Building a User Profile from Automatic Human Activity Recognition in Lifelogging, for a Personal Recommender System

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Insight

Human Activity Recognition System – the what

We attempt to extend users' profiles for recommendation purposes using lifelogging data.

We are currently building a classification model based on the necessary sensors – visual, accelerometer and GPS – in order to provide a reliable activity classification model.

The main challenge is to combine the appropriate descriptors and classifiers in order to have a stable and reliable Human Activity Recognition model. The purpose of the model is to be deployed real life lifelogging use.

- We are working on exploring the features that would best describe the visual context of the wearer. Those features should be invariant towards changes in the environment that are not relevant to the activity that user is performing. For example, using a computer is not related to any change of the luminance in the building. The visual features are the main challenge.

The rest of the sensory data are physical motion and location. Physical motion – accelerometer data features – is well established and researched. The location - GPS data - provides location, which is almost immediately a feature of its own.

The other significant challenge in our work is to establish the best framework for fusing the features from the different sensors with the appropriate classifiers.

Motivation – the why

Constructing a user profile remains a challenge within recommendation systems. A very appropriate way to establish similarity between users is their lifestyle. This lifestyle can be drawn from lifelogging data.

One method of doing so is to establish the occurrence and duration of certain general life trend activities in one's lifelog. By determining what activities are more dominant in one's lifelog, we would be able to establish, which users are similar to each other.

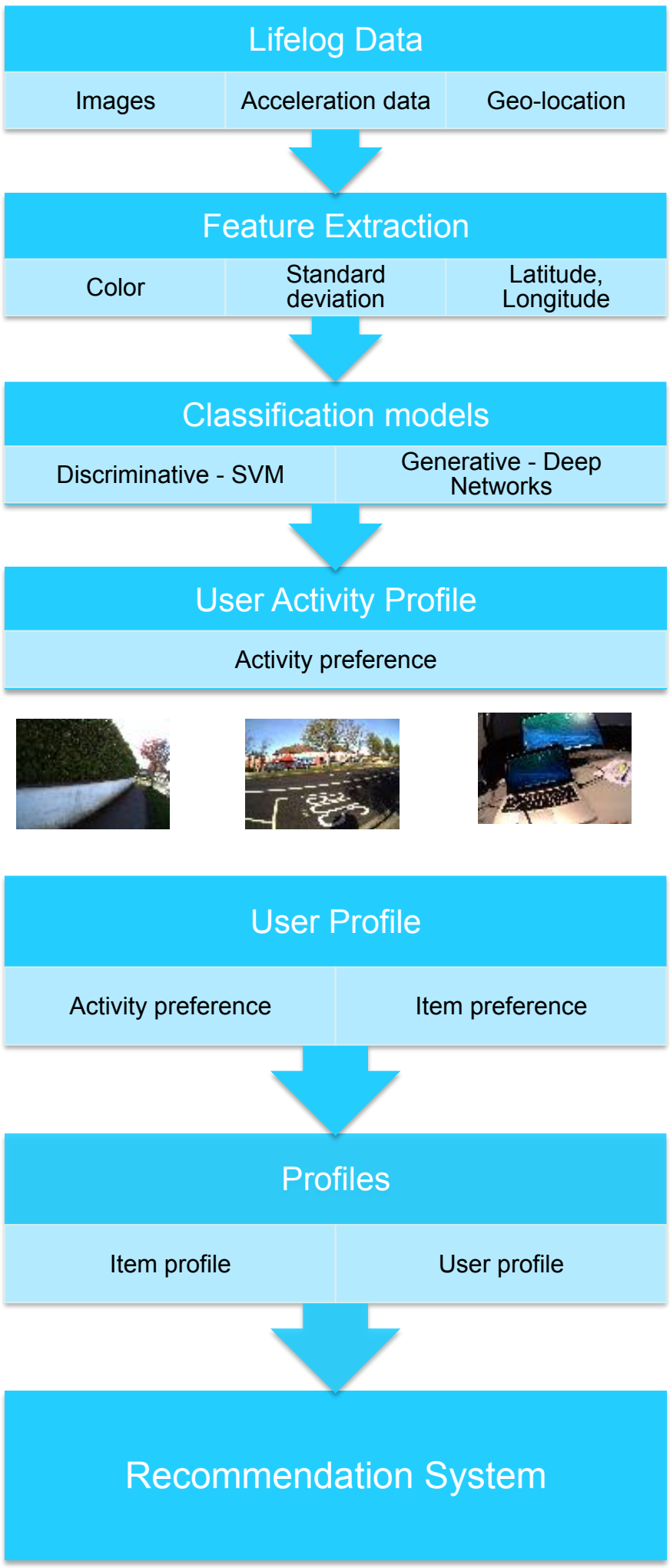
We believe that this can further improve the process of determining the similarity between the various users and hence their preferences

Method – the how

We are evaluating SIFT, HOG and Color Histograms, as the last one is to represent global image descriptors and the former two represent local image descriptors for the visual sensors.

We are considering both Generative and Discriminative models or the combination thereof. From the discriminative models, we are working with SVM classifier. The generative models that we are interested in are (Hierarchical) Hidden Markov Model and Deep Neural Networks.

Lastly we will be exploring the various fusion options, where we can fuse the features before or after classification.



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