Particle Swarm Optimization based Image Retrieval using Relevance Feedback

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Archers & Elevators Publishing House
ISBN:978-81-19385-38-6

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PREFACE

Content-based image retrieval (CBIR) is the set of techniques for searching for similar images from an image database using automatically extracted image features. RF increases the retrieval performance as it enables the system to learn what is relevant or irrelevant to the user across successive retrieval-feedback cycles. RF process is embedded into a stochastic optimization engine able to provide on one side a better exploration of the search space, and on the other side to avoid the stagnation in local minima. Besides introducing a deeper description and experimental analysis of the basic method, a new schema where the concept of swarm evolution with iterative swarm subdivision to allow a much more extensive exploration of the solution space, a faster and better convergence is introduced.

Understanding the subjective meaning of a visual query, by converting it into numerical parameters that can be extracted and compared by a computer, is the paramount challenge in the field of intelligent image retrieval, also referred to as the “semantic gap” problem. An innovative approach is proposed that combines a relevance feedback (RF) approach with an evolutionary stochastic algorithm, called particle swarm optimizer (PSO), as a way to grasp user’s semantics through optimized iterative learning. The retrieval uses human interaction to achieve a twofold goal is to guide the swarm particles in the exploration of the solution space towards the cluster of relevant image and also to dynamically modify the feature space by appropriately weighting the descriptive features according to the users perception of relevance.

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