Spatial Temporal Reasoning For Location-Specific Actions

Tech ID: 34174 / UC Case 2025-841-0

BRIEF DESCRIPTION

A groundbreaking system that enables navigation in GPS-denied environments by using intelligent systems to mimic biological systems that recognize locations through visual cues and perform contextually appropriate actions.

FULL DESCRIPTION

This technology introduces a novel approach to vision-based localization and navigation by leveraging biologically-inspired models to transform first-person perspective observations into precise geographical coordinates without relying on GPS or map databases. Utilizing sequential generative models, namely VAE-RNN and VAE-Transformer, this system achieves remarkable localization precision in diverse environments by directly mapping visual-temporal observations to spatial understandings, thereby enabling contextually appropriate responses to specific locations.

SUGGESTED USES

· Enhanced autonomous driving systems with location-specific actions.

· Real-time navigation aids for robots in diverse environments.

· Efficient and precise location-based services without reliance on GPS.

· Improved spatial intelligence for AI systems in urban planning and mobility solutions

· Potential for specialized map service offerings utilizing STRMs.

ADVANTAGES

· Does not rely on dense satellite image databases or GPS coordinates.

· Outperforms existing cross-view geo-localization methods and, in some cases, matches commercial GPS accuracy.

· High precision localization with minimal deviation in challenging environments.

· Training can be done in an active environment because the system can reject transient objects.

· Superior computational efficiency enabling real-time operation on resource-constrained platforms.

· Direct transformation of visual cues into precise spatial understanding.

PATENT STATUS

CONTACT

Edward Hsieh
hsiehe5@uci.edu
tel: 949-824-8428.

OTHER INFORMATION

CATEGORIZED AS

» **Sensors & Instrumentation**
» Analytical
» Environmental Sensors
» Other
» Physical Measurement
» Position sensors
» **Transportation**
» Automotive

RELATED CASES

2025-841-0

Patent Pending

RELATED MATERIALS

» Lui, H. W., & Krichmar, J. L. (2025). STRMs: Spatial Temporal Reasoning Models for Vision-Based Localization Rivaling GPS Precision. arXiv preprint arXiv:2503.07939

UCI Beall Applied Innovation

5270 California Avenue / Irvine,CA
92697-7700 / Tel: 949.824.2683