Public Abstract

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Title:CONFOCAL MICROSCOPY IMAGING ANALYSIS OF PLANT MORPHODYNAMICS

Pollen tubes are delivery mechanisms in a plant's reproductive cycle. Morphodynamic analysis of these microscopic structures provide biologists with insight into the inner workings of these structures. This thesis presents three methods of computer-aided analysis of two-dimensional slices of a pollen tube in medium. First, visual comparison of these plant structures can be simplified by straightening and reorienting the pollen tube. The pollen tube must be identified and extracted from its original image. Key features may then be identified and an abstracted version of the image may be generated. Next, motion analysis may be performed on the structures within the pollen tube. Six methods of point feature detection algorithms are discussed. Correspondence tracking is used to track features from frame to frame. Average optical flow identifies general motion within the pollen tube. The results of point feature tracking and optical flow are compared on two data sets, each marking different organelles within the pollen tube, in order to learn more about the nature of the internal structures in the pollen tube.