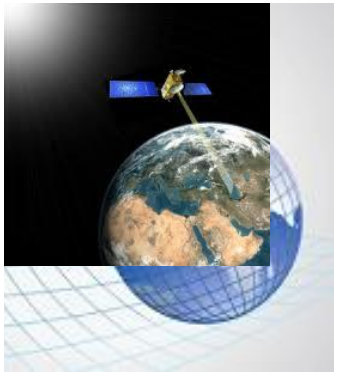
UNIVERSITAT POLITÈCNICA DE VALÈNCIA

ESCUELA TÉCNICA SUPERIOR DE INGENIERÍA GEODÉSICA CARTOGRÁFICA Y TOPOGRÁFICA

MASTER'S PROGRAMME IN GEOMATICS ENGINEERING AND GEOINFORMATION

- **Branch:** IT / Engineering/ Architecture
- **Implementation year:** Academic year 2010/11
- **Aimed at** graduates who want to deepen their insight in Geomatics:
  - Graduates in Geomatics and Surveying Engineering
  - Other engineering
- **GEOMATICS**: Discipline devoted to collecting, storing, processing and visualising of georeferenced information (geo-information) using multiple techniques:



Remote Sensing — Photogrammetry

Cartography — Geographic Information Systems

Geostatistics — 3D modelization

Global Navigation Satellite Systems (GPS, Galileo…)

…

SYLLABUS (EF)

120 ECTS
4 SEMESTERS

FIRST YEAR

Semester A			Semester B		
Subject	***ECTS***	***Category***	***Subject***	***ECTS***	***Category***
Programming for Geospatial Applications EF	6	Compulsory	Web Development and Geoportals EF	6	Compulsory
Geostatistics and Multivariate Analysis EF	6	Compulsory	Distribution of Spatial Information EF	6	
Urban Planning and Cadastre EF	6	Compulsory	GIS Application Development EF	6	
Geomatic Applications in Geomarketing EF	6	Elective	Positioning EF	6	
Big Data/ Data Mining EF	6	Elective	Geospatial Content Managers and Smart Cities **Completely in English.**	6	Elective

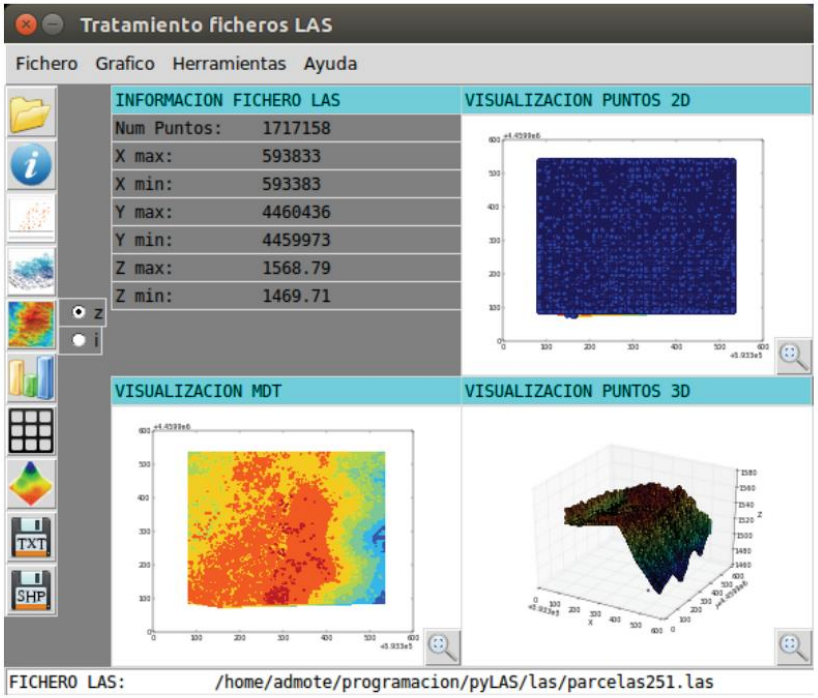
SECOND YEAR

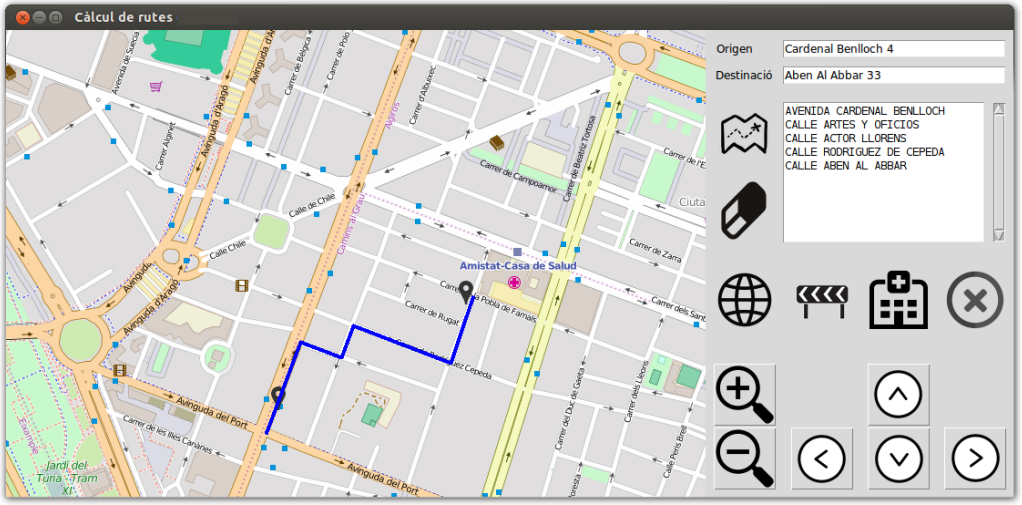
Semester C			Semester D		
Subject	***ECTS***	***Category***	***Subject***	***ECTS***	***Category***
Remote Sensing and Cartographic Updating EF	6	Compulsory	Instrumentation for Spatial Data Acquisition EF	6	Elective
Environmental Mapping and Modelling EF	6		Geovisualisation y 3D Modelling EF	6	
Techniques for Heritage and Architectural Documentation EF	6		Work Placement EF	6	
Sensor Georeferencing and Navigation EF	6		Master Thesis EF	18	Compulsory
Geospatial Apps in Mobile Devices EF	6				

EF → English Friendly (doubts and tutorial classes, exams and presentations).

First year, semester A

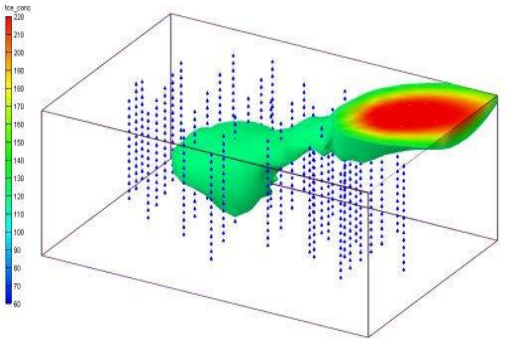
PROGRAMMING FOR GEOSPATIAL APPLICATIONS





First year, semester A

GEOSTATISTICS AND MULTIVARIATE ANALYSIS

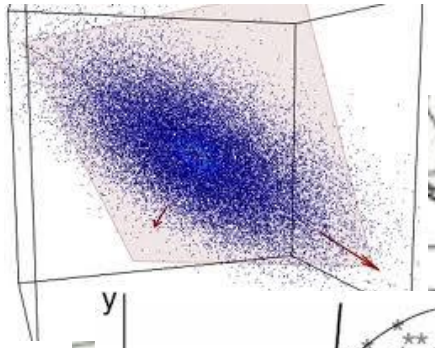


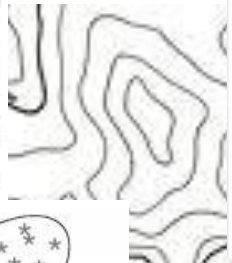
Correlations

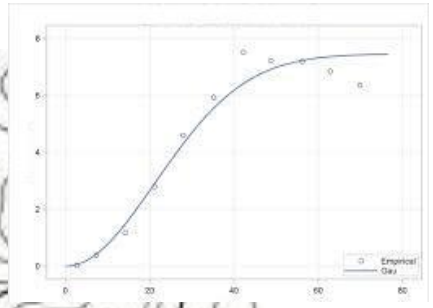
PCA

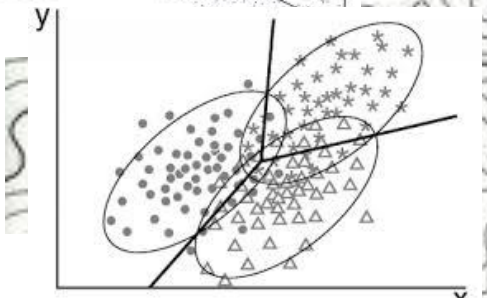
Discriminant Analysis

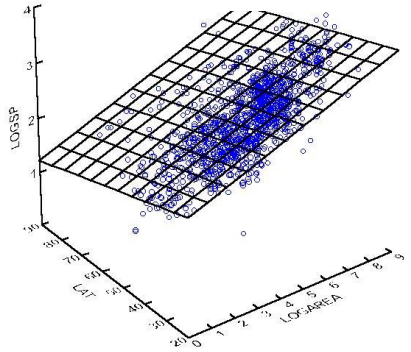
Multiple Regression

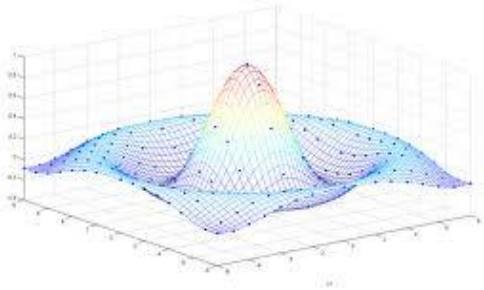












Semivariogram

Kriging

Cokriging

Interpolation

First year, semester A

URBAN PLANNING AND CATASTRE

URBAN PLANNING

- Spanish Regulations in Urban Planning and Management
- Urban Plan Typologies
- Cartography in Urban Planning

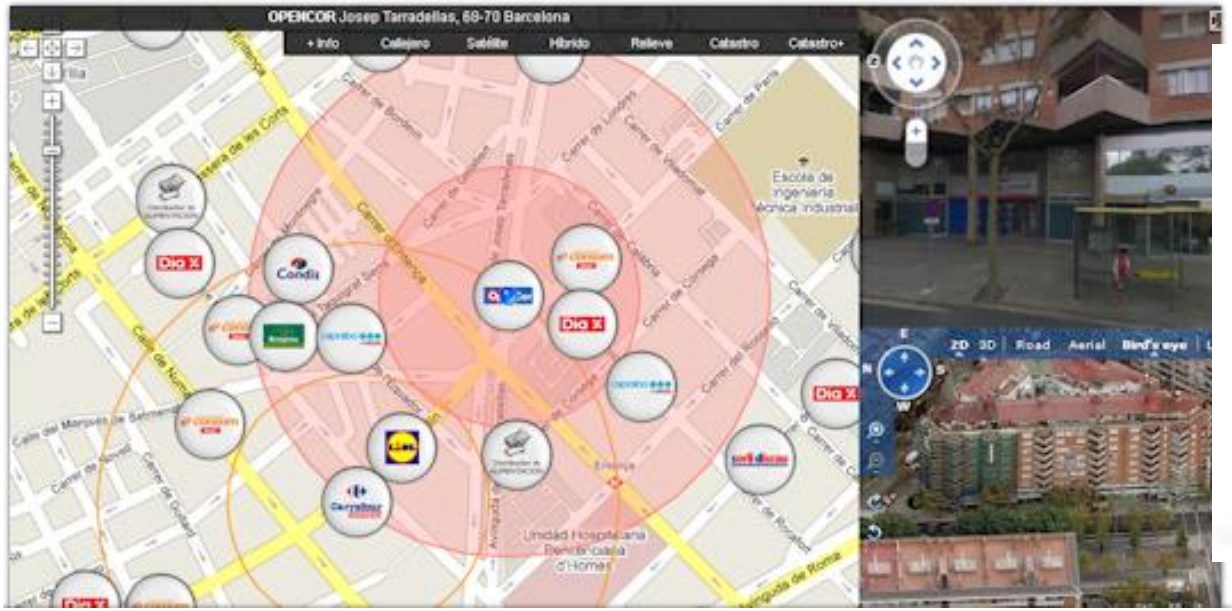
CADASTRE

- Cadastre and Land Registry Coordination
- Cadastral Regularisation
- International Cadastre Models. Géomètre Expert
- The Land Administration Domain Model (LADM)

GEOMATIC APPLICATIONS IN GEOMARKETING

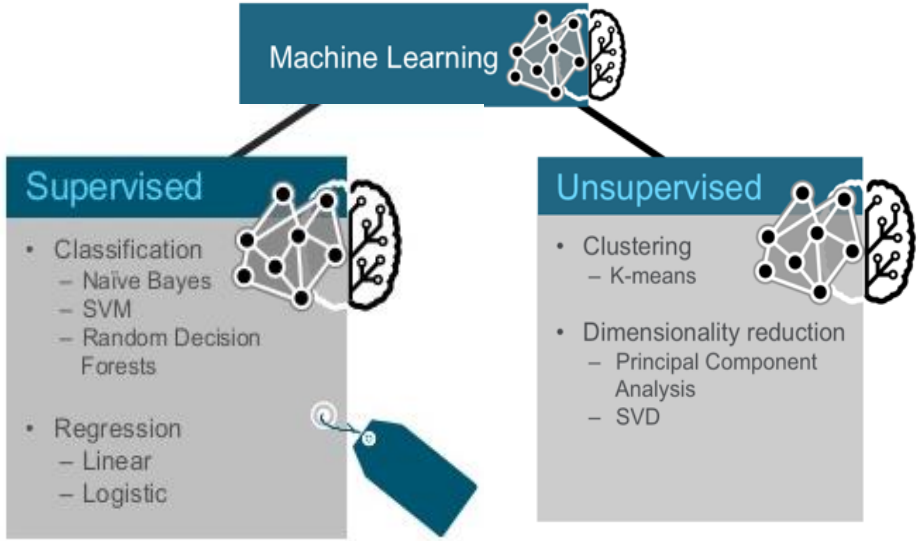
- Geomarketing provides information for making business decisions based on spatial localization.

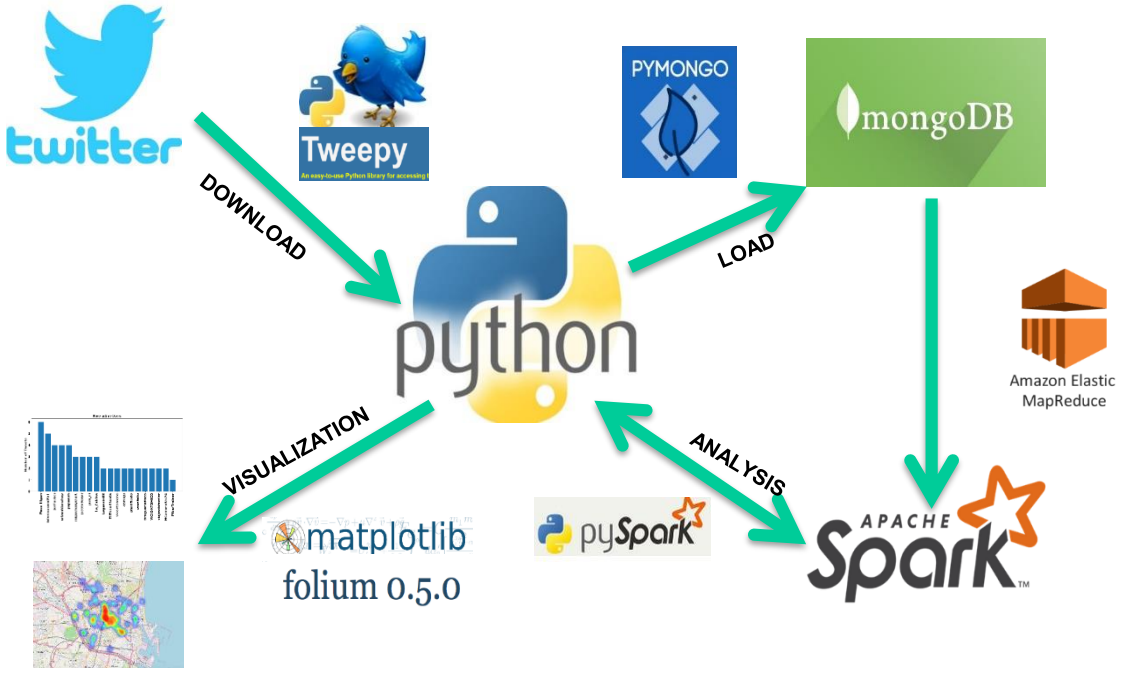
- Analysis of a business through the exact location of customers, points of sale, branches, etc., locating them on a map through symbols and personalized colors to make profitable commercial actions.



BIG DATA / DATA MINING

1. STORAGE
2. ANALYSIS TOOLS
3. DATA MINING

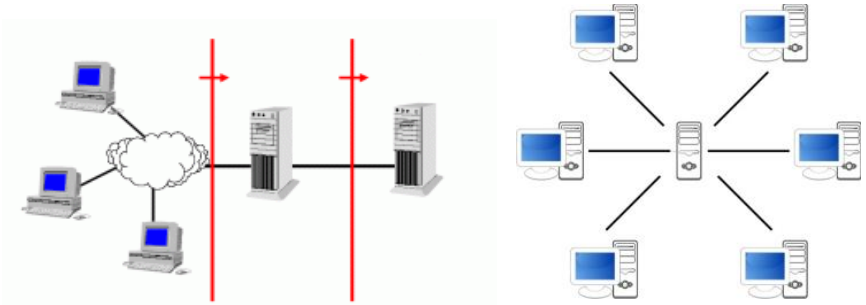




First year, semester B

WEB DEVELOPMENT AND GEOPORTALS

Information Architectures:
Web and Client-Server



Languages

HTML CSS JavaScript XML python

Frameworks:

jQuery mobile GeoExt jQuery write less, do more.

MapServer open source web mapping

Advanced Geoportal

Geoservices OGC

Server Programming

OpenLayers™ django

GeoServer

DISTRIBUTION OF SPATIAL INFORMATION

REGULATIONS

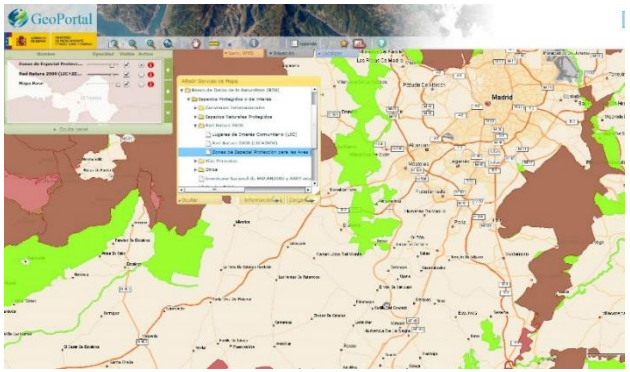
SPECIFICATIONS

- Hydrography
- Land Use
- Transportation Networks
- Urban Areas
- …

METADATA

DATA MODELS MANAGEMENT

LISIGE



Spatial analysis tools

First year, semester B

GIS APPLICATION DEVELOPMENT

Development language: **Python**

Programming Environments:

Arcpy (ArcGIS)

PyQGIS (Quantum GIS)

POSITIONING

Computation Algorithms
Software and Tecniques
Applications

GNSS multiconstelation

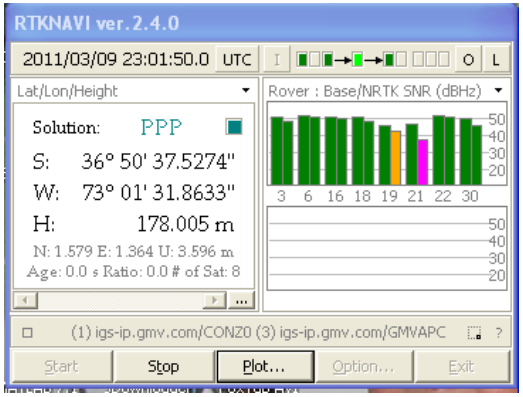
Positioning Equations: programming

PPP: Precise Point Positioning

Atmosphere, Ionosphere (Galileo), Troposphere (Climate)

Wide Area DGPS

Kinematic GPS RTK (Agriculture)

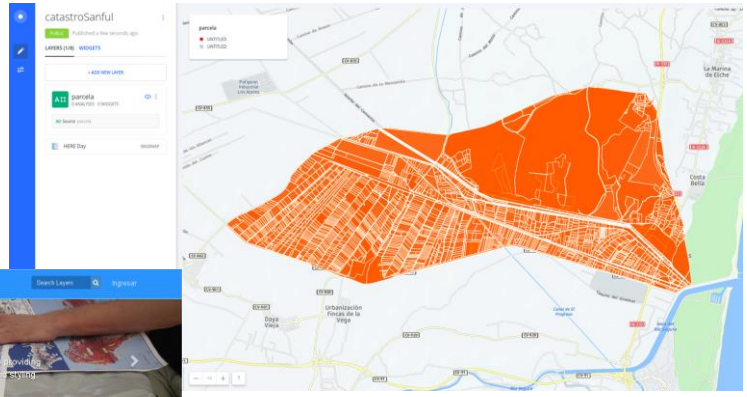


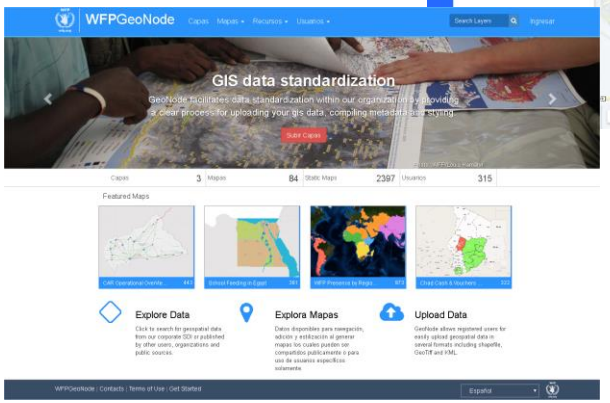
First year, semester B

GEOSPATIAL CONTENT MANAGERS AND SMART CITIES

1. GEOSPATIAL CONTENT MANAGERS

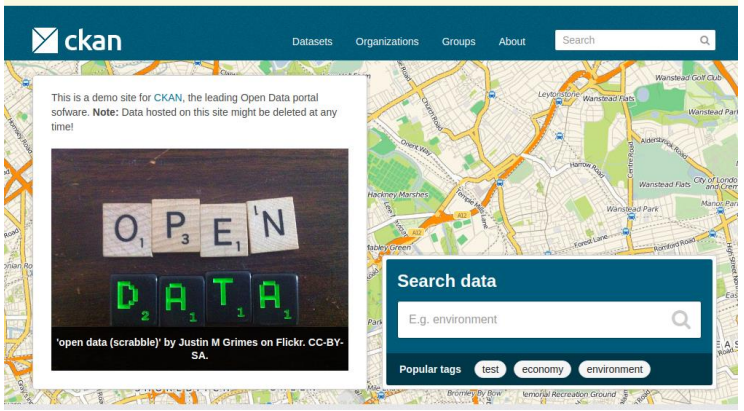
- Web mapping and online spatial analysis: CartoDB, Geocloud
- GeoNode, Geoshape, gvSIG online
- OpenData: CKAN.





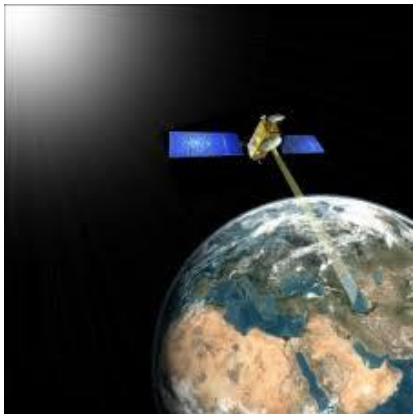
2. SMART CITIES

CKAN: http://docs.ckan.org/en/latest/



Second year, semester C

REMOTE SENSING AND GEODATABASE UPDATING



Thematic Mapping

Biophysical Variables

Earth Observation Programmes
Soil Use Databases

PNOT

Copernicus

SIOSE

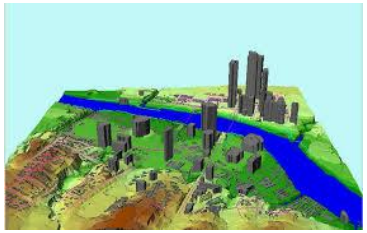
INSPIRE - Infrastructure for Spatial Information in Europe

Image Segmentation
Feature Extraction
Variable Selection
Classification Methods
Sampling
Morphologic Filters

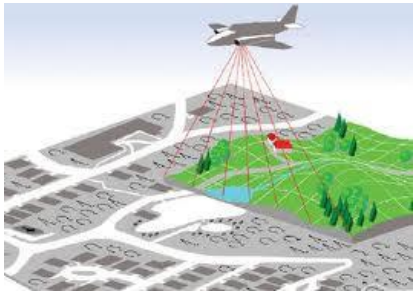
Database Updating

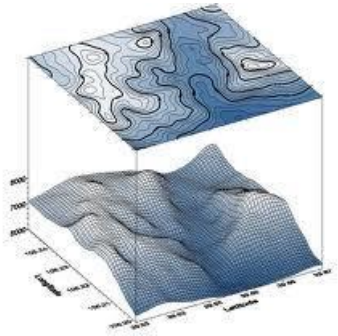
Second year, semester C

ENVIRONMENTAL MAPPING AND MODELLING



DIGITAL ELEVATION MODELS





INTEGRATION WITH GEOSPATIAL DATASETS

- Climate
- Geology
- Satellite images…

Geomorphologic Analysis
River and Coast Dynamics
Fire Ecology
Risk Analysis

Second year, semester C

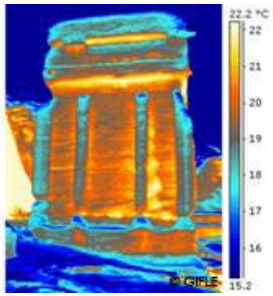
TECNIQUES FOR HERITAGE AND ARCHITECTURAL DOCUMENTATION

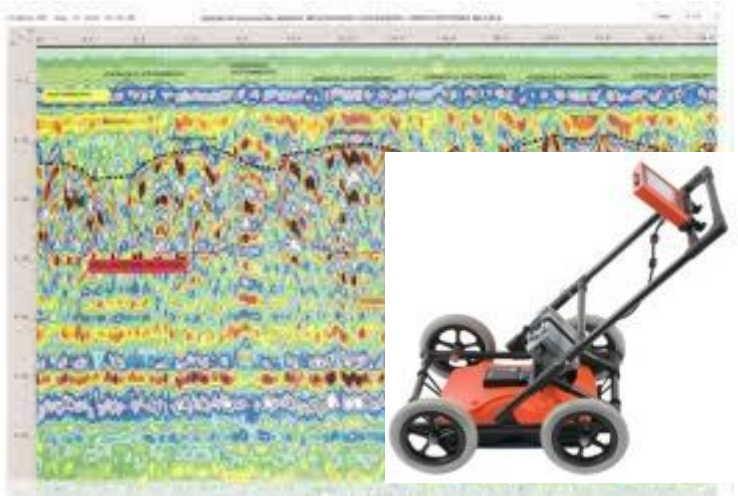
Capture / Processing / Analysis

Visible / Thermal / Multispectral

Laser Scanner

Georadar



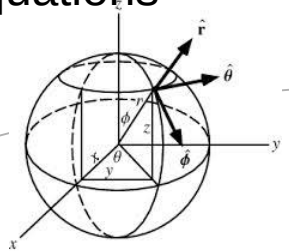


Monitoring / Diagnosis

APPLIED PROJECT

SENSOR GEOREFERENCING AND NAVIGATION

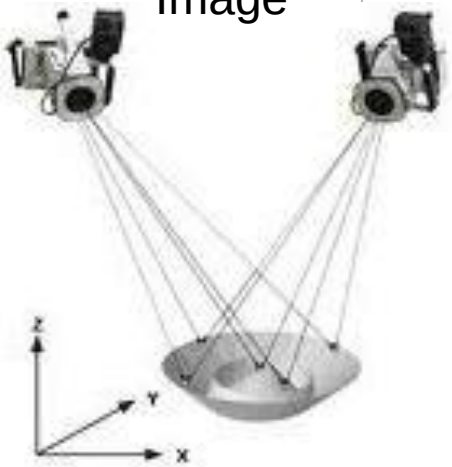
Coordinate Systems
Navigation Equations



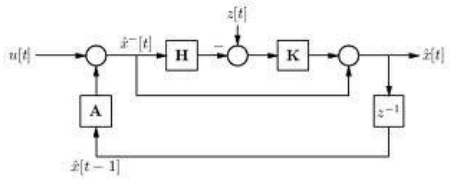
INS

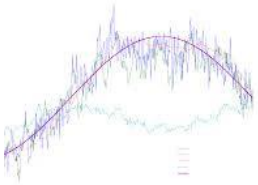
GNSS

Image



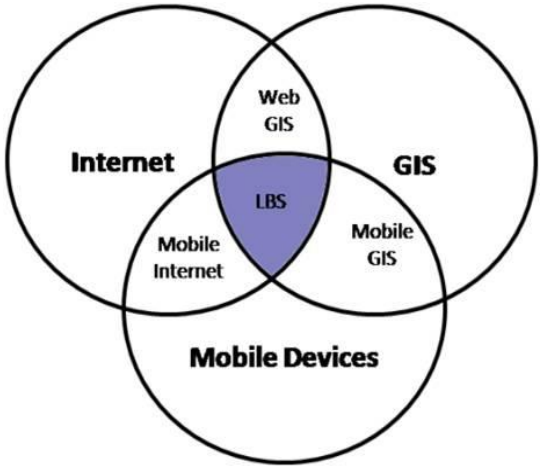
Integration
Kalman Filters





GEOSPATIAL APPS IN MOVILE DEVICES

Location Based Services (LBS)

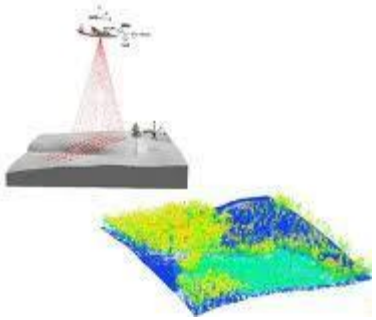


Smart Cities

INSTRUMENTATION FOR SPATIAL DATA ACQUISITION

Geomatics project using multiple collection techniques

Laser Scanner



LIDAR

GNSS

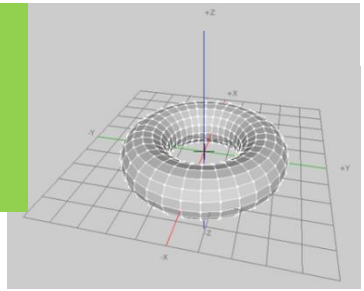
GPR

UAV

Close-Range Photogrammetry

Second year, semester D

GEOVISUALISATION AND 3D MODELLING



Principles of visualisation

2D, 3D and 4D techniques

3D modelling in archaeology, landscape,…

Augmented reality

DOUBLE DEGREES

École Spéciale des Travaux Publics

París (France)

University of Applied Sciences

Karlsruhe (Germany)

Methodology

Combination of theory and practical applications

Seminars and workshops

Work placements (elective)

SERVICIO INTEGRADO DE EMPLEO

Visits to private companies and public institutions and talks by experienced professionals from the different fields of Geomatics

Leica Geosystems

TOPCON

ICV INSTITUT CARTOGRÀFIC VALENCIÀ

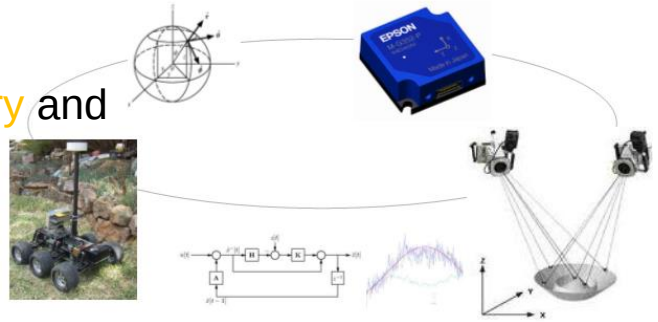
INSTITUTO GEOGRÁFICO NACIONAL cnig

Partners

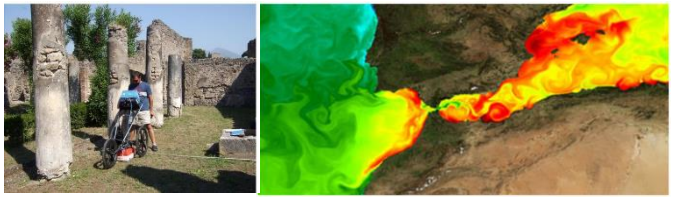

VSC
VAL SPACE CONSORTIUM
esa
European Space Agency
gmv
INNOVATING SOLUTIONS
aplitop
Aplicaciones de Topografía e Ingeniería Civil
Zenit
TOPOGRAFÍA, CARTOGRAFÍA Y FOTOGRAMETRÍA, S.L.
Global Geomática
geoconcept
AJUNTAMENT DE VALÈNCIA
ICV
INSTITUT CARTOGRÀFIC VALENCIÀ
astro escénica
una ventana al universo
mediXXI gsa
Excavaciones RECHE
Taller Innovación Abierta
geozone
GENERALITAT VALENCIANA
eye 20 21
DIPUTACIÓ DE VALÈNCIA
Ajuntament d'Ajuntaments
FG Topografía / Mediciones Topográficas
Dryade
JARDINERÍA Y MEDIOAMBIENTE
TOPO MARKET
Leica Geosystems
ABO WIND
GETOP
GEODESIA Y TOPOGRAFÍA INGENIEROS
grupo NOVACARTOGRAPHIA
Trimble
esri
gvSIG
cota
Cota Ambiental S.L.P.
INSTITUTO GEOGRÁFICO NACIONAL
cnig
GOBIERNO DE ESPAÑA
MINISTERIO DE FOMENTO
TOPCON
CONNECTING VISIONS
DIELMO
valersa
grupo
GENERALITAT VALENCIANA
GOBIERNO DE ESPAÑA
MINISTERIO DE DEFENSA
INTA
AUTODESK
GRUPO AGUAS DE VALENCIA
PLANETICA
INNOVACIÓN EN CONSULTORÍA INTERNACIONAL

Geomatics students will lern to…

- Work with data collected with different Global Navigation Satellite Systems (GPS, Galileo, GLONASS, etc.)
- Develop mapping applications for mobile devices (*smartphones*, *tablets*, etc.)
- Integrate Sensors for navigation purposes (using GNSS, inertial sensors and imagery)
- Work whit cartographic models for environemtal and natural hazard studies.
- Manage resources using Geographic Information Systems (GIS).
- Set up map servers and geoportals.
- Use multispectral satellite images for updating cartographic databases.
- Manage 3D data obtained by LiDAR or laser scanner.
- Apply the methodology for heritage documentation.
- Manage databases for cadastral information, real state registry and territory.



Graduate employability



Our graduates develop highly valued skills and abilities both in the public (mapping agencies, environment or transportation departments, etc) and private sectors (construction companies, consulting firms, service providers, etc)

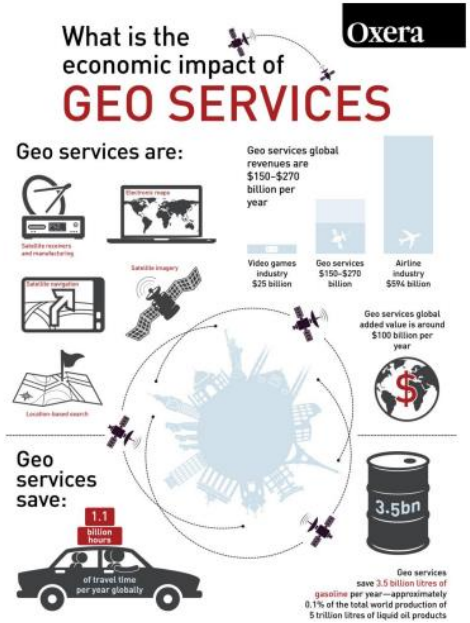
CAREERS AND RECRUITMENT

Mapping opportunities

Scientists who can combine geographic information systems with satellite data are in demand in a variety of disciplines.

NATURE | VOL 427 | 22 JANUARY 2004 | www.nature.com/nature

2013 OXERA report for Google on the economic impact of geoservices



DOCTORATE PROGRAMME IN GEOMATIC ENGINEERING BY THE UNIVERSITAT POLITÈCNICA DE VALÈNCIA AND THE UNIVERSIDAD POLITÉCNICA DE MADRID

3 years in a consolidated group working in competitive and funded Research and Development projects

Current business partners:

CTTC

CSIC
CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS

Trimble

Leica Geosystems

INSTITUTO GEOGRÁFICO NACIONAL

cnig

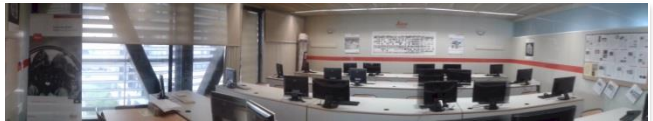
TOPCON

- # LABORATORIES AND SEMINARS
- **With last generation instruments and sensors**
  - GNSS receivers (Topcon, Trimble and Leica)
  - Total stations
  - Laser Scanner Scanstation2
  - Georradar GPR gssi 3000
  - Seismograph
  - Data processing and analysis software (Bernese, CAD/ArcGIS/ENVI)
  - 2 UAVs






www.top.upv.es



- **Training for employment**
  - Employment forum
  - Business days
  - Sponsored rooms: Topcon and Leica
  - Enterpreneurship formation:
    - Start-UPV space
  - Work placements in international companies
  - Students visits to prestigious companies (ESA, IGN, ICC, ICV, GMV…)

ESA. 2013

IGN. 2014

GMV. 2015

Further information:

http://www.upv.es/entidades/ETSIGCT/infoweb/euittop/info/880897normali.html

https://geomaticaupv.webs.upv.es/master-en-ingenieria-geomatica-y-geoinformacion/

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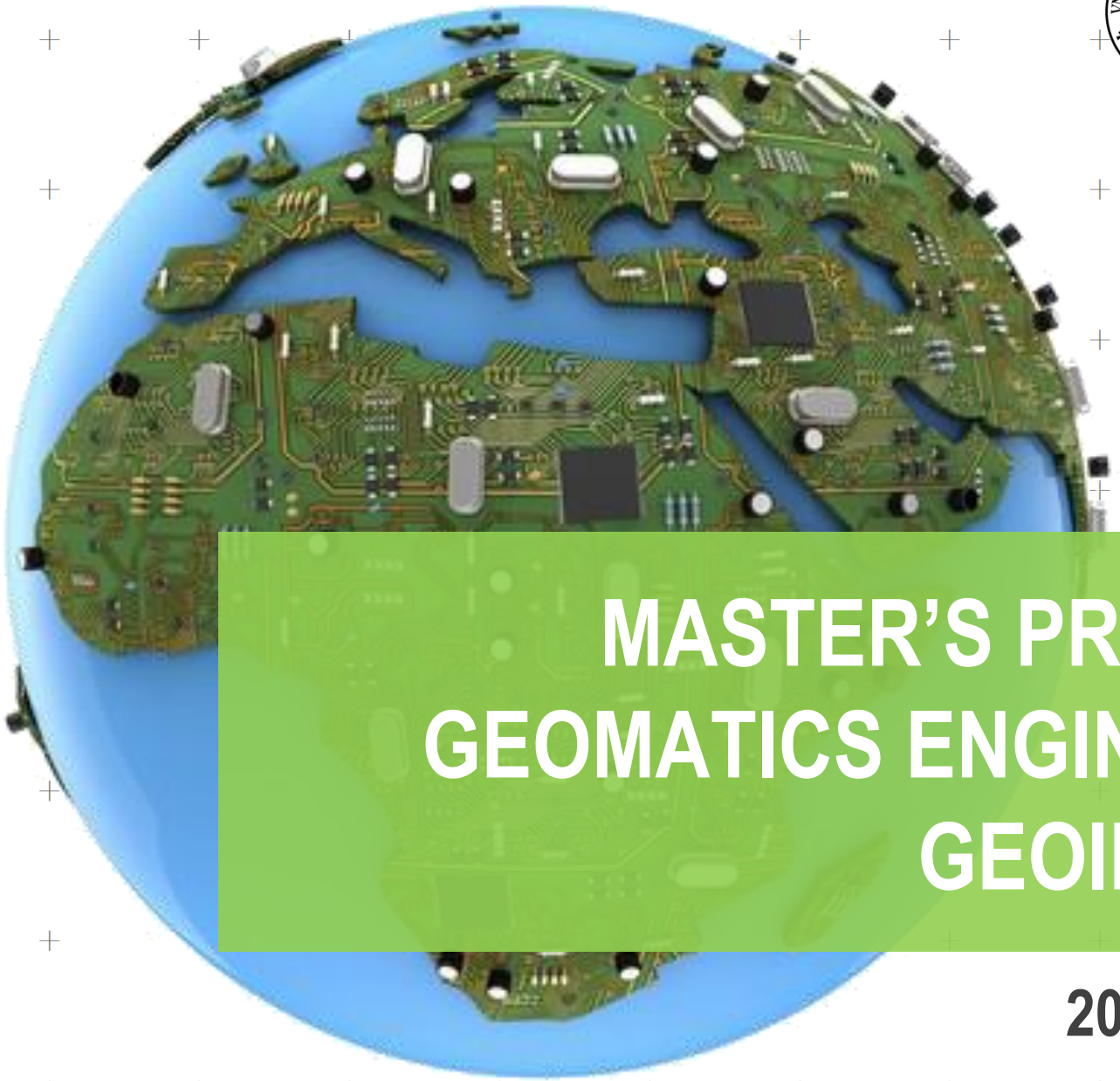

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MASTER'S PROGRAMME IN GEOMATICS ENGINEERING AND GEOINFORMATION

2018-2019