HUMAN BEHAVIOUR UNDERSTANDING THROUGH EGOCENTRIC PERCEPTION

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INTRODUCTION

Lifestyle can be characterized by the behaviour of people in their daily life.
The identification of behaviour is a crucial stage for a variety of goals and applications, including self-awareness, patient monitoring or memory enhancement.
The field of **egocentric perception** aims at the understanding of the relation between a person and their environment, and is incrementally gaining attention due to the increasing availability of wearable sensors, which allow the continuous gathering of data describing the daily life of people.
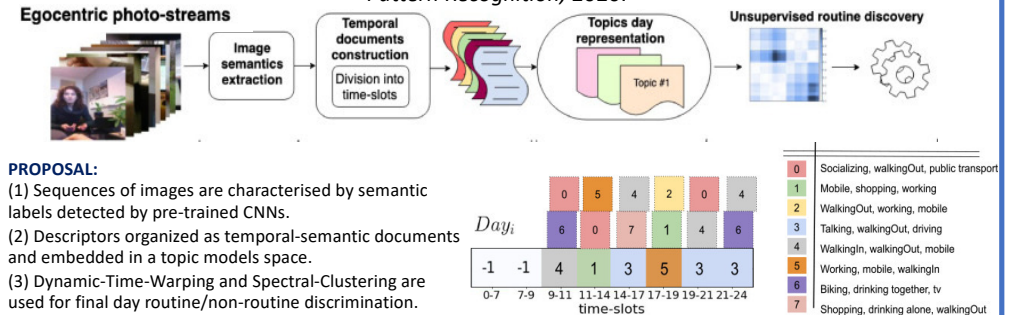When using **wearable cameras**; *visual information* in the form of photo-sequences provide information of the surrounding environment of the user, while *audio* will describe the sound experience of the wearer of the sensors.

Recorded egocentric photo-streams

Day 1
Day 2
Day 3
Day 4
Day ...
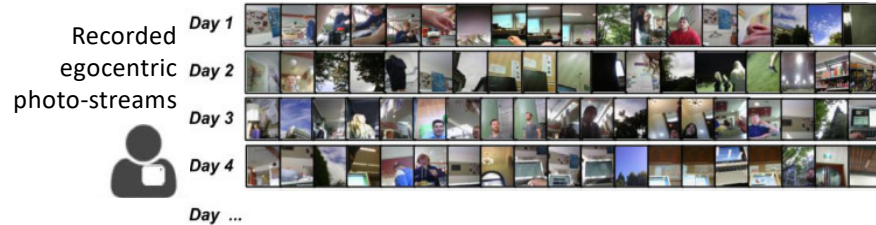
TOPIC MODELLING FOR ROUTINE DISCOVERY FROM EGOCENTRIC PHOTO-STREAMS

Estefania Talavera, Caroline Wuerich, Nicolai Petkov, and Petia Radeva.
Pattern Recognition, 2020.

PROPOSAL:
(1) Sequences of images are characterised by semantic labels detected by pre-trained CNNs.
(2) Descriptors organized as temporal-semantic documents and embedded in a topic models space.
(3) Dynamic-Time-Warping and Spectral-Clustering are used for final day routine/non-routine discrimination.

0 Socializing, walkingOut, public transport
1 Mobile, shopping, working
2 WalkingOut, working, mobile
3 Talking, walkingOut, driving
4 WalkingIn, walkingOut, mobile
5 Working, mobile, walkingIn
6 Biking, drinking together, tv
7 Shopping, drinking alone, walkingOut

VALIDATION: We present the *EgoRoutine,* an egocentric dataset composed of a total of 100.000 images, from 104 days.
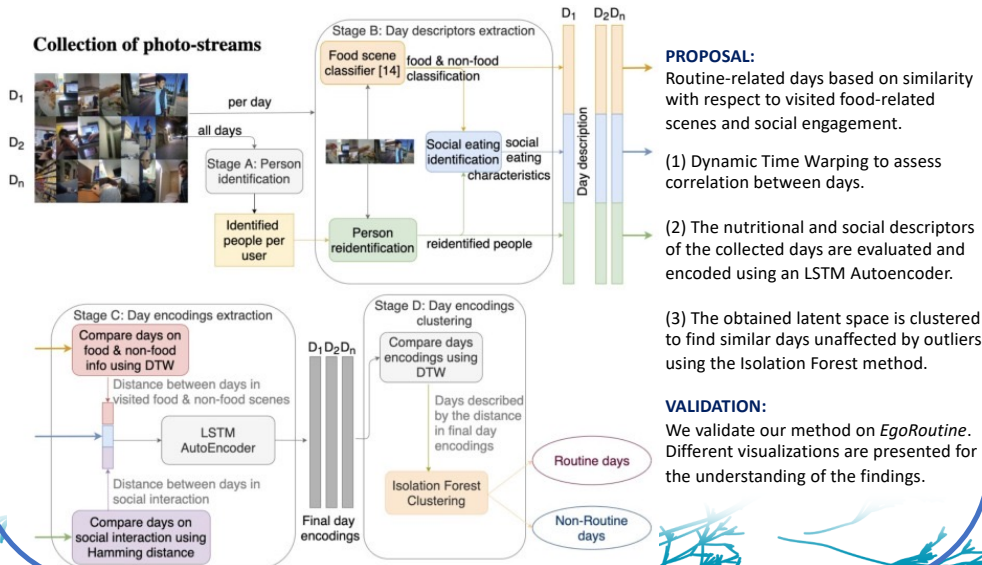
CONCLUSIONS: (a) topic modelling is a powerful tool for patterns discovery when analysing a BoW representation of photo-streams and (b) that using Dynamic-Time-Warping and Distance-based clustering is a robust approach for the detection of clusters of routine related days, while being tolerant to small temporal differences in the daily events.

DOES OUR SOCIAL LIFE INFLUENCE OUR NUTRITIONAL BEHAVIOUR? UNDERSTANDING NUTRITIONAL HABITS FROM EGOCENTRIC PHOTO-STREAMS

Andreea Glavan, Alina Matei, Petia Radeva, and Estefania Talavera.
Expert Systems with Applications, 2021.

PROPOSAL:
Routine-related days based on similarity with respect to visited food-related scenes and social engagement.

(1) Dynamic Time Warping to assess correlation between days.

(2) The nutritional and social descriptors of the collected days are evaluated and encoded using an LSTM Autoencoder.

(3) The obtained latent space is clustered to find similar days unaffected by outliers using the Isolation Forest method.

VALIDATION:
We validate our method on *EgoRoutine*. Different visualizations are presented for the understanding of the findings.

INSTAINDOOR AND MULTI-MODAL DEEP LEARNING FOR INDOOR SCENE RECOGNITION

Andreea Glavan and Estefania Talavera.
Neural Computing and Applications, 2021.

Closet — "...color and print (...) new shirts and dresses..."
Beauty Salon — "...take down the braids (...) oiled the scalp..."
Aquarium — "...heating this tank (...) fish in general..."
Cafe — "...the espresso base and you pour the steamed milk..."
Library — "...Nigerian authors (...) one of my favorite books..."
Stadium — "...practice match (...) another goal..."
Bar — "... we drink to (...) only drink beer ..."
Reading Room — "...new loft (...) watching the game..."
Arcade — "...retro games and custom set up..."

PROPOSAL:
Multi-modal learning based on the fusion of transcribed speech to text and visual features.

VALIDATION:
(a) 70% accuracy and 0.7 F1 on *InstaIndoor*, our novel dataset of social media videos of indoor scenes.

(b) 74% accuracy and 0.74 F1 on a *subset of YouTube-8M* indoor scenes.