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**Multilevel Space-Time Aggregation for Cell Microscopy  
Segmentation and Tracking**

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A multilevel aggregation method is applied to the problem of segmenting live cell bright field microscope images. The method employed is a variant of the so-called Segmentation by Weighted Aggregation technique, which itself is based on Algebraic Multigrid methods. The variant of the method used is described, and it is explained how it is tailored to the application at hand. In particular, a new scale-invariant saliency measure is proposed for deciding when aggregates of pixels constitute salient segments that should not be grouped further.

It is shown how segmentation based on multilevel intensity similarity alone does not lead to satisfactory results for bright field cells. However, as expected, the addition of multilevel intensity variance (as a measure of texture) to the feature vector of each aggregate leads to improved cell segmentation.

Preliminary results are presented for applying the multilevel aggregation algorithm in space-time to temporal sequences of microscope images, with the goal of obtaining space-time segments (object tunnels) that track individual cells.

Application of the algorithm to segmentation and road finding for satellite images is also briefly discussed.