Milestone: Automatic Camera Network Topology Recognition

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***Abstract*—The abstract goes here.**

***Index Terms*—Network topology, tracking.**

I. Introduction

As digital cameras have become more economically feasible, systems of networked cameras have become more prevalent. Furthermore, the cost of computation has dropped low enough that video processing is a viable option for many applications of camera networks. Such applications include analysis of consumer patterns in marketplaces, or use in crime prevention.

While the hardware is now mature and available on the market, there are still many problems to solve and areas for improvement. Calibration of such systems still remains an exhausting and expensive task. Cameras that are precalibrated and RGB-D (color and depth) equipped will soon be the norm, but this only solves half of the problem. To make real use of a network of cameras, the position and orientation of each cameras in the world must be known, at least relative to a common point. Traditionally this requires many many hours of manual work, and does not scale well as more and more cameras are added.

In theory, this calibration information can be inferred from the spatial and temporal information of the scene. Existing techniques can be applied to identify moving objects within the scene from RGB-D data. In the course of this project, we endeavour to create an algorithm which will use the estimated trajectories of the objects in the scene, and through the use of statistical inference techniques and geometry, estimate the relative locations and orientations of the cameras from which the data originated.

II. Related Work

III. Algorithm

IV. Milestone Goals

See Table I and II for achieved and remaining milestones.

V. Results

VI. Conclusion

The conclusion goes here.

TABLE I
Milestones Achieved

Week	Milestone
1/26-2/1	- Determine Project Topic
	- Write Project Proposal
	Thurs 1/30 - Proposal Due
2/2-2/8	- Literature Survey
	- Familiarize with Data Set
	- Begin Algorithm Dev. - Toy Problem
2/9-2/15	- Finish Toy Problem
	- Algorithm Dev. - Handpicked Data
	- Write Milestone Progress Report
	Thurs 2/13 - Milestone Progress Due

TABLE II
Remaining Milestones

Week	Milestone
2/16-2/22	- Algorithm Dev. - Continue with Handpicked Data
	- Expand Dataset, Test, Develop
2/23-3/1	- Expand Dataset, Test, Develop
3/2-3/8	- Measure Performance with Fewer Cameras
3/9-3/15	- Produce Graphical Demo of Results
	Tues 3/11 - Project Presentations (I)
	Tues 3/11 - Project Presentations (I)
3/16-3/19	- Write Final Report
	Wed 3/19 - Final Report Due

References

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[2] T. Ellis, D. Makris, J. Black, *Learning a multi-camera topology*, in Joint IEEE Workshop on Visual Surveillance and Performance Evaluation of Tracking and Surveillance (VS-PETS), 2003, pp. 165-171.

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[4] A. Rahimi, B. Dunagan, and T. Darrell, *Simultaneous calibration and tracking with a network of non-overlapping sensors*, in Proceedings of the 2004 IEEE Computer Society Conference on Computer Vision and Pattern Recognition, 2004, pp. I-187.