DEEP LEARNING APPROACHES @LISTIC
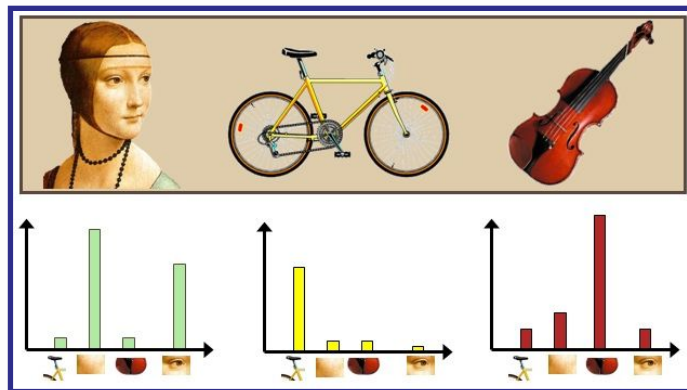
Alexandre Benoit, Patrick Lambert, Nicolas Voiron
Doctorantes : Amina Ben Hamida (cotutelle REGIM Lab, Université de Sfax, Tunisie)
Rizlène Raoui (CIFRE AboutGoodsCompagny)
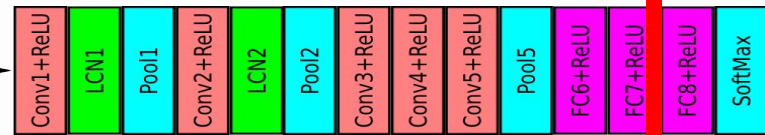Sourour Brahimi (REGIM Lab, Université de Sfax, Tunisie)

Annecy, september 2017

Engineered features VS learned features for image classification

VS

Transferred learned feature definitely outperforms classical state of the art methods

(c) Baseball Diamond

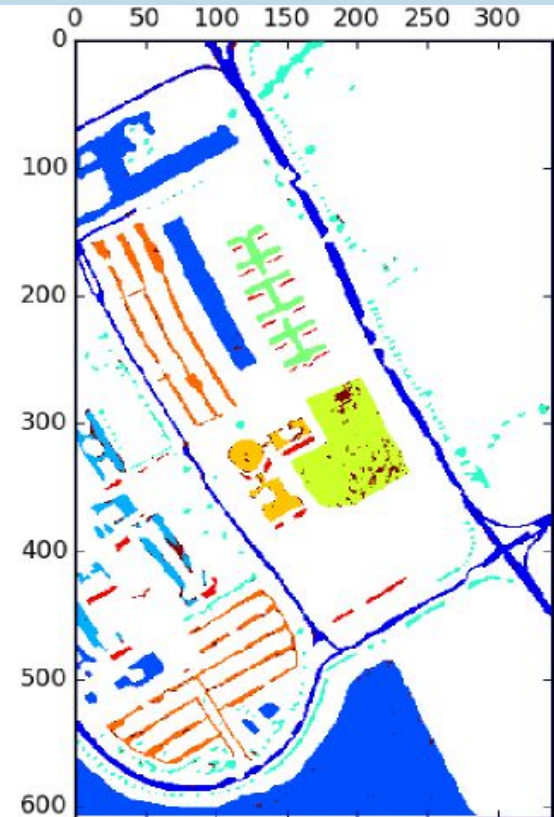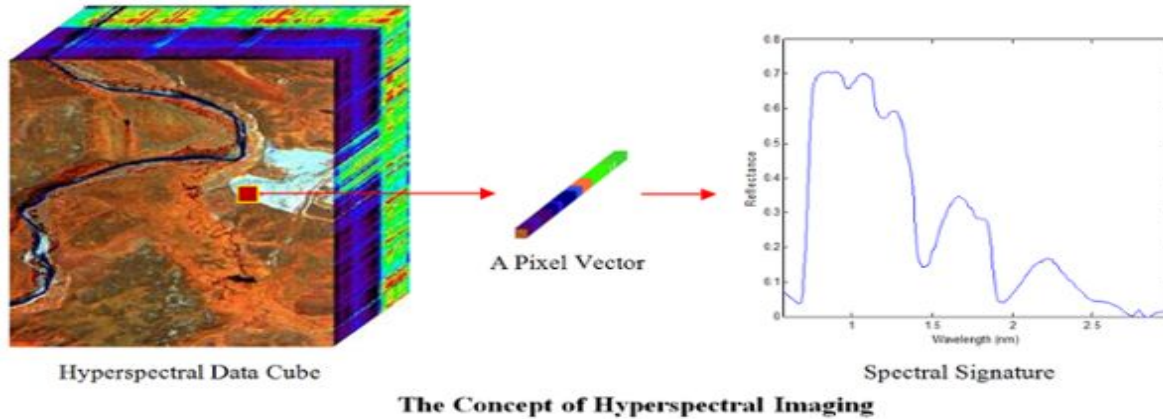(b) Airplane

DeepNet accuracy : 96%

State of the art Bag of words accuracy : 91%

Dealing with hyperspectral data using :
3D convolutions & network simplification (SqueezeNet)

Hyperspectral Data Cube

A Pixel Vector

Spectral Signature

The Concept of Hyperspectral Imaging

<u>**Method**</u> : Deep BUT light 3D network (8 layers, ~6000 parameters)
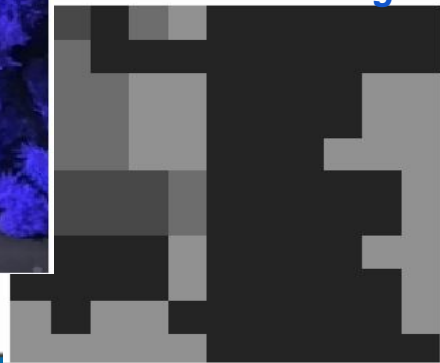<u>**Results**</u> : 98% accuracy training on 4% of the data (~2k samples)

Semantic segmentation from noisy reference [IGARSS2017]

Segment recent high resolution images (2016, 20m/pixel)

but training from outdated coarse reference (2009, 300m/pixel) :

FC-DenseNet, 25 layers, 1M parameters

Input image
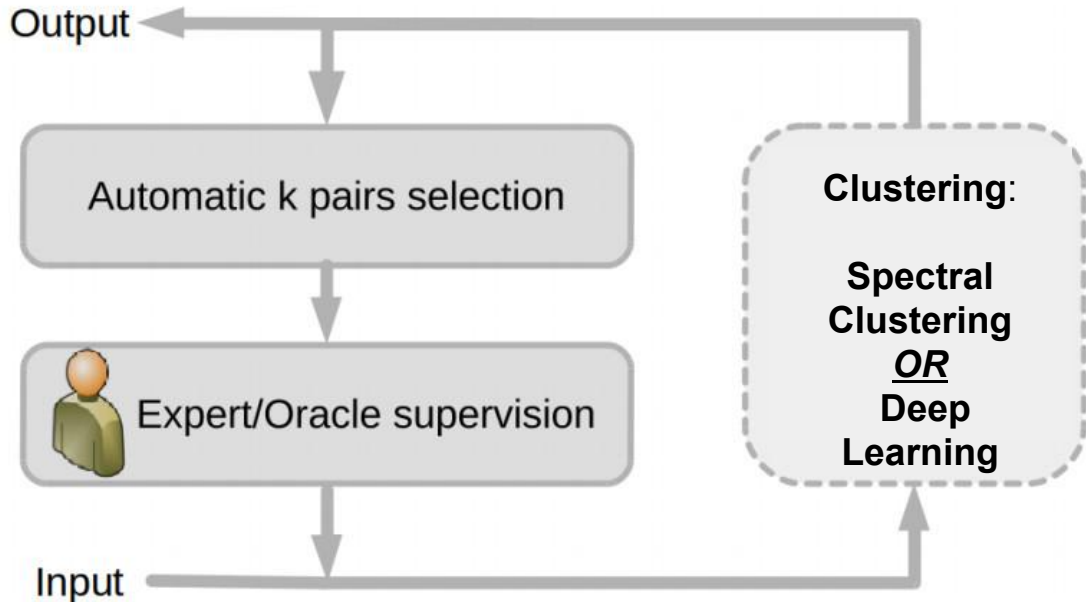
coarse reference used for training

predicted labels

real reference used for testing

Multimedia data clustering [CBMI2016]

Semi supervised learning :
Spectral clustering vs Deep metric learning

Output

Automatic k pairs selection

Expert/Oracle supervision

Input

Clustering:

Spectral Clustering
OR
Deep Learning

<u>**Method**</u> :
use label propagation to boost clustering approaches

<u>**Results**</u> :
- **propagation boosts DL**
- **DL better scales**
- **training issues must be investigated**

Multimedia target detection [TRECVid2012-2017]

TRECVid INS : find a target from few samples

exemple (BBC eastenders): "in a 800h video database find Stacey in cafe1"

Living room 1

Cafe 1

Dot

Stacey

Location samples (4 maximum/area)

Person samples (4 maximum/person)

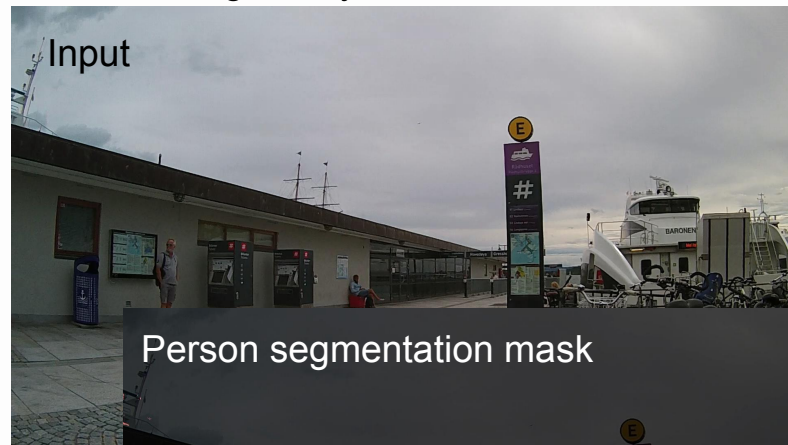# Multimedia semantic segmentation

Sale receipts analysis :
R. Raoui PhD, LISTIC/About Goods Company

Person detection in high resolution Timelaps:
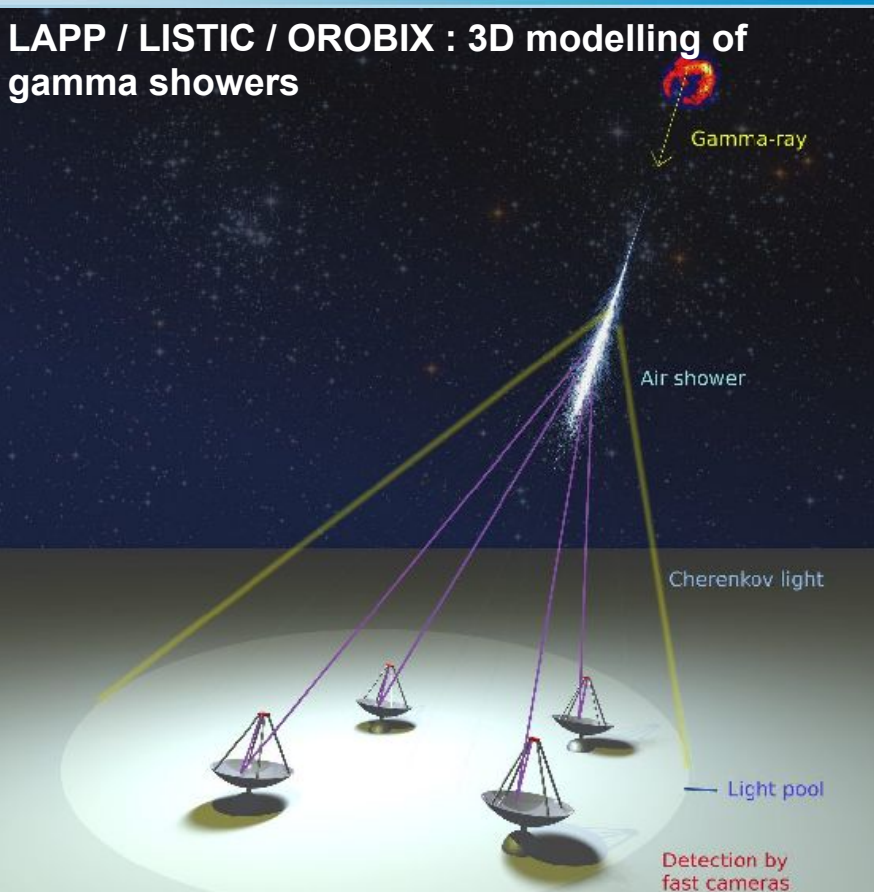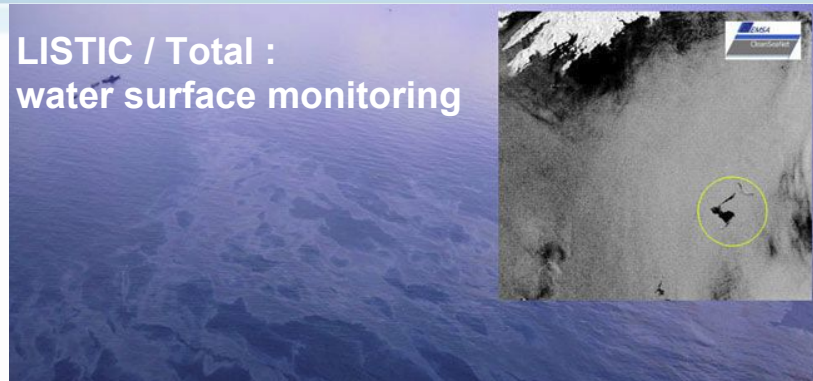LISTIC/Regim/Edytem labs, S/Brahimi

Input

Person segmentation mask

New projects

LAPP / LISTIC / OROBIX : 3D modelling of gamma showers

Gamma-ray

Air shower

Cherenkov light

Light pool

Detection by fast cameras

LISTIC / Total : water surface monitoring

LISTIC / Noveltis / CNES (pending) : Remote sensing object detection