

# Normalization of Linear Array Scanner Scenes Using the Modified Parallel Projection Model

Michel MORGAN, Soo JEONG, Kyung-Ok KIM and Ayman HABIB, Canada

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## SUMMARY

Epipolar resampling aims at generating normalized images where conjugate points are located along the same row. Such a characteristic makes normalized imagery important for many applications such as automatic image matching, DEM and ortho-photo generation, and stereo-viewing. Traditionally, the input media for the normalization process are digital images captured by frame cameras. These images could be either derived by scanning analog photographs or directly captured by digital cameras. Current digital frame cameras are incapable of providing imagery with ground resolution and coverage comparable with those of analog ones. Linear array scanners are emerging as a viable substitute to two-dimensional digital frame cameras. However, linear array scanners have more complex imaging geometry than that of frame cameras. In general, the imaging geometry of linear array scanners produces non-straight epipolar lines. Moreover, epipolar resampling of captured scenes according to the rigorous model, which faithfully describes the imaging process, requires the knowledge of the internal and external sensor characteristics as well as a Digital Elevation Model (DEM) of the object space. Recently, parallel projection has emerged as an alternative model approximating the imaging geometry of high altitude scanners with narrow angular field of view. In contrast to the rigorous model, the parallel projection model does not require the internal or the external characteristics of the imaging system and produces straight epipolar lines. In this paper, the parallel projection equations are modified for better modeling of linear array scanners. The modified parallel projection model is then used to resample linear array scanner scenes according to epipolar geometry. The proposed methodology requires a minimum of five ground control points and does not require the availability of DEM. Experimental results using IKONOS data demonstrate the feasibility of the proposed methodology.