中山大學
SUN YAT-SEN UNIVERSITY

HYPERCOMP
Hyperspectral Computing Laboratory

Hyperspectral Image Analysis:
高光谱遥感分析
Course introduction

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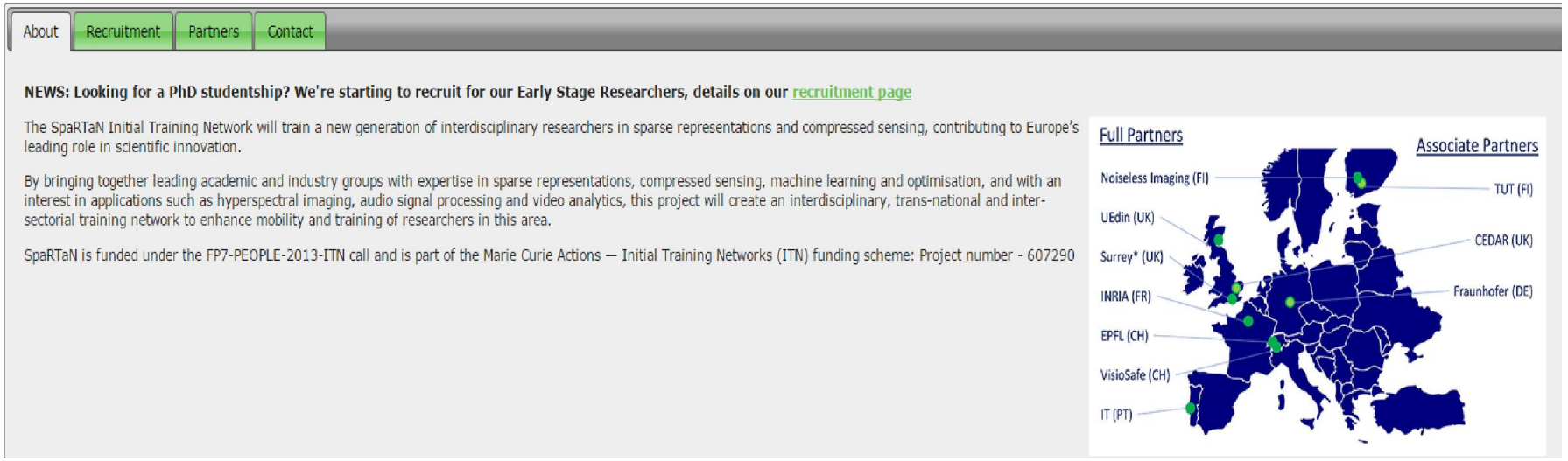
Keynotes（关键词）

1. 就业：高光谱已经迈入民用阶段，工作机会越来越多
2. 考研：专业选择、科研经历（面试重点）
3. 出国：推荐信、绩点、英文成绩、科研经历、知识
4. 高光谱分析的特点（与其他课程的区别）
5. 其他遥感分析的特点
6. 多元统计分析的特点：最新手段和方法
7. 国内外课程的区别（冰岛大学讲课经历）
8. 课程理念：全面、丰富，遥感发展的最新阶段
9. 讨论

Hyperspectral (高光谱)

SpaRTaN

Sparse Representations and Compressed Sensing Training Network



Hyperspectral (高光谱)

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Prof. Dr. Devis Tuia

SNSF Professor, Head of Unit

Multimodal Remote Sensing
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Research interests

- Earth Observation
- Data fusion
- Machine learning, pattern recognition
- Interactive models
- Land use / land cover classification
- Vegetation parameters retrieval
- Imaging spectroscopy
- Very high resolution imaging
- LiDAR

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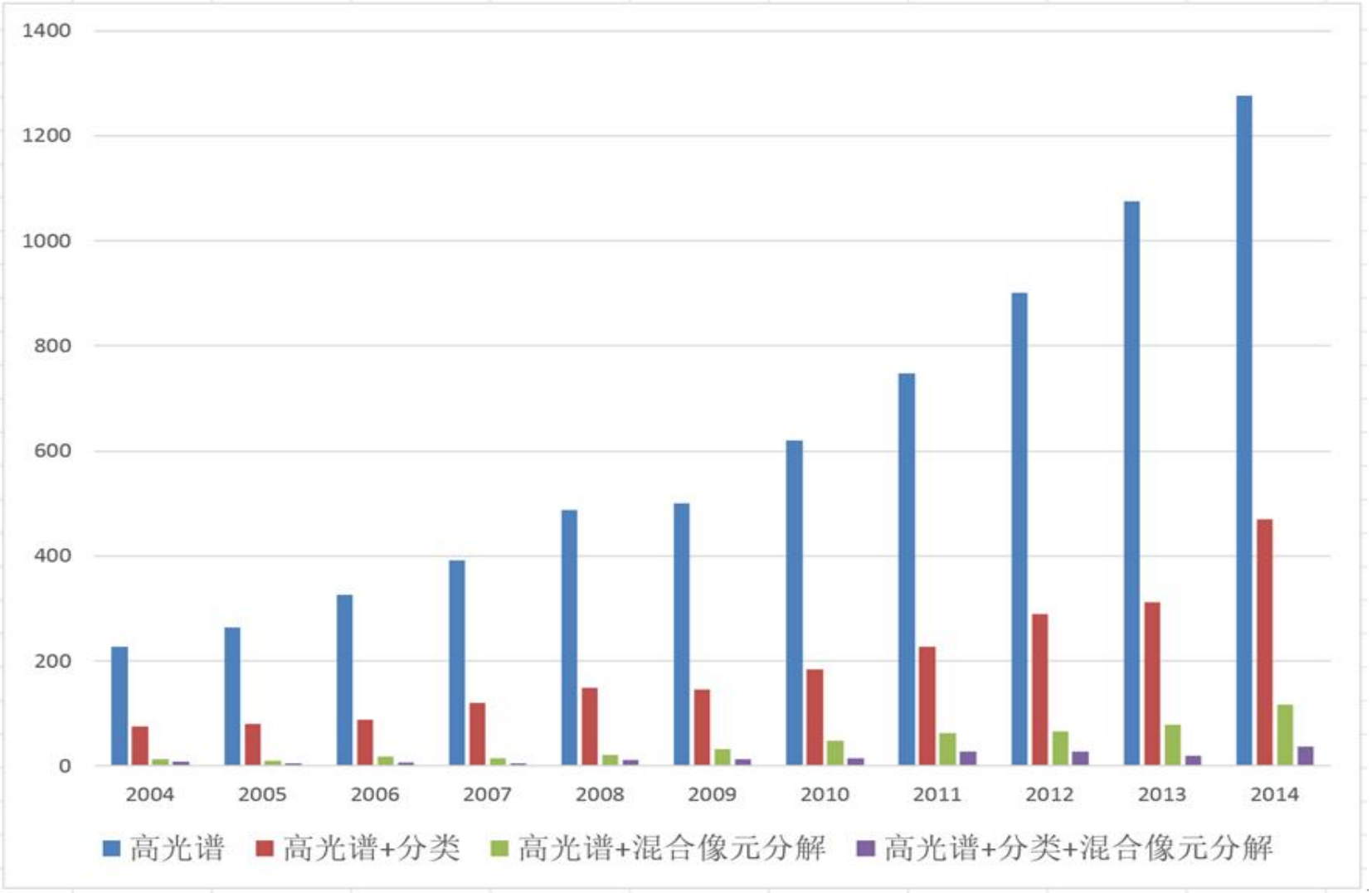

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讲师
特聘教授
客座教授
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"长江学者奖励计划...
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李军
教授

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详细地址：

Links

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个人主页，google学术

一、研究方向：高光谱图像分类、分割，混合像元分解，LiDAR，Inverse Problem

二、学历背景

· 2007.9-2011.6 电气与计算机工程, University of Lisbon，博士

· 2004.9-2007.6 摄影测量与遥感，北京大学，硕士

· 2000.9-2004.6 地理信息系统，湖南师范大学，本科

三、工作经历

· 2014.01- 中山大学教授，博士生导师（青年千人）

· 2011.06-2013.12 西班牙University of Extremadura，博士后

四、学术论文

1. Z. Xue, J. Li, L. Cheng, and P. Du. SpectralSpatial Classification of Hyperspectral Image via Morphological Component Analysis Based Image Separation. IEEE TGRS, accepted, 2014

Welcome to Jun Li's home page

I am a Professor (download my CV) in School of Geography and Planning, Sun Yat-Sen University, China

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My Google Scholar Site is available HERE

My Web Site in Sun Yat-Sen University is available HERE

Research Interests Publications Codes

- News and Upcoming Events

---Where Are You? IT Newsletter

---TALK by Jon Atli Benediktsson: Morphological and Attribute Profiles for Classification of Hyperspectral Remote Sensing Imagery

---International Workshop on Multi-Sensor Data Fusion for Remote Sensing Image Analysis, Guangzhou, China, September 9-11, 2014 (Download Presentations!)

---The Chinese Conference on Pattern Recognition (CCPR), Changsha, China, November 17 19, 2014

jun li

Sun Yat-Sen University
hyperspectral analysis
Verified email at mail.sysu.edu.cn - Homepage

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Title 1–20	Cited by	Year
Minimum volume simplex analysis: A fast algorithm to unmix hyperspectral data J Li, JM Bioucas-Dias Geoscience and Remote Sensing Symposium, 2008. IGARSS 2008. IEEE ...	135	2008
Semisupervised hyperspectral image segmentation using multinomial logistic regression with active learning J Li, JM Bioucas-Dias, A Plaza Geoscience and Remote Sensing, IEEE Transactions on 48 (11), 4085-4098	113	2010
Hyperspectral image segmentation using a new Bayesian approach with active learning J Li, JM Bioucas-Dias, A Plaza Geoscience and Remote Sensing, IEEE Transactions on, 1-14	101	2011
Spectral–Spatial Hyperspectral Image Segmentation Using Subspace Multinomial Logistic Regression and Markov Random Fields J Li, JM Bioucas-Dias, A Plaza Geoscience and Remote Sensing, IEEE Transactions on 50 (3), 809-832	97	2013

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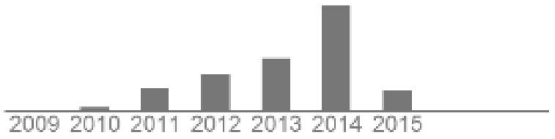

Co-authors View all...

José M. Bioucas Dias

Antonio Plaza

Jón Atli Benediktsson

Gamba Paolo

Course introduction（课程介绍）

- This course is intended to cover several different aspects related with the technology of **hyperspectral image analysis and interpretation**（高光谱图像分析和解译）.
- Attention will be given to both **theoretical aspects** and also to **implementation aspects** （理论和应用）, so that course participants can have a broad view and at the same time a specfic view about some successful algorithms and case studies.
- The course will cover **two main topics** which have been very successful in hyperspectral image analysis:

  1.The first topic is related with **classification** （分类）, which assumes that the spectral response of each pixel is dominated by a main single substance.

  2.The second topic is related with **spectral unmixing** （混合像元分解）, which analyzes hyperspectral data taking into account the possibility that several materials are mixed within each individual pixel.

Course schedule （课程安排）

The course will last for a total of **17 weeks** in which both **theoretical and practical/discussion aspects** （理论知识和实验）will be covered.

The duration **of hyperspectral classification** will be around 5 **weeks**（分类约为5周）. Around **two invited session** will be included.

The duration of **spectral unmixing** will be around 6 **weeks**（混合像元分解约为6周）. Around **two invited session** will be included.

The **theoretical sessions** will be around 1hour and 30 mins, while the **practical sessions and discussion** will be 1 hour.（理论课程约为1小时45分钟，实验及讨论课约为30小时）

Final exam will be in the last week（最后一周考试）.

Course schedule（课程安排）

Time	Content
2015.03.06 2015.03.13 Lecture 0&1	1. Introduction to the course(课程介绍、提问) 2. Introduction to remote sensing (遥感基本知识介绍) 3. Introduction to hyperspectral remote sensing (高光谱基本概念介绍)
2015.03.18 Lecture 2	1. Introduction to hyperspectral classification 2. Unsupervised Classifcation
2015.03.25 Lecture 3	1. Supervised Classification （监督分类方法） 2. Practice（实验课）
2015.04.01 Lecture 4	1. Invited session：methodological advances （武汉大学黄昕教授） Professor Xin Huang, Wuhan University
2015.04.08 Lecture 5	1. Invited session：agricultural applications （南京农业大学程涛教授） Professor Tao Cheng, Nanjing Agricultural University
2015.04.15 2015.04.22 Lecture 6	1. Spectral Spatial methods(光谱和空间相结合方法) 2. Practice (实验课)
2015.04.29 Lecture 7	1. Conclusion of Classification session, discussion (总结) 2. Practice (实验课)

Time	Content
2015.05.06 Lecture8	1. Introduction to spectral unmixing (介绍) 2. Estimation of the number of endmembers (端元数量估计) 3. Practice （实验课）
2015.05.13 Lecture 9	1. Pure pixel based algorithm (纯像元方法) 2. Practice (实验课)
2015.05.20 Lecture 10	1. Minimum Volume algorithms (最小单纯形体积) 2. Practice (实验课)
2015.05.27 Lecture 11	1. Invited session: Sparese Unmixing (Antonio Plaza教授) Antonio Plaza, University of Extremadura, Fellow, EIC TGRS
2015.06.03 Lecture 12	1. Nonnegative Matrix Factorization based algorithms (非负矩阵分解方法) 2. Practice (实验课)
2015.06.10 Lecture 13	1. Invited Session: new advance (深圳大学贾森副教授) Sen Jia, Shenzhen University
2015.06.17 Lecture 14	1. Conclusion of the Unmixing Session, discussion (总结) 2. Practice (实验课)
2015.06.24 Lecture 15	1. Conclusion of the Course (课程总结)
2015.07.01	**Exam（考试）**

Course schedule（课程安排）

注： 课程时间会调节到周三下午或
周四上午

Course material and code download（参考文献）

Lectures and codes will be able to download from my webpage

1. Reference:

[1] 童庆禧，张兵，郑兰芬．高光谱遥感原理，技术与应用[M]．北京：高等教育出版社，2006.

[2] 张良培，张立福．高光谱遥感［M]．北京：测绘出版社，2011.

[3] 张兵, 高连如, 高光谱图像分类与目标探测[M]，北京：科学出版社，2011.

[4] J. A. Richards and X. Jia, Remote Sensing Digital Image Analysis: An Introduction, Springer-Verlag: Berling, 2003

2. **Code will be provided in the class.** （实验课所需代码上课时将提供）

The codes of the algorithms discussed in the course can be downloaded from:

http://www.umbc.edu/rssipl/people/aplaza/codes.zip

All AVIRIS hyperspectral data sets can be downloaded from:

http://aviris.jpl.nasa.gov/alt_locator

Acknowledgement（致谢）

We would like to acknowledge Professors Peijun Du(杜培军，南京大学)、Kun Tan(谭坤，中国矿业大学) and Wenjie Fan（范闻捷，北京大学）for sharing their slides entitled with the courses, some of which are cited in this course.

Course grades （成绩）

Exam (85%): 考试

Discussion & Attendence (15%): 上课讨论，出勤

Optional

Presentation(20mins, 25%):

学期开始时选题，后半学期报告（20-30分钟）

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Questions?

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