**Project**: Healthactivity recognition using active learning.

**Area:** Active Learning, Machine Learning.

**Date:** September 27, 2018

**People:** Vivya Kalidindi, Dr. Pradeep Chowriappa

**Objective:** A deeper look into physical activity [1] and food intake [2] data can reveal patterns of both healthy and unhealthy behavior that could be leveraged for personalized feedback [7] by using smartphones sensors [1]. Health tracking devices and apps can also act as an incentive for patients to take charge of their own wellness. People can refine their activity or view how far they’ve come in their training.

To detect the health-care for humans ranging from personal fitness to elder care [6] by providing calorie deficit by way of decreased food intake and increasing physical activity through sending automated personalized feedback without human interpretation.

Multi-Armed Bandit (MAB) model [4][5] will not dynamically learn a user’s physical activity and dietary behavior and strategically suggests changes to those behaviors for a healthier lifestyle but also maximize the changes of achieving calorie loss. Maximization is achieved by strategically suggestion a fusion of frequent and infrequent health behaviors suggestions map to “exploit vs explore principle. Pareto-Frontier model [5] is utilized to keep the users in a loop by giving users control to prioritize recommendations that they like to permit. Using MAB also solves a few practical issues of generating suggestions. MAB is an online learning algorithm that learns, adapts and decides simultaneously. All of these learning and adaption are done with relatively less data since MABs are not heavily parameterized. This is crucial at the early stages when less data is available from users. MAB’s online nature also means model update needs only processing the latest data with less computation. A competing technique to MAB is the Markov Decision Processes (MDP) [11], the most used reinforcement learning[2][9] algorithm for decision making. In comparison to MABs, MDPs are highly parameterized and often require large amount of data to train.

**Hypothesis:** Yes, it is possible to get automated personalized feedback by using two decision models i.e., MDP model and pareto-frontier model.

**Alternative Hypothesis**

**Keywords:** Active learning, Activity recognition, Machine learning, Mobile phone sensing, Reinforcement learning, Multi-armed Bandit, Pareto-Frontier model, Markov Decision Processes.

**Specific Aim:**

1. **Data Collection:** It can be done by using The MATLAB [5] Support Package for Apple iOS Sensors enables you to collect sensor data from your iOS device.
2. **Data Preprocessing:**
3. **Features of Interest:**
4. **Methodology**:
5. **Validation of Results**:

**Specific Aim worked during this report:**

**Key Accomplishment:**

1. Installation of MATLAB in lab desktop is completed.
2. Gained knowledge about MDP.

**Red Flags:**

1. Problem in understanding of Frechet distance

**Future Work:**

1. Need to accomplish knowledge about Machine Intelligence in HealthCare.

**Time Line:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **AIM** | **September 1st – September 8th** | **September 9th – September 15th** | **September 16th – September 22nd** | **September 23rd – September 28th** |
| **Data Collection and preprocessing** |  |  | **Data can be collected by MATLAB support packages.** |  |
| **Feature Extraction** |  |  |  |  |
| **Proof of Concept** | **Finding the papers for health recommendations by using smartphones.** | **Relevant to this research, a correlated paper found by Tanzeem Choudhary regarding the automatic feedback of health.** |  |  |
| **Additional Work** |  |  | **Installation of MATLAB is completed.** | **Focus on the paper which related to the research about Machine Intelligence in HealthCare and Medical Cyber Physical Systems.** |

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