Human Body Tracker System in Retail Environments

Group 12 - Mindless Rookies

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1. Problem Definition and Background Information

The aim of this project is increasing shop owners' profit by getting customers' informations about how much time they spent in different parts of the store and showing the result in a heat map. For example brighter color shows that the customers spent more time at that part of the store. After collecting and analyzing the data of customers' behaviors, the result is presented to the shop manager. For this project, geographical locations are only retail environments. The aim here is to increase the managers profit. People who are shop owners experience this problem in order to increase their profits. Moreover, this is not a crucial or vital problem, our concern is only market owners who have some problems about getting money because of the wrong order of shelf in the store.

Some companies and universities are working on this problem to innovate new aspects about this problem and there are some products which are available in the market. For instance Alex Leykin who has project named with “Tracking and Activity Analysis in Retail Environments”, tried to track customers in a store and performs a number of activity analysis tasks based on the output from the tracker.

For people who are unaware of this problem, image processing and machine learning algorithms will be used in our project, the images which are taken from multi cameras will be combined to analyze the customers' behaviors in the retail environment.

2. Significance of the Problem and Motivation

- **WHAT makes this problem challenging?**

  - Working on real/wild environment.

  - High computational complexity of image processing related algorithms and trying to decrease this complexity in order to compute on any given processor.

  - Multi-Camera integration with different camera distortions and non-overlapping area calculations etc.

- Providing a general purpose solution which would work in any retail environment.
- Obtaining tracked-object continuity through the visual fields of different cameras by using constraints, machine learning algorithms and belief networks etc.

- **WHY would you like to solve this problem? Have you also considered other public project ideas? WHY did you settle on this problem for your project?**

  - Image processing is a method that we all want to create solutions to problems by using it and improve ourselves in this area. Besides, human body tracker systems can be a solution for multiple ideas that can make the life easier or make users money. Due to these reasons, our project seems to have optimal problem for us.

- **WHY don't we already have satisfactory solutions to this problem?**

  - There are solutions on this specific problem. However, these solutions should be reinvented by us to have the technology in our hands and provide our own unique solutions without bargaining on any other company or foreign technologies.

- **WHAT has been missing in the existing solutions to this problem?**

  - The company (Adoniss Ltd.) doesn't have a specific solution yet. One of our aim is to find a more efficient solution than the other existing solutions have.

- **IF you manage to solve the problem, how would other people benefit from the solution? How would you benefit from the solution?**

  - Specifically in retail environments which is the project's main environment, our solution will change the manager's perspective on marketing and selling strategies in positive (profitable) way. Besides, solution method will be applicable for different problems that belong different areas. Turning this motivation into practice will be our prudential aim.

- **ARE YOU planning to turn your project into a commercial/academic business/product when you finish your project? WHAT specific steps are you planning to take?**

  - Yes. This project will turn into a commercial product after its completion. Adoniss Yazılım will be dealing with the marketing and commercial issues.

3. User Story

The only end users in this system are shop managers. They are the ones who are interacting with the system. The system will collect information about customer types and behaviours. Statistical analysis about those will also be given to the managers through the system.

Customers are also considered as stakeholders as the information about them will be collected in retail environments.

Image processing and machine learning techniques will be heavily involved in this project to come up with a solution to the project.

Non-function requirements can be defined as:

- Measurements of the system are the private data of customer. All data should be kept securely.
- Measurements should have success rate of %80. Success rate of the system is ratio of actual human density and measured human density.
- Produced system should handle multiple cameras and able to process them in real-time. In this case as real-time one should understand system should has at least the same frequency(FPS) as cameras.

As a/an (Type) User	**I want to**	**so that … (optional)**
Managers	Collect information about where customers are likely to spend time	the system will give a heat map about where are the most-used places in the store
Managers	Collect information about which type of users spend time at the investigated place of the store	the system will give information about the age, sex of the customers
Developers	Implement image processing and machine learning algorithms	the system will respond the way it supposed to be
Managers	Acquire enough knowledge about how to use the system	They can use it correctly and efficiently
Developers	Prepare documentation about the project	All stakeholders can have enough knowledge about the system
Developers	Collect data in log files when an exception occurs	System can keep track of any erroneous behaviour

4. Support

We are getting technical and financial support from Adoniss Yazilim. The test environment will be formed by the company.

Engin Firat and Tunc Guven Kaya will be our contacts during this project. They will also be giving technical support about image processing and machine learning techniques. The intellectual property rights of the project will belong to Adoniss Yazilim.

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5. References

- http://retail-surveillance.com/merchandising/solutions/