**Reconstructs Ground Level Scenes into Overhead Scenes to Estimate the Geographic Location of Its Capture**

This geolocation estimator determines the geographic location of a scene captured in a video or image. The ability to identify the location where a camera captured a video or still image of interest is necessary for purposes ranging from personal research to police work and counterterrorism. When no metadata or description accompanies a video or image, it is difficult to determine the location of the scene pictured. One available option is to query databases for commonalities with the image data of the scene at hand. This procedure is often ineffective, however, as databases tend only to store image data of frequently captured locations. Besides this, resources that would otherwise be useful for identifying locations, such as overhead satellite or LIDAR maps, prove useless, since much of the time the recording viewpoint of the video or image of interest is from a ground level perspective.

Researchers at the University of Florida have developed a geographic location estimation system that analyzes the geometry and topography of the scene of any recorded video or still image to determine the location of capture. This estimator reconfigures the perspective of the image to appear as an overhead scene then compares it with global overhead images or maps in order to estimate the location of the scene depicted.

**Application**

Geolocation system that estimates the captured location of an arbitrary video or image

**Advantages**

- Changes the perspective of any still or video captured scene to appear as if taken from above and compares the reconstruction with overhead maps and images, estimating the geographic location of the captured scene
- Extracts overhead spatial information from ground level recordings, enabling accurate image location estimation that utilizes valuable existing resources, such as satellite, LIDAR, and topographic maps

**Technology**

This geographic location estimator determines the approximate location at which a camera captured an arbitrary image or video of interest. After analyzing the spatial relationships between objects and backgrounds in the scene and applying an algorithm to precisely calculate the pose of the camera during the capture, the geolocation system reconstructs the scene from an overhead perspective. It then compares the scene with overhead images of known geographical origin, such as LIDAR, satellite, or
topographic maps, to identify possible matches and estimate the location where a camera captured the scene.

Inventors

Warren Dixon, Ph.D., is a professor in the Mechanical and Aerospace Engineering Department at the University of Florida. He earned his Ph.D. in electrical engineering from Clemson University and his master’s degree in electrical engineering from the University of South Carolina. Dr. Dixon’s research is focused on enabling technologies and designing controllers that incorporate nonlinear dynamics to achieve improved performance.

Hakjae Kim, Ph.D., was a postdoctoral researcher in the Department of Mechanical and Aerospace Engineering at the University of Florida. He earned his Ph.D. in mechanical engineering from the University at Buffalo, State University of New York. He was a member of the Nonlinear Controls & Robotics research group at the University of Florida.