

Tien, F.-C.; Tsai, C.-Y.**Scanline-based stereo matching by genetic algorithms.** (English) Zbl 1087.68676

Int. J. Prod. Res. 42, No. 6, 1083-1106 (2004).

Summary: The Computer Stereo-Vision System (CSVS) is a non-emissive, non-scanning, economic and flexible vision system. It adopts a pair of cameras at different positions and acquires simultaneously two images of an object to derive information on depth. The problem of correspondence between images is one of most important issues in the study of CSVS. The key concern of this problem is to determine which feature in one image corresponds to a given feature in the other image. Owing to the high complexity of the correspondence problem, the matching process usually suffers from slow computation time and imprecise results. The present paper proposes a scanline-based stereo-matching model. The objective function of the proposed model is a function with the means and variance of intensity, gradient magnitude and direction, and related constraints including uniqueness, geometry and epipolar constraints. The formulated energy function is then solved using genetic algorithms. Binary representation is used to match the relationship between the candidate features of both images. Two operators, the roulette selection operator and elite principle, are adopted for offspring selection. A modified position-based crossover operator and its repair mechanism are developed to exchange partially the chromosomes. In addition, an order-based mutation is used to prevent early convergence. Experiments show that the designed selection, crossover and mutation operators can effectively derive the matching relations line by line for real-world testing images. The proposed method was also compared with another method and was superior in computation speed and required less demand of the memory.

MSC:**68T45** Machine vision and scene understanding**68T05** Learning and adaptive systems in artificial intelligence**Full Text:** [DOI](#)