Graph Cuts to Combine Multiple Sources for Feature Extraction

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ABSTRACT

Creating a high fidelity virtual environment for flight simulators can be both expensive and labor intensive. Aircraft simulators rely heavily on geo-specific imagery to provide the trainee with a high fidelity virtual environment which is rich in 2D visual cues. It is well known that the addition of three dimensional (3D) models to this synthetic environment enhances visual cues that enable the perception of depth and motion. Alignment of 3D features with the underlying imagery is crucial to avoid visual distractions, especially at low altitudes. This paper addresses the challenge in creating 3D content that is aligned with existing imagery at a large scale. A new framework of using "guidance" images to accumulate information gleaned from various types of input in order to find a final, imagery-aligned set of extracted features. The method exploits additional sources of geospatial data including LIDAR, NIR, Materials-Classified Imagery, and OpenStreetmap or other Vector data sources. It produces results that are consistent with OTW imagery even when features are visible in the OTW imagery and missing in additional data sources, or when features are misaligned by several meters. The method has been applied to large volumes of high resolution data in order to extract rooftops and vegetation.