FOREGROUND EXTRACTION WITH RANDOM FIELD COHERENCE

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ABSTRACT

Foreground estimation is a technique used to identify pixels and regions of interest in a video sequence. In particular, these algorithms set out to classify pixels as either foreground or background. As such, foreground estimation is often equivalently known as background subtraction. Based on these classifications, higher level decisions can be made. This work improves upon past efforts in background modeling with the addition of a tracking system for localization and the building of spatial and temporal dependencies amongst image pixels. These efforts are performed methodically using a probabilistic network.

Foreground estimation techniques that work on a per-pixel basis have been under development over the past few years. More recently, systems are being developed to consider the vast amount of additional information available from the spatial and temporal neighborhoods about each point. This thesis sets out to establish spatial and temporal relationships using a unified probabilistic framework. Building on previous knowledge of per-pixel background models, tracking systems, and probabilistic formulations, it combines all available information in a principled manner. This is realized through the application of a Markov random field and a conditional random field in a quest to utilize as much available information as possible. This work develops a system for localized, coherent background subtraction using an undirected probabilistic framework.