Integrated Tool Chain for Recording, Handling, and Utilizing Large, Multimodal Context Data Sets for Context Recognition Systems

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Toolchain Overview

Recording

Handling

Utilizing
Recording: Data Collection

- recording
  - sensor interface
  - file format
  - timestamps
  - synchronization
- monitoring
  - data integrity
- documenting
  - experiment setup
  - progress of exp.

- CRN Toolbox
- Context Logger
- MASS
CRN Toolbox
(Context Recognition Network Toolbox)

CRN Toolbox Configuration GUI

by Hendrik Speidel
Context Logger

• recording sensor data
  – accelerometer
  – magnetic field
  – GPS
  – gyroscope
  – audio
• online labeling
• upload to ContextDB
• IOS & Android

by Tobias Franke
MASS
Monitoring Application for Sensor Systems

MDNS sensor discovery
sensor status
timeline

sensor placement
MASS
Monitoring Application for Sensor Systems
Handling: Data Management & Annotation

- handling sensor data recordings
  - storing
  - reviewing
  - labeling
  - preparing
  - sharing

- Context Database
- Labeling Tool
- Trace Generator
### Context Database

![Image of CouchDB interface](image)

#### Fields:

- **_id**: `biking.part1.accelerometer`
- **_rev**: `1-2457631e4807c9a84401c5022be3c941`
- **_channels**:
  - 0: `unit: "g/10"`  
  - name: `accX`  
  - type: `DOUBLE`
  - 1: `unit: "g/10"`  
  - name: `accY`  
  - type: `DOUBLE`
  - 2: `unit: "g/10"`  
  - name: `accZ`  
  - type: `DOUBLE`
- **name**: `accelerometer`
- **primarySessionId**: `context/biking.part1`
- **source**: `io.ColumnFileParser`
- **type**: `DataStream`

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*Note: The image shows a CouchDB interface with the context database and some fields displayed.*
Labeling Tool

Labeling Tool by Florian Wagner

- **Video:** Video data can be displayed and synchronized playback is available.
- **Labels:** Multiple label tracks can be added, edited, or removed.
- **Sensor Data:** Load/save data from files or ContextDB.
- **Synchronized Playback:** Video can be played back in sync with sensor data.
Trace Generator

**Data Selection**
- datasets, recording sessions
- data streams (sensors)
- sensor channels

**Partial Distortion / Filtering**
- simulate faulty sensors
- simulate appearing/disappearing of sensors

**Writing Trace Files**
- data trace file (e.g. ARFF)
- story file
  - ground truth of distortion/filtering
Utilizing:
- Online Context Recognition

- Classifier training
- Sharing
  - Live sensor data
  - Distributed processing
- Context recognition
  - Online sensor data processing
- CRN Toolbox
- Service-Oriented Extension
CRN Toolbox
for online context recognition

- read live data
- extract features
- classify
Service-Oriented Extension

- service-level interfacing of CRN Toolbox instances
- service registration & discovery
  - sensing services
  - recognition services
- semantic annotation of services
  - more abstract service level
  - dynamic reconfiguration
Summary

Recording

Handling

Utilizing
thank you

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