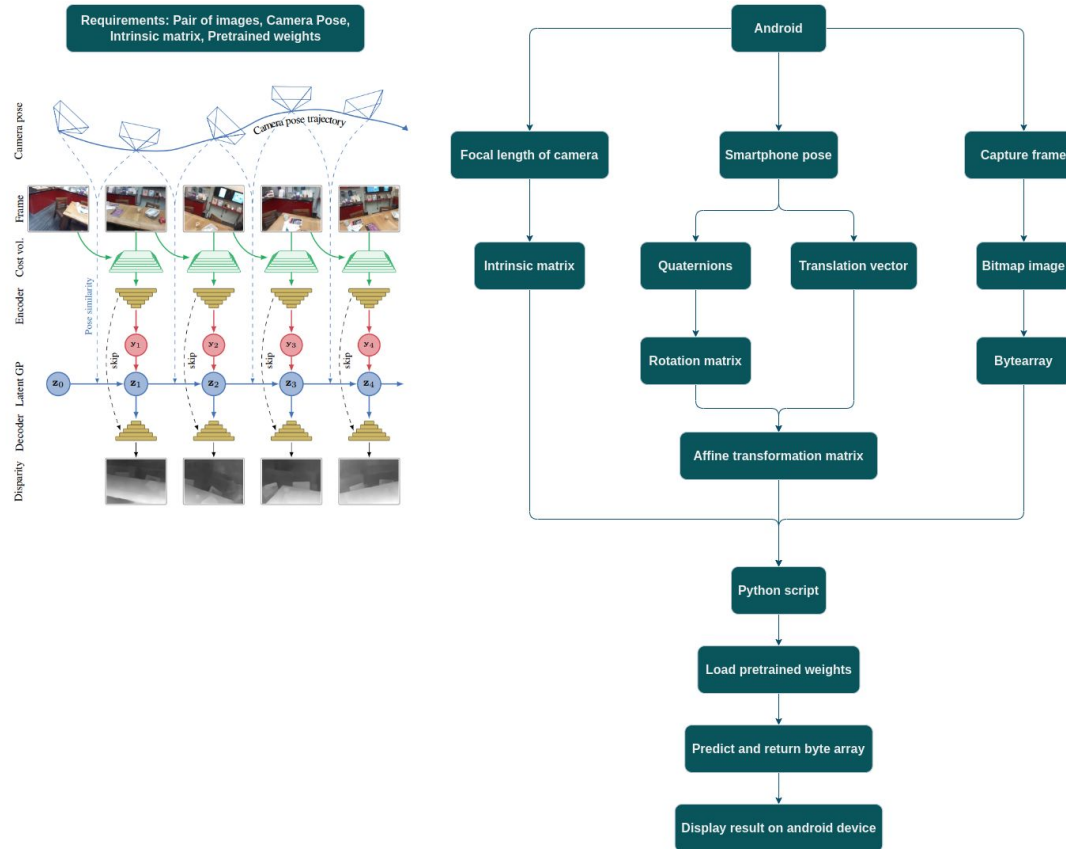
- M1** Literature search
- M2** Data collection and preprocessing
- M3** Building a baseline
- M4** Functionality testing
- M5** Robustness MVS approaches
- M6** Experimental Analysis
- M7** Development
- M8** Report submission



Current status

- Deployment of pretrained model on the android device
- Literature work
- Collections of dataset
- Baseline creation

Android deployment pipeline



Demo

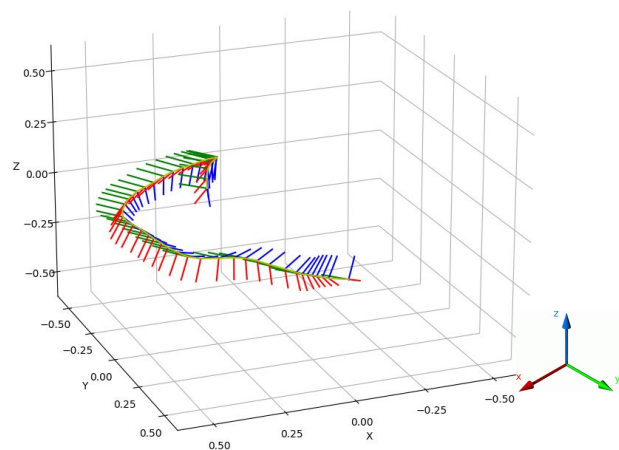


Fig 4. Translation of smartphone in the 3D world with orientation



Fig 5. Demo implementation on the android device (Oneplus 7, GM1901, Snapdragon 855, 6GB RAM)



Thank you!!

