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Metareasoning Image Optimization Q-Learning

Authors : Mahasa Zahirnia

Abstract : The purpose of this paper is to explore new and effective ways of optimizing satellite images using artificial intelligence, and the process of implementing reinforcement learning to enhance the quality of data captured within the image. In our implementation of Bellman's Reinforcement Learning equations, associated state diagrams, and multi-stage image processing, we were able to enhance image quality, detect and define objects. Reinforcement learning is the differentiator in the area of artificial intelligence, and Q-Learning relies on trial and error to achieve its goals. The reward system that is embedded in Q-Learning allows the agent to self-evaluate its performance and decide on the best possible course of action based on the current and future environment. Results show that within a simulated environment, built on the images that are commercially available, the rate of detection was 40-90%. Reinforcement learning through Q-Learning algorithm is not just desired but required design criteria for image optimization and enhancements. The proposed methods presented are a cost effective method of resolving uncertainty of the data because reinforcement learning finds ideal policies to manage the process using a smaller sample of images.

Keywords : Q-learning, image optimization, reinforcement learning, Markov decision process
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