Revisiting Rotation Averaging: Uncertainties and Robust Losses
Supplementary Material

	Soft L_1			MAGSAC		
	Baseline	+ Inliers	+ Covariance	Baseline	+ Inliers	+ Covariance
Ellis Island	68.2	70.0	67.1	73.8	**76.4**	<u>76.3</u>
Gendarmenmarkt	8.9	7.0	6.1	49.6	<u>54.0</u>	**54.2**
Montreal Notre Dame	77.2	76.4	74.0	<u>79.3</u>	78.6	**79.3**
Notre Dame	77.5	**80.2**	73.9	<u>80.1</u>	78.7	79.5
NYC Library	59.0	61.7	60.6	63.7	**68.6**	<u>65.4</u>
Piazza del Popolo	60.2	59.3	<u>62.1</u>	60.3	**62.2**	60.7
Roman Forum	57.7	50.8	60.3	62.5	<u>65.5</u>	**70.2**
Tower of London	48.8	49.4	<u>66.8</u>	51.9	57.8	**67.2**
Union Square	27.2	24.6	31.3	28.0	**38.0**	<u>35.0</u>
Yorkminster	63.3	64.0	<u>64.5</u>	62.3	64.1	**67.1**
Vienna Cathedral	**67.1**	<u>66.8</u>	60.6	62.9	46.8	66.7
Piccadilly	33.2	33.6	30.6	46.7	<u>50.0</u>	**51.6**
Alamo	63.3	65.4	62.4	<u>65.4</u>	65.4	**66.8**
facade	68.1	69.9	75.3	<u>81.4</u>	69.9	**83.2**
kicker	78.7	78.7	<u>78.8</u>	78.7	78.7	**79.0**
playground	82.6	<u>90.0</u>	79.6	84.4	89.4	**90.7**
meadow	15.2	15.8	15.5	15.2	<u>15.8</u>	**17.7**
courtyard	60.3	48.6	56.1	**84.3**	81.5	<u>81.7</u>
Average	56.5	56.2	57.0	62.8	<u>63.4</u>	**66.2**

Table 1. The Area Under the recall Curve (AUC) at $5°$ of estimated rotations after rotation averaging for different scenes in 1DSfM [5] dataset and ETH3D [4] dataset by [3] (Baseline) with different losses (Soft L_1 [2] and MAGSAC [1]) and weighting strategies: by the number of inliers (+ Inliers), by the proposed covariance (+ Covariance).

In Tab. 1, the Area Under the recall Curve (AUC) at $5°$ is reported on the scenes of both the 1DSfM dataset and the ETH3D dataset. On average, using the proposed uncertainties leads to the highest AUC score with both robust losses. Compared to the original Theia code (*i.e.*, Baseline with Soft L_1), the proposed algorithm leads to a more than 10 points increase in the AUC score.

References

[1] Daniel Barath, Jana Noskova, and Jiri Matas. Marginalizing sample consensus. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 2021.

[2] Pierre Charbonnier, Laure Blanc-Féraud, Gilles Aubert, and Michel Barlaud. Deterministic edge-preserving regularization in computed imaging. *IEEE Transactions on image processing*, 6(2):298–311, 1997.

[3] Avishek Chatterjee and Venu Madhav Govindu. Efficient and robust large-scale rotation averaging. In *ICCV*, 2013.

[4] Thomas Schops, Johannes L Schonberger, Silvano Galliani, Torsten Sattler, Konrad Schindler, Marc Pollefeys, and Andreas Geiger. A multi-view stereo benchmark with high-resolution images and multi-camera videos. In *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition*, pages 3260–3269, 2017.

[5] K. Wilson and N. Snavely. Robust Global Translations with 1DSfM. In *ECCV*, pages 61–75, 2014.