The Department of Computer Science and Engineering

University of Nevada, Reno

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Identification of Tree Locations in Geographic Images

A thesis submitted in partial fulfillment of the
requirements for the degree of Master of Science
with a major in Computer Science.

by

David Brown

Abstract: This thesis describes an interactive image analysis utility for the correct placement of trees within a virtual reality wildfire visualization system. The wildfire visualization system is VFIRE (Virtual Fire in Realistic Environments), which uses fire simulation results produced by software programs such as FARSITE to place the user into an immersive, artificial environment where he or she can see graphical depictions of real or fictitious wildfire events. The purpose of VFIRE is to assist in training and planning for actual fires, and the purpose of this utility is to place trees within the artificial environment at locations corresponding to their locations in the real environment. In developing this utility, our directive was to achieve adequate tree-placement accuracy using any, arbitrarily chosen image, assuming no constraints on the minimum suitability of that image for tree detection. This directive led to the selection of a template-matching algorithm wherein the user selects a particular tree as a template and commands the utility to search the image for similar-looking trees. Tree detection results are presented for a 1-meter panchromatic image of the current area of interest, Kyle Canyon, in Southern Nevada. It is difficult to perceive the aesthetic effect of tree-detection inaccuracies in terms of numeric error rates. Therefore, screen shots are provided representing tree-detection results placed into three broad, subjective categories: good, adequate, and poor. The results obtained were found to be roughly fifteen percent good, seventy percent adequate, and fifteen percent poor, where accuracy was directly related to the suitability of the terrain for tree detection in each particular region of the image.

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