Interactive Machine Learning tool with Automatic Tagging for Video Recognition System

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Supervised machine learning
- Powerful technique for intelligent system
- Slow to train, and not interactive
- Training of machine is heavy task

Interactive machine learning (IML)
- Direct manipulation style training interface (easy to train)
- Quick feedback by visualization (easy to understand)

Problem of IML for large-scale data (ex: video)
- Slow feedback
- Low visibility

IML with Automatic Tagging
1. Feedback speed-up using LSH*1
2. User controllable batch operation
3. Visualization based on priority

Unknown tag
>Target tag
>Non-target tag


The user can register the labels in a current displayed frame by pushing the registration button. By pushing the button, target labels and target tags are registered as target labels. On the other hand, non-target labels, non-target tags and unknown tags in the frame are registered as non-target labels automatically. So the user can register 40 or more labels by only few mouse clicks.

Visualization of training state is performed on real-time simultaneously with video play, and the user can pause and skip the frame always.

Experiment
Two human subjects (User 1 and 2) (They challenged the task without practice.)

Task: Making system recognize a logo mark in a video with optical environment change (fluorescent light, sunlight and shadow)

random (for comparison): Exact label attachment to frames chosen at random

The user can indicate the target by mouse-clicking. System visualizes the recognition state in the whole video.

Training progresses

The user 1 indicated only the many almost same examples.