FACULTY OF MATHEMATICS,
PHYSICS AND INFORMATICS
Comenius University
Bratislava

Pattern Recognition

Lab 1 - Introduction

Ing. Viktor Kocur, PhD.

16.2.2022

Kontaktné informácie

- Room: I-4
- Consultations: e-mail me, I am ususally available after 13:00
- E-mail: viktor.kocur@fmph.uniba.sk, kocurvik@gmail.com
- Website: `https://dai.fmph.uniba.sk/w?title=Course:Rozpoznavanie_obrazcov`
- GitHub: `https://github.com/kocurvik/edu`

Requirements for exam

40 points max for labs:

- 10pt - Activities during labs
- 5pt - Preliminary project report
- 25pt - Project (presentation, code, final report)

To pass the labs you need at least 20 points!

Project

Two types of project:

1. Feature extraction + classification
2. Classification on data from a database (features are already available)

The project contains:

- Preliminary report - information about the data and methods you plan to use
- Presentation
- Final report + code

Deadlines will be determined later!

Two approaches

Pattern

Pattern is a formal description of an object.

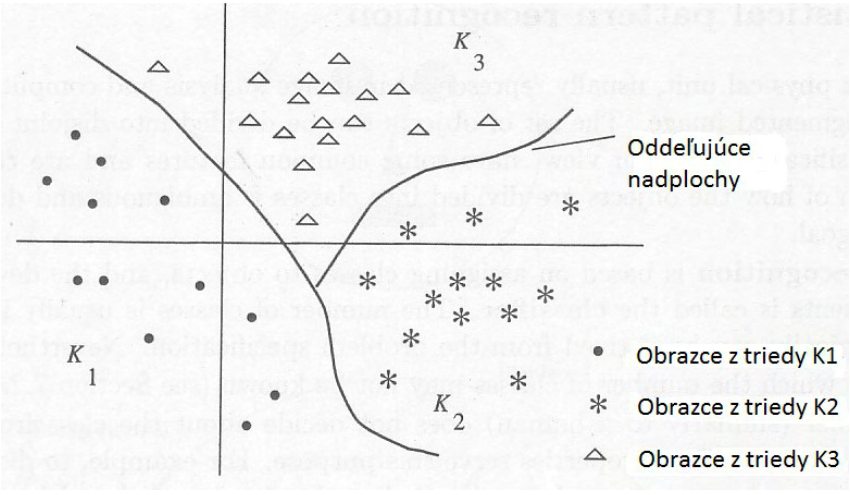
Statistical description

Pattern is a vector of features. For example a vector from $\mathbb{R}^n$.

Syntactic description

Pattern is a string of words from a given language. The words are primitives of the language.

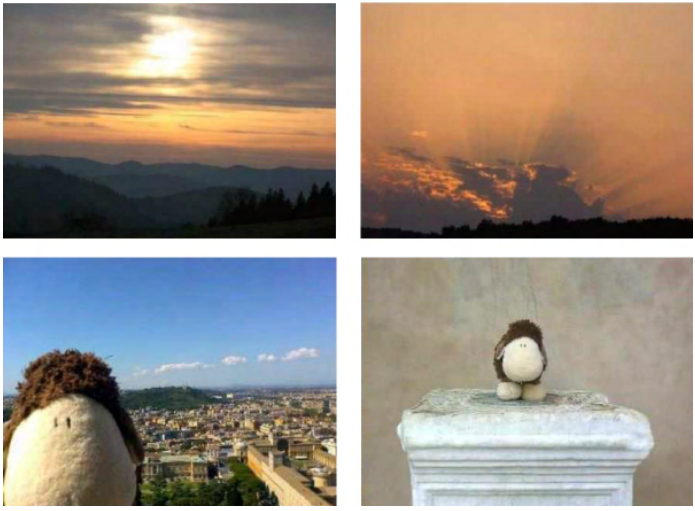
Classification - statistical approach



Statistical approach - example

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.2500	NaN	S
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.2833	C85	C
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.9250	NaN	S
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.1000	C123	S
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0500	NaN	S
5	6	0	3	Moran, Mr. James	male	NaN	0	0	330877	8.4583	NaN	Q
6	7	0	1	McCarthy, Mr. Timothy J	male	54.0	0	0	17463	51.8625	E46	S
7	8	0	3	Palsson, Master. Gosta Leonard	male	2.0	3	1	349909	21.0750	NaN	S
8	9	1	3	Johnson, Mrs. Oscar W (Elisabeth Vilhelmina Berg)	female	27.0	0	2	347742	11.1333	NaN	S

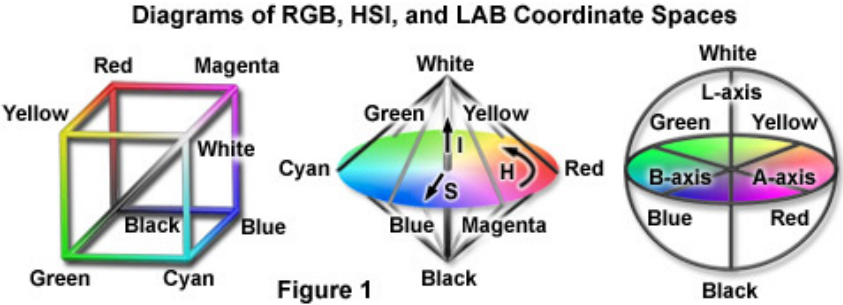
Local vs. global



Instance vs. class

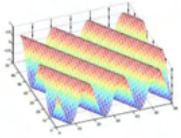
Shape features

Color features

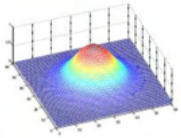


Textures

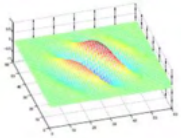
Gábor filters



(a)



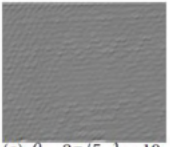
(b)



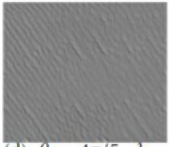
(c)

(a) Vstupný obraz.

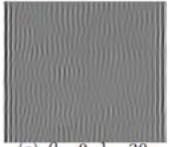
(b) $\theta = 0, \lambda = 10.$



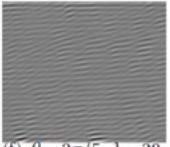
(c) $\theta = 2\pi/5, \lambda = 10.$



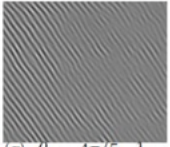
(d) $\theta = 4\pi/5, \lambda = 10.$



(e) $\theta = 0, \lambda = 30.$

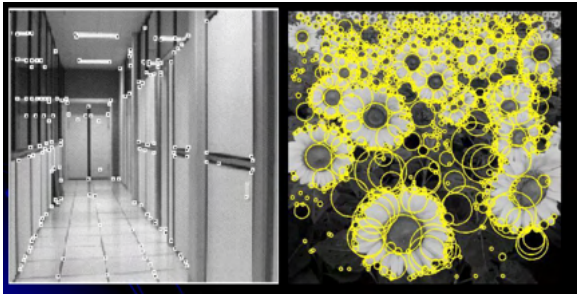


(f) $\theta = 2\pi/5, \lambda = 30.$



(g) $\theta = 4\pi/5, \lambda = 30.$

Corners, Blobs, HOG



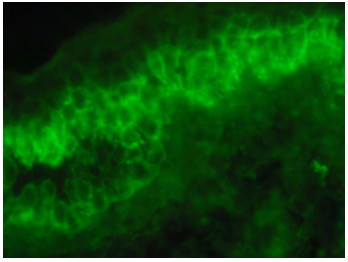
Input image

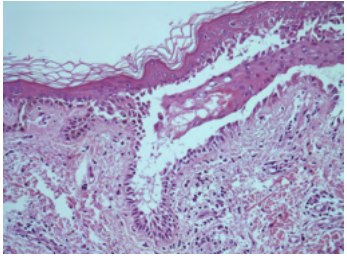
Histogram of Oriented Gradients

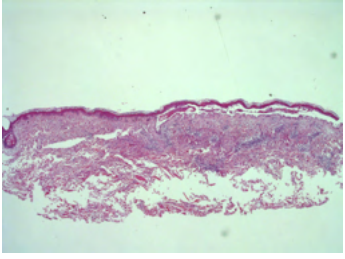
Example

Example

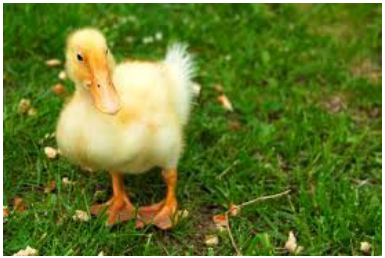
Example





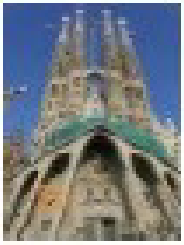


Example



Example

nn



zoom in