

Graded Assignment 2: Stereo Vision and Armadillo

Marking scheme [out of 100 marks]

Disclaimer: The following table presents a **high-level summary** of content expected in each question to clarify the point breakdown but it is **no substitute** for the full task description in the jupyter notebook of this assignment. Please read carefully the instructions in the notebook and ask any questions you may have on the Q&A forum.

Criterion ID	Points	What you need to achieve:
Q1: Data loading and visualisation	5	Correctly implement loading from file of camera calibration and input images. Side-by-side visualisation of input images.
Q2: Understanding the ply format for mesh representation	10	A technically sound explanation of the ply mesh format (with any supporting diagrams). The quality of the answer presentation in the notebook will be taken into account. A snapshot of the mesh from a suitable 3D viewer, ideally with visualised mesh attributes (e.g. vertices and faces).
Q3: 3D point projection onto images (with basic occlusion handling)	15	Correctly implement a function to project an evenly spatially distributed subset of un-occluded points of the 3D model using the provided camera calibration. Produce and submit a point cloud of 3D points selected for projection (as a ply file) and a visualisation of their 2D projections onto one of the camera images generated using the implemented function.
Q4: Feature Detection and Matching in Stereo Reconstruction (part a)	15	A technically sound explanation (in words with any supporting maths) of the implemented method for stable feature point detection and matching in the stereo image pair provided. Include both theoretical background and key implementational detail (e.g., parameters). The quality of the answer presentation in the notebook will be taken into account.
Q4: Feature Detection and Matching in Stereo Reconstruction (part b)	15	Correctly implement the method described in 4a for stable feature detection and matching. The code should generate a suitable visualisation of found feature matches to demonstrate that your solution works. Finally, implement and visualise feature match ranking by quality as part of your solution.
Q5: Triangulation for 3D point stereo reconstruction	20	A technically sound explanation (in words with any supporting mathematical derivations) of the triangulation approach. Written performance analysis and discussion of

(part a)		your entire feature-based stereo reconstruction pipeline. The quality of the answer presentation in the notebook will be taken into account.
Q5: Triangulation for 3D point stereo reconstruction (part b)	20	Correctly implement the described triangulation method for 3D point reconstruction. Validate using the test point pair provided. Submission of the performance validation outputs as evidence that your 3D point reconstruction pipeline works correctly. The 3D point cloud and reprojections of the triangulated points into both images should be submitted as a minimum for validation.