

# MART @ NTCIR-15

Micro Activity Retrieval Task

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# What is MART?

- Previous Lifelog tasks @ NTCIR have focused on macro-events e.g. events over tens of minutes or hours
- MART aims to encourage researchers to develop approaches to detecting micro-activities
- What's a micro-activity?
  - Something that happens on a short time scale (< 2 minutes) e.g. writing an email, taking a few bites of a sandwich, taking a quick telephone call, ...

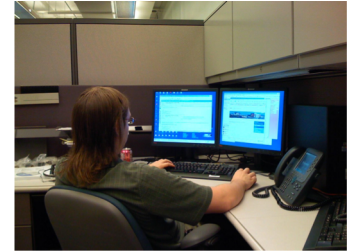
# What is MART?

- Previous Lifelog tasks @ NTCIR focused primarily on using visual features from lifelog camera images
- The MART task will focus on using rich multi-modal sensor streams including visual lifelog data, detailed computer interactions, bio-signals, movement sensors (e.g. accelerometer), affective sensing and more



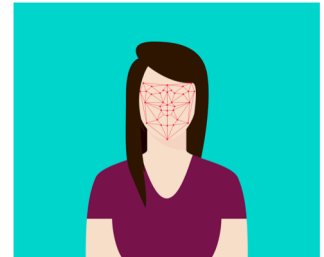
# Types of activities

- Reading text aloud
- Basic office tasks e.g. sorting physical files
- Counting money
- Writing an email
- Silently reading text on a screen (for a later quiz)
- Watching a short video presentation
- Working on a physical puzzle (e.g. tower of Hanoi)
- Arranging physical artefacts in the environment (e.g. move X to Y)
- ....



# Types of sensor data

- Timestamped lifelog camera data
- EEG (Electroencephalography)
- EOG (Electrooculogram)
- GSR (Galvanic Skin Response)
- HR (Heart rate) / HRV
- Accelerometer (via IMU)
- Detail computer interactions
- Facial expression analysis
- And more...



# Data collection experiment

- This will be done in a large room at Dublin City University
- Participants' activities will be controlled via a pre-defined protocol (driven by software)
  - e.g. bring the box on the table X to table Y



# Data collection experiment

- Volunteers will do **15 different kinds of activities** with **6 repetitions** of each activity
- Experiment will last 3 hours
- That's 30 activities per hour of approximately 2 minutes each



# MART @ NTCIR-15: two sub-tasks

- Sub-task A): A novel retrieval task that can be undertaken in an **interactive or automatic manner**
- Sub-task B): An insights task where participants can explore interesting use cases of the dataset



# Sub-task A

- 10 experimental volunteers = 900 micro-activities
  - 450 of these will have ground truth labels (volunteer\_id, activity)
  - 450 of these will be labelled with the volunteer\_id only
  - 50% Train / 50% Test ... but this is not a machine learning task
- \*\* The multi-modal data streams will be pre-segmented on an activity-by-activity basis

# Sub-task A

- Each submission from a team will contain **450 activity labels** for the test set (for the 10 volunteers, for the 3 repetitions of 15 activities each)

- Accuracy measure:

$$\frac{\text{Number of correctly labelled activities}}{\text{Total number of labelled activities}}$$

- Submissions will be ranked by accuracy
- Submissions must provide a single label for each and every activity in the test set

# Pre-processed data

- Pre-processed data will be provided in order to ease task participation, i.e.:
  - Time alignment
  - Multiple formats (e.g. csv, pandas, ...)
  - Aggregated features over time (e.g. over the entirety of the activity)
  - Visual pre-computed features using CNN e.g. Inception v4
  - and more...

# Baseline system

- We will release a baseline system
- This system will incorporate both automatic and/or interactive techniques
- Why? To give a starting point to task participants

# Timeline

- Sept-Oct 2019 - Experiment preparation, ethics, ...
- Nov-Jan 2019 - Dataset collection
- Dec-April 2019 - Task registration Due
- Jan 2020 - Dataset release
- Jan-Mar 2020 - Dry run (5 submissions)
- Mar-Aug 2020 - Formal run (best of 5 submissions)
- Sept 2020 - Evaluation result release
- Sept-Nov 2020 – Paper preparation phase
- Dec 2020 - NTCIR-15 Tokyo

# Some important points

- Focus is on micro-activities rather than macro-activities
- By design, activities will not require retrospective labelling
- Rich multi-modal dataset incorporating bio-signal measurements
- Sub-task A is intended to be completed by combining both automatic and interactive approaches
- Data will be collected in a controlled environment (unlike previous Lifelog tasks)

# Thank you

Thank you for your time

- If you have any queries (or suggestions) please feel free to email me: [graham.healy@dcu.ie](mailto:graham.healy@dcu.ie)
- Please check out [ntcir-mart.computing.dcu.ie](http://ntcir-mart.computing.dcu.ie)