Technology Commercialization Opportunity

Object Tracking using **R**andom Projections, **O**nline Distance **L**earning and a Hybrid Template **L**ibrary (ROLL_Tracking™)

Technology Description

Object tracking imposes demanding requirements in terms of processing speed, tracking accuracy and robustness to changes in object appearance. Furthermore, tracking under resource constraints is a challenging task, where hardware limitations can hinder the performance of a tracking system.

ROLL_Tracking employs Random Projections, a novel dimensionality reduction technique for efficient tracking that maximizes performance while minimizing the use of resources. Furthermore, to support increased robustness under severe changes in object appearance, an online learning framework is utilized that learns to discriminate between the appearance of the target and that of the background. The online learning framework is based on an online distance metric learning algorithm that can support single or multiple objects tracking, and is robust to occlusions, changes in illumination, viewpoints and pose. In addition, a template library is built over time to capture prior knowledge about the object's appearance and provide a model of the object's appearance for further use.

ROLL Tracking is a combination of the template library, the online metric learning and the Random Projections transformation; the method can support robust tracking of numerous objects, under challenging conditions, with a varying degree of prior knowledge regarding the object's appearance and motion characteristics. In addition, ROLL_Tracking can be customized to support object tracking on a wide range of hardware platforms ranging from resource limited mobile systems, such as smartphones, to high performance multiprocessor systems.

Keywords: Object tracking, distance metric learning, online learning, nearest neighbor classification, random projections, target tracking, video indexing, video analytics, image analysis.

Technology Readiness

ROLL_Tracking is presently at this level of readiness: (Note: The alpha version is applicable for single object tracking. We are in the process of extending this technology to multiple object tracking)

Idea	Concept	Prototype	**Alpha Version**	Beta Version	Released

The developers of ROLL_Tracking will work with licensees to finalize the development and move ROLL_Tracking towards a "released version."

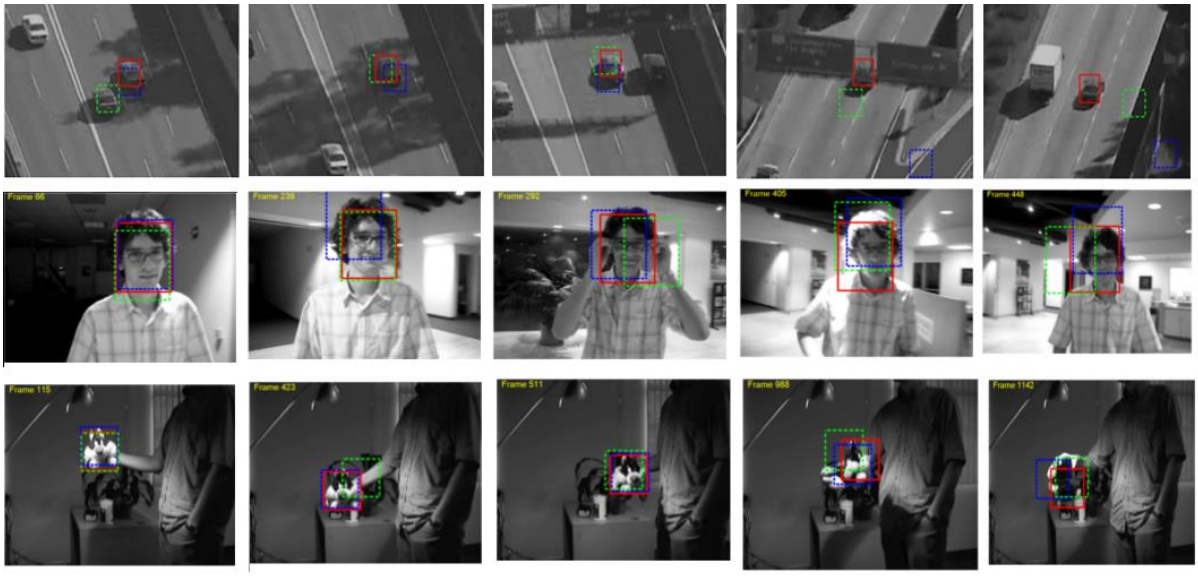
Intellectual Property

ROLL Tracking is the subject of an issued patent US 8,873,798.

Applications

The figure below presents some applications of the ROLL_Tracking algorithm. In the first row, an airborne camera is tracking a vehicle undergoing severe changes in appearance due to shadows and occlusions by the traffic signs. The second row corresponds to tracking a human face while changing pose and illumination conditions. Tracking of a generic object under different pose and illuminations is also presented in the last row of the figure.

The tracking accuracy of ROLL_Tracking (in the solid red box) was compared to two state-of-the-art tracking algorithms, the Semi-supervised On-line boosting (in the greed dot-dashed box) and the Multiple Instance Learning tracking (in the blue dashed box). As shown, ROLL_Tracking is able to accurately maintain tracking despite the challenging conditions while outperforming two competitive tracking systems.



Target Customers

- Surveillance, Safety and Security, Access Control
- Industrial Vision Manufacturers, Automotive and Traffic Management
- Sports and Entertainment
- Advertisement and Marketing
- Video Content Management for Indexing, Retrieval and Augmenting Reality Applications

Opportunity

RIT's Intellectual Property Management Office (IPMO) is interested in working with those parties who are qualified and interested in the commercialization of the ROLL_Tracking intellectual property. Arrangement types include licensing the application to existing organizations or new organizations that have expertise in the field or related fields.

Contact

Those interested in learning more about this opportunity should contact:

Mr. William E. Bond, Director of Intellectual Property Management at RIT (585) 475-2986
bill.bond@rit.edu

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