3D Image Reconstruction UML Diagrams

Activity Diagram – Image Processing for Model Creation

Sufficient Matches

Image Clusters

Depth by Structure from Motion

SIFT Image Matching

Input Images

Corresponding Points

Unified Depth Map

Model Presentation

Render Model

Architecture – Pipeline Processing with Model-View-Controller for User Interface

Image Verification

Camera Registration

Calibration

SFM

Clustering

Image Matching

Inserts Additional Images

View Updates

View Updates

User Input

User Input Edits Model

Controller request Model state data

Bundle Adjustment

View

Controller

Model

State Machine Diagram

ImageList is not empty

FileNotFound UnrecognizedFile

Insert Images CMD

Save CMD

Save Model

Encode and Save Model to Memory

FileError

Display Error

ProcessError

Display Error

Model Loaded

Show Model Space, Model and UI Elements

Processing

Process Images

Load Image

Load Image From Source

Load Model

Load Model From Saved File

Start-Up

Show Blank Model-Space and UI Elements

New Model

Verify all images can be accessed

NumImages = 0

Register Camera CMD

Calibrate Camera

Calc. camera intrinsic matrix from images

Register Camera

Verify that all images in set have chessboard pattern

Save Camera

Save Camera data with user set nickname

State Diagram – Processing

All images included in model

Unincluded images remain

Otherwise

Checkpoint or high reprojection error found

Processing

Triangulate

Triangulate 3D positions of keypoints

Determine Image Pair

Find best pair to expand model

Image Matching

Find Corresponding points in images and create adjacency matrix

Bundle Adjustment

Find And Minimize Reprojection Errors

Model Loaded

Rendering

Render Model based on Connected Depth Map

Load Images From Model loaded

Load Images from New Model