[Bea1985]

Selection of Segment Similarity Measures for Hierarchical Picture Segmentation

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Abstract: The problem of defining appropriate segment similarity measures for picture segmentation is exmained. In agglomerative hierqarchical segmentation, two segments are coamapared and merged if found similar. The propesed Hierarchical Step-Wise Optimization (HSWO) algorithm finds and then merges the two most similar segements, on a step-by-step basis. By considering picture segmentation as a piece-wise picture approximation problem, the similarity measure (or the step-wise criterion) is related to the overall approximation error. The measure then corresponds to the increase of the approximation error resulting from merging two segments. Similarity measures derived from constant approximations (zeroth order polynomials) and planar approximations (first order polynomials). An adaptive measurebased upon local variance is also used. The advantages of combining similarity measures (or cirteria) are also stressed. Different picture areas can require different measures which must therefore be combined in order to obtain good overall results. Moreover, in hierarchical segmentation, simple measures can be used for the first merging steps, while, at a higher level of the segment hierarchy, more complex measures can be employed.

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See also [Bea1985b].