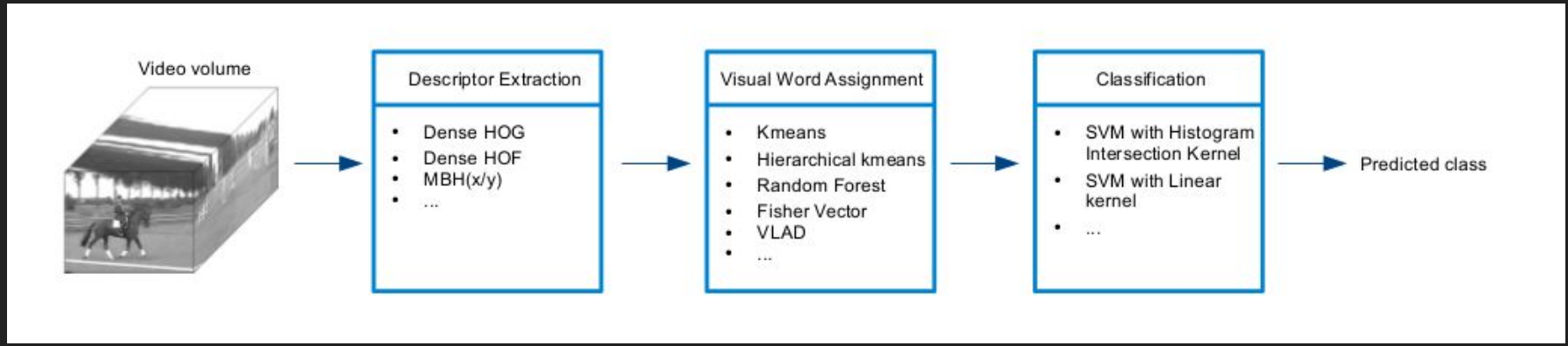
Video Classification

Using

Dense Trajectories

SMAI Project, Monsoon ‘16

Main Paper and Workflow



Uijlings, JRR, Duta, IC, Sangineto, E & Sebe, N 2015,
'***Video classification with Densely extracted HOG/HOF/MBH features: an evaluation of the accuracy/computational efficiency trade-off***'
International Journal of Multimedia Information Retrieval

Descriptor Extraction

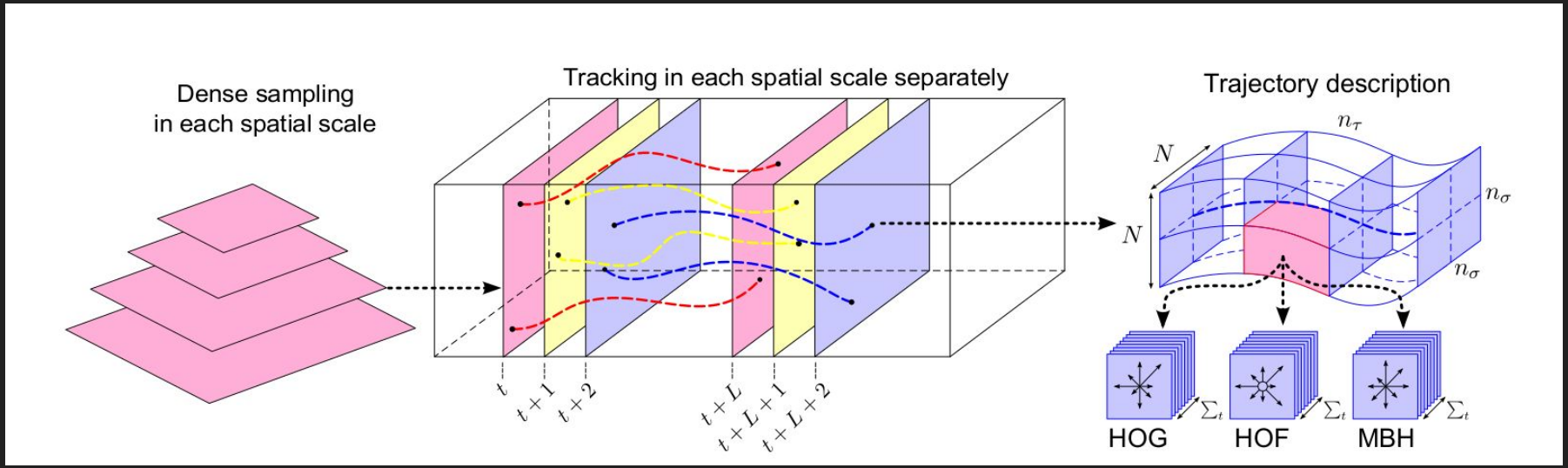
Research Paper

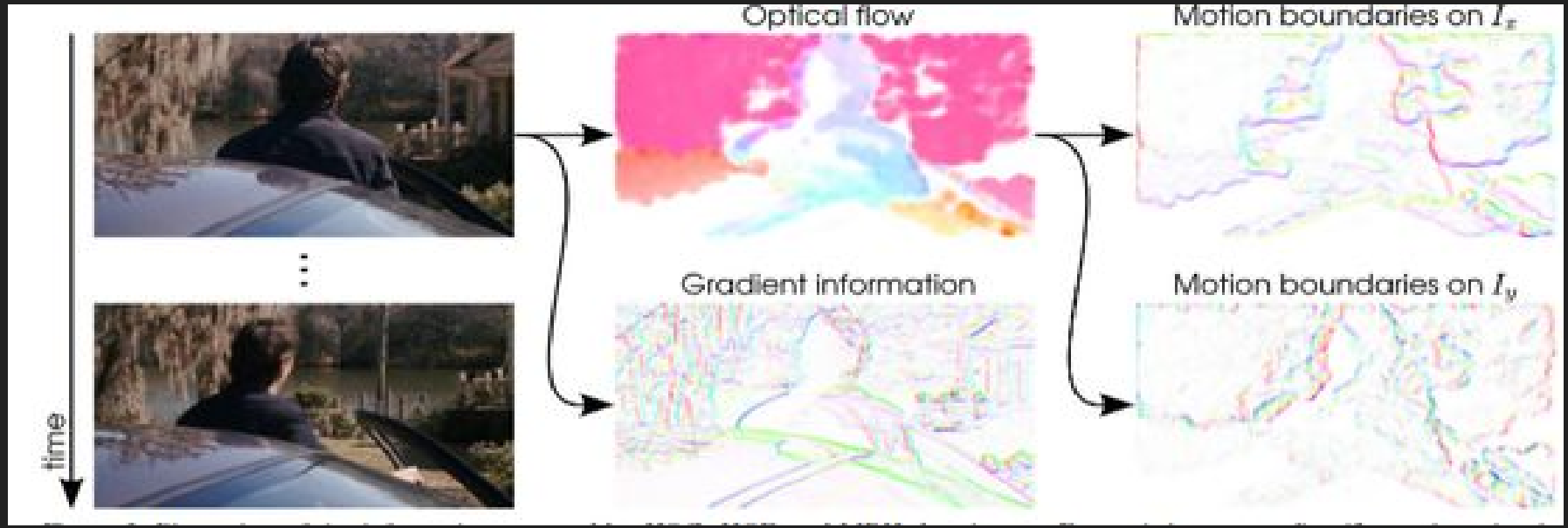
Action Recognition by Dense Trajectories

Heng Wang and Alexander Klaser and Cordelia Schmid and Cheng-Lin Liu
IEEE Conference on Computer Vision & Pattern Recognition, 2011 June

Code for feature extraction in OpenCV 2.4 available from the authors.

http://lear.inrialpes.fr/people/wang/dense_trajectories


Dense sampling
in each spatial scale
Tracking in each spatial scale separately
Trajectory description
t
$t+1$
$t+2$
$t+L$
$t+L+1$
$t+L+2$
n_τ
N
N
n_σ
n_σ
Σ_t
Σ_t
Σ_t
HOG
HOF
MBH

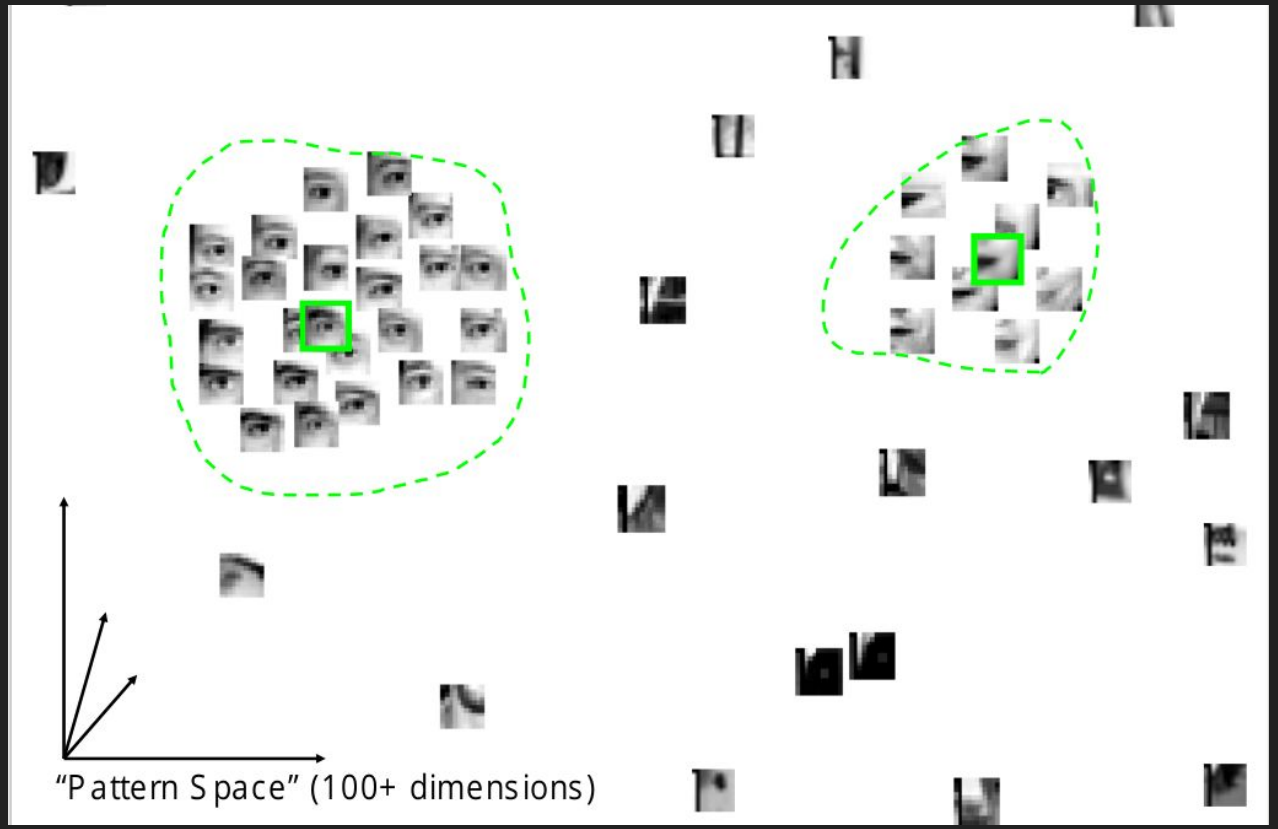


information captured by HOG, HOF, and MBH descriptors.

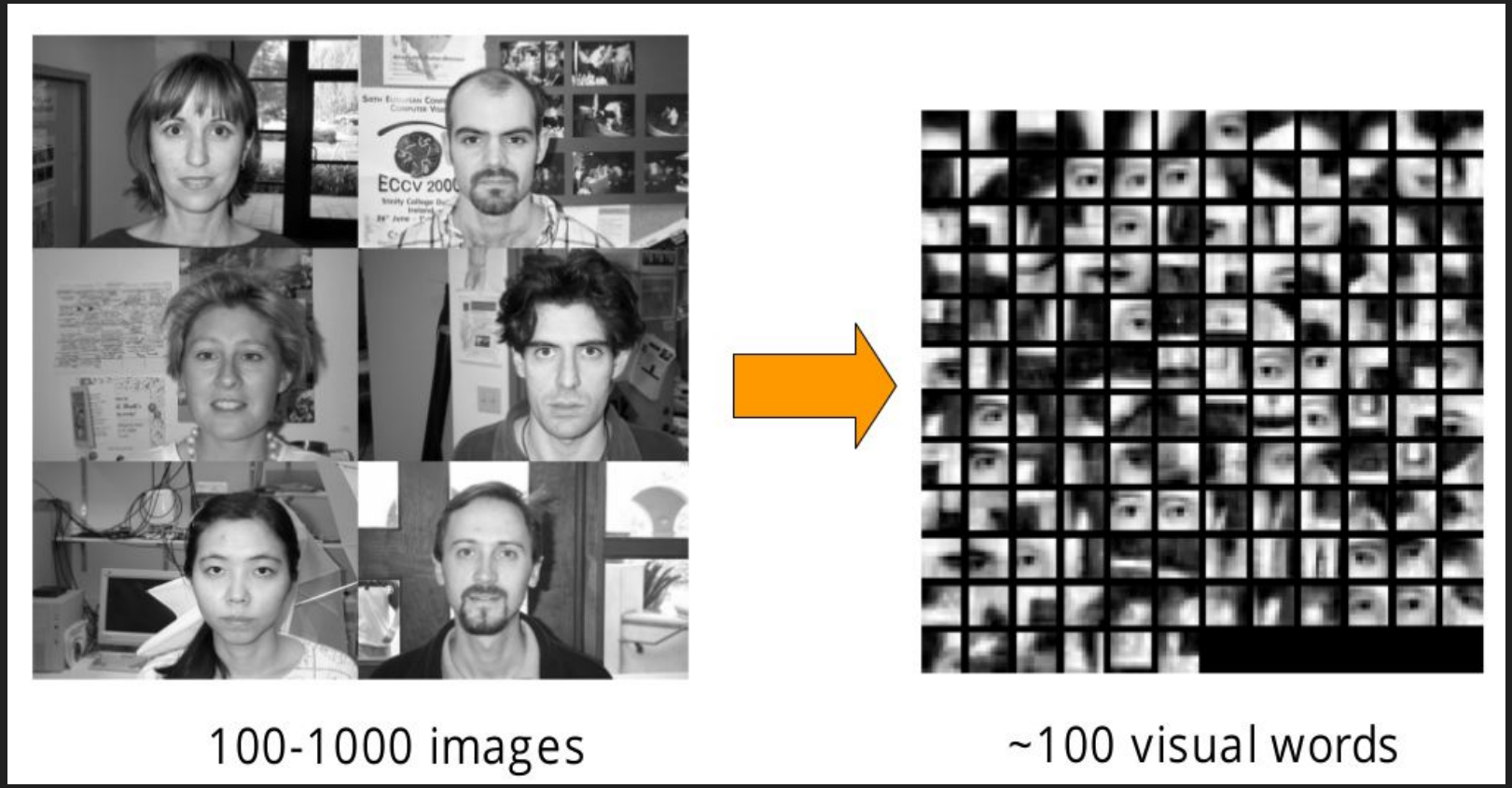
Visual Words Extraction

Bag of Visual Words using k-means clustering

- Construct a codebook for each descriptor (trajectory, HOG, HOF, MBH) separately.
- Cluster a subset of 100,000 randomly selected training features using k-means.
- Descriptors are assigned to their closest vocabulary word using Euclidean distance.
- The resulting histograms of visual word occurrences are used as video descriptors.



k-means clustering



Reduction from original images to bag of visual words.

Implementation

Can be done in MATLAB, or OpenCV.

Features encoded using k-means will be used in the classification stage.

Classification

Research Paper

Support vector machines based on K-means clustering for real-time business intelligence systems.

Jiaqi Wang*, Xindong Wu, Chengqi Zhang.

The images represented using a histogram of bag of visual words is feeded to an SVM classifier.

Main paper the project is based on uses a histogram kernel, and **libsvm** to implement the support vector machine for classification.

We’ll preferably be using the same.

https://www.csie.ntu.edu.tw/~cjlin/libsvm/

Datasets

- KTH Actions
- UCF Sports
- Hollywood
- Youtube, if time and resources permit.