



THUIR at the NTCIR-14 Lifelog-3 Task: How does Lifelog help the user's status recognition



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❖ Goal

- **Recognize different statuses according to:**
 - Non visual data (biometrics, location, activity ...)
 - Visual based data (semantic data extracted from images)
 - Both visual and non visual data
- **Statuses selected:**
 - Inside or Outside
 - Alone or not alone (is there at least one person surrounding the user)
 - Working or not working

❖ Motivation

- Automatic way to know the user's statuses
- Use of the recognized statuses as features for other researches and applications

❖ Features and Models

➤ Non visual Features:

Categories	Features
User	UserID
Environment	Location, City, GPS coordinates (longitude, latitude), Time of the sample
Biometrics	Heart Rate, Calories
Activity	Steps, Activity

➤ Visual based Features:

- Extraction of tags from the image using a concept detector (MS Vision API)
- Create a semantic graph with the tags
- Clustering the tags with the Markov Cluster Algorithm
- Labelling the clusters according to the status
- According to the image tags, recognizing the status

➤ Machine Learning Models for the Non-Visual Features:

- AdaBoost + Random Tree and AdaBoost+ C4.5
- Bagging + C4.5 and Bagging + LMT
- Random Forest

➤ Model for the Visual based Features:

- Annotation of the clusters according to the statuses
- For each sample, tags take the status of the cluster they belong
- The main status is considered as the recognition status

❖ Results and Features Analysis

➤ Experiment Design:

- Model train, validation, and feature analysis using 10-fold cross validation
- Feature analysis by elimination one feature category at a time and by training using only one feature at a time

➤ Results and Feature Analysis:

➤ Non visual Features:

Experiment	Highest Accuracy	Correspondent Model	Effective Feature Categories
Inside or Outside Recognition	88.6%	AdaBoost + Random Tree	1-Time, 2-Steps, 3-Latitude/Longitude
Alone or not Alone Recognition	74.2%	AdaBoost + Random Tree	1-Time, 2-Latitude/Longitude 3-Heart Rate
Working or not Working Recognition	80.2%	AdaBoost + Random Tree	1-Heart Rate, 2-Time, 3-Latitude and Longitude

➤ Visual based Features:

For alone and working tasks, the testing set only contains 100 samples

- Inside or Outside status: 95.9%
- Alone or not Alone status: 55.1%
- Working or not Working status: 76.4%

➤ Merged Features:

For alone and working tasks, the training and testing set contains 200 samples

Experiment	Highest Accuracy	Correspondent Model
Inside or Outside Recognition	99.5%	AdaBoost + C4.5
Alone or not Alone Recognition	66.2%	Random Forest
Working or not Working Recognition	76.5%	Bagging + LMT

❖ Statistics



❖ Conclusions

- Recognition of 3 statuses using 3 different methods:
 - For inside and outside, the best set of features is the merged features
 - For alone or not alone the best features are the non visual features
 - For working and not working, the best set is also the non visual one
- No smaller set of features could be found for the non visual features

❖ Future Work

- For alone and working statuses, train and test for the visual based features and the merged features with bigger set of features.
- Prediction of these statuses

❖ Acknowledgement

This work is supported by Natural Science Foundation of China (Grant No. 61672311, 61532011) and the National Key Research and Development Program of China (2018YFC0831900)