Activity Recognition from a Wearable Camera

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Introduction

• A novel approach of activity recognition using the video recorded from a wearable camera.

• The objective is to recognise the user’s activities from a tiny front-facing camera embedded in user’s glasses.

• Our system allows caretakers to remotely access the current status (activities) of a specified person.

• Apply to:
  ✓ General fitness training
  ✓ Elderly people stayed alone
  ✓ Patients under rehabilitation treatment
  ✓ People requiring cognitive assistance or guidance on daily activities.

Video Collection and Feature Extraction

• We use Lucas Kanade Optical Flow as the primitive feature extraction method.

• Followed by Average Pooling of consequence of Images Patches

System Overview

The system processing pipeline:

- Video Acquisition
  - Reformat & Pre-processing
  - Optical Flow

- Feature Extraction
  - Features Segmentation & Pooling

- Feature Classification
  - K-NN, SVM, LogitBoost

- Structured Classification

- Results

• Our system currently supports four basic activities:
  ✓ Walking
  ✓ Drinking
  ✓ Going Upstairs
  ✓ Going Downstairs

Classification Method

• Three main classification methods:
  ✓ K-Nearest Neighbour:
  ✓ Logit-Boost
  ✓ Support Vector Machines (SVMs):

• Additional structured classification method:
  ✓ Hidden Markov Model (HMM)

Results

• Overall System Accuracy:
  ✓ SVM (RBF kernel)+HMM: 82.1%
  ✓ LogitBoost (200 WLs)+HMM: 82%
  ✓ KNN (22 NNs)+HMM: 78.9%