
Computer Vision

MAP-I Curricular Unit

Context

This document describes a PhD level course, corresponding to a Curriculum Unit credited with 7 ECTS, intended for the MAP-I doctoral program. It is offered jointly by (i) Departamento de Ciência de Computadores, Universidade do Porto, (ii) Departamento de Engenharia Informática, Universidade do Porto, (iii) Departamento de Engenharia Electrotécnica e de Computadores, Universidade do Porto (iv) Departamento de Electrónica, Telecomunicações e Informática, Universidade de Aveiro.

Course Description

The proposed unit intends to be a specialization in computer vision topics, namely image and video processing, pattern recognition and machine learning.

The impressive technological evolution of signal and image capturing hardware has slowly created a new and demanding problem: How do we handle so much data? There is a clear need for automatic tools that can help us analyse, find and annotate the massive amount of video information captured by modern technology. A *Computer Vision* learning unit is therefore vital for motivating and preparing PhD students with mathematical tools that will help them handle the various real-world problems where computer vision methods might provide robust solutions.

Teaching Staff

Miguel Tavares Coimbra (<i>Principal Instructor</i>)	FC, UP	mcoimbra@fc.up.pt
João Paulo Silva Cunha	DETI, UA	jcunha@det.ua.pt
Jaime dos Santos Cardoso	FE, UP	jaime.cardoso@inescporto.pt
Luís Filipe Almeida Teixeira	FE, UP	luisft@fe.up.pt

Prerequisites

Familiarity with basic signal processing methods, namely frequency domain analysis, is highly desirable. Also, some familiarity with a popular programming language such as C or Java is desirable. None of these are strictly necessary but students who have not previously taken courses in these topics may have to work harder to keep up.

Textbooks and references

- D. Forsyth, J. Ponce, “Computer Vision: A Modern Approach”, Prentice Hall, 2002.
- R. Gonzalez, R. Woods, “Digital Image Processing – 3rd Edition”, Prentice Hall, 2008.
- L. Shapiro, G. Stockman, “Computer Vision”, Prentice Hall, 2001.

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- M. Sonka, V. Hlavac, R. Boyle, “Image Processing, Analysis, and Machine Vision”, Brooks/Cole Publishing, 1999.

Course Objectives

The main objectives of this unit can be summarized in the following topics:

- Present and motivate the student for the various topics of *Computer Vision*.
- Provide the students with a core-set of mathematical tools, useful for most *Computer Vision* challenges.
- Introduce the student to national and international institutions and companies where *Computer Vision* is a potential solution to their real-world problems.
- Help the student develop rigorous research and development methodologies.

Course Topics

- **Chapter I - Image and Video Processing**
 - **Definitions:** optics and image formation; digital image; colour models; medical imaging; noise.
 - **Low-level feature extraction:** colour; texture; shape.
 - **Image pre-processing:** filtering; enhancement.
- **Chapter II - Image Segmentation**
 - **Basic methods:** thresholding; colour segmentation; region-based segmentation; mathematical morphology.
 - **Segmentation by clustering:** background subtraction; mean-shift; k-means; graph-theoretic clustering; normalised cuts.
 - **Segmentation by fitting:** fitting lines; fitting curves; robust methods.
- **Chapter III – Pattern Recognition**
 - **Fundamentals:** definitions; feature vectors; classes; principal component analysis.
 - **Generic pattern recognition techniques:** statistical pattern recognition, soft-computing machines, neural networks, support vector machines.
 - **Pattern recognition for computer vision:** hypothesize and test; template matching; relations between templates.
- **Chapter IV – Video Processing**
 - **Motion analysis:** block matching; optical flow: motion as a low-level feature; visual tracking.
 - **Video Compression:** fundamentals, data redundancy, standards.

Expected number of students

10

Teaching Methodology

- Theoretical presentation of *Computer Vision* topics in the form of classes and/or seminars given by lecturers of the learning unit or invited speakers.
- Integration of students into the teaching process, namely the presentation of state-of-the-art reviews on certain *Computer Vision* topics, enabling them to tighten their relationship with the learning unit and stimulating their interest on a set of specific topics.

Time scheduling

- 7 ECTS (189 hours)
- 3 hours/week for 14 weeks
- 1.5 hours/week guided study

Evaluation Criteria

- 50%: Final Exam.
- 40%: Scientific paper submission. This can be either an individual paper with a review on a specific computer vision topic, or a group paper (two students) which describes scientific results obtained by the students.
- 10%: Presentations of selected papers during lectures.



João Paulo Silva Cunha (M'86–SM'04) was born in Porto, Portugal in 1966. He is Associate Professor at the Dep. of Electronics, Telecommunications and Informatics of the University of Aveiro, Portugal and visiting professor at the Neurology Dep. of the University of Munich, Germany. Prof. Cunha is faculty member of the Carnegie-Mellon-Portugal program and was Faculty member of the Information Networking Institute (INI) of Carnegie Mellon University, Pittsburgh PA, USA between 2007 and 2009. He is also co-PI of the MIT-Portugal project “MISC – Massive Information Scavenging with Intelligent Transportation Systems”. He earned a degree in Electronics and Telecommunications (1989) and a PhD in Electrical Engineering (1996) both at University of Aveiro, Portugal. He is the creator (1997) and leader of the “Healthcare Information and systems” R&D group of IEETA/University of Aveiro (www.ieeta.pt/sias) where he has currently 17 co-workers of which several PhD and MSc students.

Prof. Cunha is senior member of the IEEE (2004) where he joined the Engineering in Medicine and Biology Society in 1986 as a student member. He is member and vice-president of the Portuguese Brain Imaging Network (ANIFC), member of the director's board of the Portuguese Biomedical Engineering Association and member of the following clinical neurophysiology associations: Portuguese League Against Epilepsy, the Portuguese EEG and Neurophysiology Association (non-MD member) and the European Epilepsy Academy (EUREPA). He is holder of several prizes, being the most relevant the “Best contribution to clinical epileptology - Claudio Munari award of excellence” delivered by European Epilepsy Academy (EUREPA) in 2002. He founded (2007) a spin-off company of his lab called Biodevices SA (www.biodevices.pt). Dr. Cunha is co-author of more than 180 publications, of which, in the last five year, he has published 6 book chapters and 8 papers in international scientific journals cited on ISI.

Jaime S. Cardoso

PERSONAL INFORMATION	Full name:	Jaime Santos Cardoso
	Parents:	Albino da Conceição cardoso Maria Albertina Fernandes dos Santos Cardoso
	Date and Place of Birth:	28th May 1976, Póvoa de Varzim
CONTACT INFORMATION	Professional Address:	INESC Porto Faculdade de Engenharia da Universidade do Porto R. Dr. Roberto Frias s/n, P-4200-465 Porto, Portugal
	Email:	jaime.cardoso@fe.up.pt
	URL:	http://www.inescporto.pt/~jsc/
	EDUCATION	Doctoral Studies Feb. 2002 - May 2006 Faculdade de Engenharia da Universidade do Porto , Porto, Portugal Doctoral Programme in Electrical and Computer Engineering <ul style="list-style-type: none">• Thesis title: Metadata Assisted Image Segmentation• Advisor: Professor Luís Corte-Real (FEUP)• Area of Study: Computer Vision
	Master Studies Sep. 2003 - Nov. 2005 Faculdade de Ciências da Universidade do Porto , Porto, Portugal Masters in Mathematical Engineering <ul style="list-style-type: none">• Thesis title: Classification of Ordinal Data• Advisor: Professor Joaquim F. Pinto da Costa (FCUP)• Grade: Very Good• Area of Study: Machine Learning	
	Graduate Studies (Licenciatura) Sep. 1994 - Jul. 1999 Faculdade de Engenharia da Universidade do Porto , Porto, Portugal Licenciatura in Electrical and Computer Engineering <ul style="list-style-type: none">• Specialization in Telecommunications• Grade: 19 (out of 20)	

ACADEMIC AND
TEACHING
EXPERIENCE

- *Current Position:*
Universidade do Porto, Portugal
 Faculdade de Engenharia, Departamento de Engenharia Electrotécnica e de Computadores (Electrical and Computing Engineering)
Assistant Professor, since 2009
 - Machine Learning (FEUP/PDEEC, T) 2009/10
 - System Integration Laboratory (FEUP/MIEEC, 5^o year, P) 2009/10
 - Vision Based Systems (FEUP/MIEEC, 4^o year, T) 2009/10
 - Seminars (FEUP/PDEEC, T) 2009/10

- **Universidade do Porto**, Portugal
 Faculdade de Engenharia, Departamento de Engenharia Electrotécnica e de Computadores (Electrical and Computing Engineering)
Invited Assistant Professor, from 2006 to 2009
 - Machine Learning (FEUP/PDEEC, T) 2008/09
 - Computer Vision (MAP-i, T) 2008/09
 - Pattern Recognition (FEUP/MIEEC, 4^o year, T) 2008/09
 - Signal and Image Processing in Biophysics (FCUP/MFM, 1^o year, T) 2008/09
 - Multimedia Coding and Processing (FEUP/MIEEC, 4^o year, T) 2008/09
 - Digital Signal Processing (FEUP/MIEEC, 3^o year, P) 2008/09
 - Signals and Systems (FEUP/MIEIC, 2^o year, P) 2008/09
 - System Integration Laboratory (FEUP/MIEEC, 5^o year, P) 2008/09

 - Computer Networks (FEUP/MIEIC, 3^o year, P) 2007/08
 - Numerical Methods (FEUP/MIEEC, 2^o year, P) 2007/08
 - Signals and Systems (FEUP/MIEIC, 2^o year, P) 2007/08
 - System Integration Laboratory (FEUP/MIEEC, 5^o year, P) 2007/08

 - Computer Networks (FEUP/MIEIC, 3^o year, P) 2006/07
 - Programming 2 (FEUP/MIEEC, 2^o year, P) 2006/07
 - Computer Networks (FEUP/MIEEC, 4^o year, P) 2006/07
 - Programming (FEUP/MIEEC, 1^o year, P) 2006/07

- **Universidade do Porto**, Portugal
 Faculdade de Engenharia, Departamento de Engenharia Electrotécnica e de Computadores (Electrical and Computing Engineering)
Invited Assistant, from 2005 to 2006
 - Computer Networks and Data Communication (FEUP/LEEC, 4^o year, P) 2005/06
 - Programming 2 (FEUP/MIEEC, 1^o year, P) 2005/06

- **Universidade do Porto**, Portugal
 Faculdade de Ciências, Departamento de Ciências dos Computadores
Monitor, from 2004 to 2006
 - Software Engineering (FCUP/DCC, P) 2005/06
 - Imperative Programming (FCUP/DCC, P) 2005/06
 - Mathematics for Computer Science (FCUP/DCC, P) 2005/06
 - Operating Systems (FCUP/DCC, P) 2004/05

- **Universidade Católica Portuguesa**, Portugal
 Escola das Artes
Invited Professor, from 2002 to 2004
 - Technologies and Communication 2003/04
 - Technologies and Communication 2002/03

Doctoral Theses

7. André Miguel Passos Baltazar
Title: Composição Musical Algorítmica Baseada na Análise de Sinais Vídeo de Dança
Role: Co-Supervisor
Course: Doctoral Program in Science and Technology of Arts, Escola das Artes, Universidade Católica Portuguesa
Conclusion: 2014 (estimation)
6. Inês Campos Monteiro Sabino Domingues
Title: to be defined
Role: Supervisor
Course: Doctoral Program in Electrical and Computer Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: 2014 (estimation)
5. Ana Maria Silva Rebelo
Title: Reconhecimento óptico robusto de pautas musicais baseado na fusão de regras musicais
Role: Supervisor
Course: Doctoral Program in Electrical and Computer Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: 2012 (estimation)
4. Ricardo Jorge Gamelas de Sousa
Title: Modelos multicritério para a previsão de relações de preferência
Role: Supervisor
Course: Doctoral Program in Electrical and Computer Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: 2012 (estimation)
3. Hélder Filipe Pinto de Oliveira
Title: Modelos Computacionais 3D Avançados para Avaliação do Resultado Estético em Cirurgias Mamárias
Role: Supervisor
Course: Doctoral Program in Electrical and Computer Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: 2012 (estimation)
2. Pedro Miguel Carvalho
Title: Análise e representação de vídeo baseada em modelos 3D
Role: Co-Supervisor
Course: Doctoral Program in Electrical and Computer Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: 2011 (estimation)
1. Susy Cabral da Costa
Title: Previsibilidade do Resultado Estético do Tratamento Conservador do Cancro da Mama
Role: Co-Supervisor
Course: PhD in Medicine, Faculdade de Medicina, Universidade do Porto
Conclusion: 2011 (estimation)

Master Theses

16. Luís Alberto de Sousa Rangel das Neves
Title: Sistema Web Semi-automático para Anotação Colaborativa de Media H.264 e Flash Vídeo
Role: Supervisor

- Course:** Master in Electrical and Computers Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: Feb. 2010
15. Andreas Dieter Mendes Seufert
Title: Investigação e Aperfeiçoamento de Algoritmos de Reconhecimento de Símbolos Musicais
Role: Supervisor
Course: Master in Electrical and Computers Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: Feb. 2010
 14. Pedro Augusto Fernandes Antunes Martins Vitoriano
Title: Avaliação Automática do Resultado de Intervenções Cirúrgicas
Role: Supervisor
Course: Master in Electrical and Computers Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: Feb. 2010
 13. Rui Alexandre Rodrigues Carneiro
Title: Unificação e expansão da interface de pesquisa no webmail
Role: Supervisor
Course: Master in Informatics and Computing Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: Jul. 2009
 12. Sérgio Manuel Colaço de Sá
Title: Adaptação Preditiva de Conteúdo Multimédia
Role: Co-supervisor
Course: Master in Electrical and Computers Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: Jul. 2009
 11. Márcia dos Santos Pinheiro
Title: Sistema Web para o Reconhecimento de Partituras Musicais
Role: Supervisor
Course: Master in Electrical and Computers Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: Jul. 2009
 10. André Miguel Passos Baltazar
Title: Extracção de Informações Rítmicas de Movimentos de Dança Através de um Sinal de Vídeo
Role: Supervisor
Course: Master in Electrical and Computers Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: Feb. 2009
 9. Ricardo Jorge Gamelas de Sousa
Title: Automatic aesthetic evaluation of breast cancer conservative treatment
Role: Supervisor
Course: Master in Engineering Mathematics, Faculdade de Ciências, Universidade do Porto
Conclusion: Nov. 2008
 8. Ana Maria Silva Rebelo
Title: New methodologies towards an automatic optical recognition of handwritten musical scores
Role: Supervisor
Course: Master in Engineering Mathematics, Faculdade de Ciências, Universidade do Porto
Conclusion: Nov. 2008

7. Pedro Luís Cameira Sollari Allegro
Title: Singing Voice Detection in Polyphonic Music Signals
Role: Supervisor
Course: Master in Electrical and Computers Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: Jul. 2008
6. Luís Daniel Torres Rebelo
Title: Avaliação objectiva do resultado estético dos tratamentos do cancro da mama
Role: Supervisor
Course: Master in Electrical and Computers Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: Jul. 2008
5. Luís Miguel Marques Soeiro Batista
Title: Sistema automático de reconhecimento de formulários manuscritos
Role: Supervisor
Course: Master in Electrical and Computers Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: Jul. 2008
4. Luís Jorge Trindade Certo
Title: QuidPyx mobile - Sistema de recomendação de música em dispositivos móveis
Role: Supervisor
Course: Master in Informatics and Computing Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: Jul. 2008
3. João Carlos Loureiro de Jesus Oliveira
Title: A Smarter YouTube - Sistema de organização automática de vídeo com base no seu conteúdo semântico
Role: Supervisor
Course: Master in Informatics and Computing Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: Jul. 2008
2. Guilherme Artur Conceição Capela
Title: Reconhecimento de símbolos musicais manuscritos na framework Gamera
Role: Supervisor
Course: Master in Informatics and Computing Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: Apr. 2008
1. Filipe Emanuel Amaro Coelho
Title: Sistema automático de reconhecimento do montante de um cheque
Role: Supervisor
Course: Master in Informatics and Computing Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: Apr. 2008

Research Project Scholarships

2. Jakub Tkaczuk, integrated in the project “Picture Archiving and Communication System with Semantic Search Engine”, since Apr. 2010.
1. Igor Francisco Areias Amaral, integrated in the project “Advanced Objective Method for the Evaluation of the Aesthetical Result of Breast Interventions”, since August 2009.

RESEARCH EXPERIENCE

- *Current Position:*
Project Leader and Researcher at INESC Porto - Instituto de Engenharia de Sistemas e Computadores do Porto since Jan. 2009. Leader of a team of 7 PhD Students, 3 Master Students and 2 Researchers and coordinator as Principal Investigator (PI) of 3 Research Projects.

RESEARCH PROJECTS / GRANTS

7. Principal Investigator (PI) of Semantic PACS (Picture Archiving and Communication System with Semantic Search Engine), funded by the Portuguese Agency for Innovation (ADI), with a budget of 320K EUR for 2009/2011.
6. Principal Investigator (PI) of OMR (Optical Recognition System for Handwritten Music Scores), funded by the Portuguese Foundation for Science and Technology (FCT), with a budget of 50K EUR for 2007/2010.
5. Principal Investigator (PI) of BCCT (Advanced Objective Method for the Evaluation of the Aesthetical Result of Breast Interventions), funded by the Portuguese Foundation for Science and Technology (FCT), with a budget of 95K EUR for 2007/2010.
4. Investigator of the FP7 European Network of Excellence VISNET II, with a funding of 6.2M EUR, for 2006/09.
3. Investigator of the FP6 European Network of Excellence VISNET, with a funding of 2.2M EUR, for 2003/05.
2. Team Coordinator and Investigator of the FP5 European project METAVISION, with a funding of 4.5M EUR, for 2000/03.
1. Team Member of ORBIT (Object Reconfigurable Broadcast Infrastructure Trial), a direct contract with BBC, for 1999/02.

SERVICE TO THE SCIENTIFIC COMMUNITY

- **Organiser** of the first three editions of the “ECE Back to Basics Colloquium”, held weekly at FEUP, the Faculty of Engineering of the University of Porto (UPorto), during the 2nd semester of 2008/09, and 1st and 2nd semesters of 2009/10.

The goal of this colloquium is to promote awareness of fundamental tools and their use in ECE research, to promote interaction between researchers leading to cross-disciplinary research projects, and to raise the awareness of the international research community towards ECE research at UPorto. Every other week a distinguished invited researcher discusses his or her work, focusing on the fundamental mathematical tools that are core to their research. Intended audience includes researchers and graduate students from the different areas in ECE. Local researchers will discuss their work alternating with invited researchers.

- **Reviewer**
 - Journals: IEEE Transactions on Image Processing, IEEE Transactions on Biomedical Engineering, Artificial Intelligence in Medicine (Elsevier), EURASIP Journal on Advances in Signal Processing, EURASIP Journal on Image and Video Processing, Journal of Zhejiang University - Science A, International Journal of Imaging (IJI), International Journal of Pattern Recognition and Artificial Intelligence (IJPRAI), International Journal of Biometrics and Bioinformatics (IJBB), Revista Ibérica de Sistemas e Tecnologias de Informação

- Scientific Committee member of RISTI (Revista Ibérica de Sistemas e Tecnologias de Informação)
- Conferences: International Society for Music Information Retrieval Conference (ISMIR'10); Computational Modeling of Objects Presented in Images (CompIMAGE'10); Conferência Ibérica de Sistemas e Tecnologias de Informação(CISTI'10) International Joint Conference Neural Networks (IJCNN'09, IJCNN'08, IJCNN'07); International Conference on Image Analysis and Recognition (ICIAR'10, ICIAR'09, ICIAR'08, ICIAR'07, ICIAR'06); Doctoral Symposium on Informatics Engineering (DSIE'09); IEEE Globecom Ad Hoc, Sensor and Mesh Networking Symposium (2008); IEEE International Symposium on Information Theory (ISIT'07); Iberian Conference on Pattern Recognition and Image Analysis (ibPRIA'07); European Conference Machine Learning (ECML'05).

LIST OF
PUBLICATIONS

Thesis

2. Jaime S. Cardoso, “Metadata Assisted Image Segmentation”, PhD thesis, Faculdade de Engenharia, Universidade do Porto, 2006.
1. Jaime S. Cardoso, “Classification of Ordinal Data”, MSc thesis, Faculdade de Ciências, Universidade do Porto, 2005.

Papers on Refereed Journals

19. Pedro Carvalho, Jaime S. Cardoso, Luis Corte-Real, “Hybrid framework for evaluating video object tracking algorithms”, *Electronics Letters*, vol. 46, issue 6, pp. 411-412, 2010.
18. Ana Rebelo and Guilherme Capela, Jaime S. Cardoso, “Optical Recognition of Music Symbols: A Comparative Study”, *International Journal on Document Analysis and Recognition*, vol. 13, issue 1, pp. 19-31, 2010.
17. Jaime S. Cardoso, Artur Capela, Ana Rebelo, Carlos Guedes, Joaquim F. Pinto da Costa, “Staff Detection with Stable Paths”, *IEEE Transactions Pattern Analysis Machine Intelligence*, vol. 31, issue 6, pp. 1134-1139, 2009.
16. Maria J. Cardoso, Jaime S. Cardoso, Thomas Wild, Wilfried Krois, Florian Fitzal, “Comparing Two Objective Methods for the Aesthetic Evaluation of Breast Cancer Conservative Treatment”, *Breast Cancer Research and Treatment*, vol. 116, issue 1, pp. 149-152, 2009.
15. Jaime S. Cardoso, Pedro Carvalho, Luis F. Teixeira, Luis Corte-Real, “Partition-distance methods for assessing spatial segmentations of images and videos”, *Computer Vision and Image Understanding*, vol. 113, issue 7, pp. 811-823, 2009.
14. Joaquim F. Pinto da Costa, Hugo Alonso, Jaime S. Cardoso, “The unimodal model for the classification of ordinal data”, *Neural Networks*, vol. 21, pp. 78-91, 2008.
13. Maria J. Cardoso, Andre Magalhaes, Teresa Almeida, Susy Costa, Conny Vrieling, David Christie, Jorgen Johansen, Jaime S. Cardoso, “Is Face-Only Photographic View Enough for the Aesthetic Evaluation of Breast Cancer Conservative Treatment?” *Breast Cancer Research and Treatment*, vol. 112, pp. 565-568, 2008.
12. Maria J. Cardoso, Jaime S. Cardoso, Natalia Amaral, Isabel Azevedo, Lise Barreau, Mario Bernardo, David Christie, Susy Costa, Florian Fitzal, Jose L. Fougho, Jorgen Johansen, Douglas MacMillan, Maria Piera Mano, Lea Regolo, Jose Rosa, Luis F. Teixeira, Conny Vrieling, Janez Zgajnar, “Turning subjective into objective: The BCCT.core software for evaluation of cosmetic results in breast cancer conservative treatment”, *Breast (Elsevier)*, vol. 16, pp. 456-461, 2007.

11. Maria J. Cardoso, Jaime S. Cardoso, A. C. Santos, Conny Vrieling, David Christie, G. Liljegren, Isabel Azevedo, Jorgen Johansen, Jose Rosa, Natalia Amaral, R. Saaristo, V. Sacchini, H. Barros, M. C. Oliveira, "Factors Determining Esthetic Outcome after Breast Cancer Conservative Treatment", *Breast Journal* (Blackwell), pp. 140-146, 2007.
10. Luis F. Teixeira, Jaime S. Cardoso, Luis Corte-Real, "Object segmentation using background modelling and cascaded change detection", *Journal of Multimedia*, vol. 2, pp. 55-65, 2007.
9. Jaime S. Cardoso, Joaquim F. Pinto da Costa, "Learning to classify ordinal data: the data replication method", *Journal of Machine Learning Research*, vol. 8, pp. 1393-1429, 2007,
8. Emanuele Berti, Jaime S. Cardoso, Vitor Cardoso, Marco Cavaglia, "Matched-filtering and parameter estimation of ringdown waveforms", *Physical Review D*, vol. 1, 2007.
7. Jaime S. Cardoso, Maria J. Cardoso, "Towards an intelligent medical system for the aesthetic evaluation of breast cancer conservative treatment", *Artificial Intelligence in Medicine*, vol. 40, pp. 115-126, 2007.
6. Maria J. Cardoso, Jaime S. Cardoso, A. C. Santos, H. Barros, M. C. Oliveira, "Interobserver agreement and consensus over the esthetic evaluation of conservative treatment for breast cancer", *The Breast* (Elsevier), vol. 15, pp. 52-57, 2006.
5. Jaime S. Cardoso, Luis Corte-Real, "A measure for mutual refinements of image segmentations", *IEEE Transactions on Image Processing*, vol. 15, pp. 2358-2363, 2006.
4. Maria J. Cardoso, A. C. Santos, Jaime S. Cardoso, H. Barros, M. C. Oliveira, "Choosing observers for evaluation of aesthetic results in breast cancer conservative treatment", *International Journal of Radiation Oncology*Biological*Physics*, vol. 61, pp. 879-881, 2005.
3. Jaime S. Cardoso, Luis Corte-Real, "Toward a Generic Evaluation of Image Segmentation", *IEEE Transactions on Image Processing*, vol. 14, pp. 1773-1782, 2005.
2. Jaime S. Cardoso, Luis Corte-Real, "Accumulator size minimization for a fast cumulant-based motion estimation", *IEEE Transactions on Circuits and Systems for Video Technology*, vol. 15, pp. 1660-1664, 2005.
1. Jaime S. Cardoso, Joaquim F. Pinto da Costa, Maria J. Cardoso, "Modelling ordinal relations with SVMs: an application to Objective Aesthetic Evaluation of Breast Cancer Conservative Treatment", *Neural Networks* (Elsevier), pp. 808-817, vol. 18, 2005.

Papers on Refereed Conferences

22. Jaime S. Cardoso, Ana Rebelo, "Robust staffline thickness and distance estimation in binary and gray-level music scores", *Proceedings of The Twentieth International Conference on Pattern Recognition (ICPR)*, 2010
21. Jaime S. Cardoso, "Stable Text Line Detection", *Proceedings of IEEE Workshop on Applications of Computer Vision (WACV)*, 2009
20. Ricardo Sousa, Beatriz Mora, Jaime S. Cardoso, "An Ordinal Data Method for the Classification with Reject Option", *Proceedings of The Eighth International Conference on Machine Learning and Applications (ICMLA)*, 2009
19. Jaime S. Cardoso, Ricardo Sousa, Luis F. Teixeira, Maria J. Cardoso, "Breast Contour Detection with Stable Paths", *Communications in Computer and Information Science (CCIS 25)*, pp. 439-452, Springer-Verlag 2009

18. Ana Paula Afonso, Jaime S. Cardoso, Maria João Cardoso, Manuel Pérez Cota, “A Avaliação da Usabilidade de um Sistema Médico Inteligente: BCCT.core”, Proceedings of the 4^a Conferência Ibérica de Sistemas e Tecnologias de Informação (CISTI 2009).
17. Helder Oliveira, Jaime S. Cardoso, “Image Retargeting Using Stable Paths”, Proceedings of the International Conference on Computer Vision Theory and Applications (VISAPP 2009), pp. 40-47, 2009.
16. Jaime S. Cardoso, Artur Capela, Ana Rebelo, Carlos Guedes, “A Connected Path Approach for Staff Detection on a Music Score”, Proceedings of the International Conference on Image Processing (ICIP 2008), pp. 1005-1008, 2008.
15. Jaime S. Cardoso, Luis F. Teixeira, Maria J. Cardoso, “Automatic Breast Contour Detection in Digital Photographs”, Proceedings of the International Conference on Health Informatics (HEALTHINF 2008), vol. 2, pp. 91-98, 2008.
14. Filipe Coelho, Luis Batista, Luis F. Teixeira, Jaime S. Cardoso, “Automatic System for the Recognition of Amounts in Handwritten Cheques”, Proceedings of the International Conference on Signal Processing and Multimedia Applications (SIGMAP 2008), pp. 320-324, 2008.
13. Artur Capela, Ana Rebelo, Jaime S. Cardoso, Carlos Guedes, “Staff Line Detection and Removal with Stable Paths”, Proceedings of the International Conference on Signal Processing and Multimedia Applications (SIGMAP 2008), pp. 263-270, 2008.
12. Ricardo Sousa, Jaime S. Cardoso, Joaquim F. Pinto da Costa, Maria J. Cardoso, “Breast Contour Detection with Shape Priors”, Proceedings of the International Conference on Image Processing (ICIP 2008), pp. 1440-1443, 2008.
11. Artur Capela, Jaime S. Cardoso, Ana Rebelo, Carlos Guedes, “Integrated Recognition System for Music Scores”, Proceedings of the International Computer Music Conference (ICMC 2008), 2008.
10. Ana Rebelo, Artur Capela, Joaquim F. Pinto da Costa, Carlos Guedes, Eurico Carrapatoso, Jaime S. Cardoso, “A Shortest Path Approach for Staff Line Detection”, Third International Conference on Automated Production of Cross Media Content for Multi-channel Distribution (AXMEDIS 2007), pp. 79–85, 2007.
9. Jaime S. Cardoso, Jorge C. Cardoso, Luis Corte-Real, “Object-based spatial segmentation of video guided by depth and motion information”, IEEE Workshop on Motion and Video Computing (WMVC 2007), 2007.
8. Jaime S. Cardoso, “Bandwidth-efficient byte stuffing”, IEEE International Conference on Communications (ICC 2007), pp. 6175-6180, 2007.
7. Jaime S. Cardoso, Maria J. Cardoso, “Breast Contour Detection for the Aesthetic Evaluation of Breast Cancer Conservative Treatment”, Springer Lecture Notes in Computer Science, Advances in Soft Computing 45, Computer Recognition Systems 2 CORES 2007: 5th International Conference on Computer Recognition Systems, pp. 518-525, 2007.
6. Margarita Kotti, Luis Gustavo P.M. Martins, Emmanouil Benetos, Jaime S. Cardoso, Constantine Kotropoulos, “Automatic Speaker Segmentation Using Multiple Features and Distance Measures: A Comparison of Three Approaches”, Proceedings of International Conference on Multimedia & Expo (ICME), pp. 1101-1104, 2006.
5. Joaquim F. Pinto da Costa, Jaime S. Cardoso, “Classification of Ordinal Data Using Neural Network”, Proceedings of European Conference on Machine Learning (ECML), pp. 690-697, 2005.

4. Jaime S. Cardoso, Joaquim F. Pinto da Costa, Maria J. Cardoso, "SVMs Applied to Objective Aesthetic Evaluation of Conservative Breast Cancer Treatment", Proceedings of International Joint Conference on Neural Networks (IJCNN) 2005, pp. 2481-2486, vol. 4, 2005.
3. P. W. Walland, G. Thomas, M. Koppetz, Jaime S. Cardoso, T. Erseghe, F. Hericourt, "The Application of Intimate Metadata in Post Production", Proceedings of Int. Broadcasting Convention (IBC 2002), 2002.
2. Jaime S. Cardoso, J. C. Alves, Luis Corte-Real, "FPGAs based hardware applied to block-based motion estimation for real-time video processing", Proceedings of 11th Portuguese Conference on Pattern Recognition (RECPAD2000), pp. 455-458, 2000.
1. Telmo Cunha, Phillip Tome, Sergio Cunha, Jaime S. Cardoso, Luisa Bastos, Utilizacao de DGPS para a Monitorizacao de Frotas em Ambiente Urbano, Actas da 2 Conferencia Nacional de Cartografia e Geodesia, 1999.

Last updated: May 10, 2010

Curriculum Vitae

Personal information

Name – Luis Filipe Pinto de Almeida Teixeira
Email – luisft@fe.up.pt
Homepage – <http://luisteixeira.net>
Nationality – Portuguese
Date of birth – April 20, 1979

Education

Ph.D. in Electrical and Computer Engineering from the University of Porto | Jan. 2005 – Nov. 2009

Thesis “Contributions for the Automatic Description of Multimodal Scenes” supervised by Prof. Luis Corte-Real and approved by unanimous vote. Keywords: multimodal analysis, content indexing, object detection and tracking, event analysis, ambient intelligence, surveillance systems.

M.Sc. in Computer Networks and Communication Services from the University of Porto | Mar. 2002 – Nov. 2004

Thesis “Editing and Description Framework for Video Objects Multimedia authoring” supervised by Prof. Luis Corte-Real approved with *Muito Bom* (Very good, top grade) and with a first-year classification of 18/20. Keywords: content reuse, content repurpose, MPEG-4, multimedia content description, semantic content, MPEG-7.

Licenciatura (5-year degree) in Electrical and Computer Engineering from the University of Porto | Sep. 1996 – Jul. 2001

Major in Telecommunications Faculdade de Engenharia da Universidade do Porto (FEUP) with a final classification of 17/20 (2nd among 116 finalists)

Work experience

Invited Assistant Professor at DEI-FEUP | Oct. 2009 – current

Coordinates and teaches the Programming 1 and 2 courses of the Electrical and Computer Engineering Master and also taught laboratory classes of other courses, namely: Computer Laboratories and Database Laboratories. Supervises M.Sc. students.

Senior Scientist at Fraunhofer Portugal AICOS | Nov. 2008 – current

Member of the Scientific Board. Collaborated in industry, European and internal projects with management, and research and development responsibilities.

Researcher at INESC Porto | Sep. 2001 – Oct. 2008

Collaborated in European projects and internal projects with research and development responsibilities. Co-supervised projects by FEUP Master/*Licenciatura* students.

Visiting Researcher at University of Victoria, BC | Oct. 2006 – Dec. 2006
Collaborated in the Marsyas project with the supervision of Prof. George Tzanetakis.

Teaching Assistant at FEUP | Mar. 2004 – Jul. 2006
Assisted Programming laboratory classes - Informatics Engineering course.

Junior Researcher at INEB | Mar. 2001 – Aug. 2001
Collaborated in an internal project of the ARSIS group with development responsibilities.

Publications

Theses

- [1] Luis F. Teixeira. Contributions for the Automatic Description of Multimodal Scenes. PhD thesis, Faculdade de Engenharia da Universidade do Porto, Portugal, 2009
- [3] Luis F. Teixeira. Editing and description framework for video objects. Master's thesis, Faculdade de Engenharia da Universidade do Porto, Porto, Portugal, July 2004.

International Journals

- [3] Jaime S. Cardoso, Pedro Carvalho, Luis F. Teixeira, and Luis Corte-Real. Partition-distance methods for assessing spatial segmentations of images and videos. *Computer Vision and Image Understanding*, 113(7):811–823, July 2009
- [4] Luis F. Teixeira and Luis Corte-Real. Video object matching across multiple independent views using local descriptors and adaptive learning. *Pattern Recognition Letters*, 30(2):157–167, January 2009
- [5] Luis F. Teixeira, Jaime S. Cardoso, and Luis Corte-Real. Object segmentation using background modelling and cascaded change detection. *Journal of Multimedia*, 2(5):55–64, September 2007
- [6] M. J. Cardoso et al. Turning subjective into objective: The BCCT.core software for evaluation of cosmetic results in breast cancer conservative treatment. *The Breast*, 16(5):456–461, October 2007

International Conferences

- [7] Pedro Teixeira, Francisco Nunes, Paula Silva, and Luis Teixeira, Mover – Activity Monitor and Fall Detector for Android, *Mobile HCI 2011* (submitted)
- [8] Jaime S. Cardoso, Ricardo Sousa, Luis. F. Teixeira, and M. J. Cardoso. Breast contour detection with stable paths. *Communications in Computer and Information Science*, 25:439–452, 2008
- [9] Luis F. Teixeira, Luis G. Martins, Mathieu Lagrange, and George Tzanetakis. "MarsyasX: multimedia dataflow processing with implicit patching. In *Proc. of ACM International Conference on Multimedia*, pages 873–876, Vancouver, BC, October 2008
- [10] George Tzanetakis, Luis G. Martins, Luis F. Teixeira, Carlos Castillo, Randy Jones, and Mathieu Lagrange. Interoperability and the marsyas 0.2 runtime. In *Proc. of the International Computer Music Conference*, Belfast, Northern Ireland, August 2008
- [11] Daniel Duraes, Luis F. Teixeira, and Luis Corte-Real. Building modular surveillance systems based on multiple sources of information – architecture and requirements. In *International Conference on Signal Processing and Multimedia Applications*, pages 314–319, Porto, Portugal, July 2008

- [12] Filipe Coelho, Luis Baptista, Luis F. Teixeira, and Jaime S. Cardoso. Automatic system for the recognition of amounts in handwritten cheques. In International Conference on Signal Processing and Multimedia Applications, pages 320–324, Porto, Portugal, July 2008
- [13] Jaime S. Cardoso, Luis F. Teixeira, and Maria J. Cardoso. Automatic breast contour detection in digital photographs. In Proc. of International Conference on Health Informatics, pages 91–98, Funchal, Portugal, January 2008
- [14] Mathieu Lagrange, Luis G. Martins, Luis F. Teixeira, and George Tzanetakis. Speaker segmentation of interviews using integrated video and audio change detections. In Proc. of International Workshop on Content-Based Multimedia Indexing, pages 219–226, Bordeaux, France, June 2006
- [15] Luis F. Teixeira and Luis Corte-Real. Cascaded change detection for foreground segmentation. In Proc. of IEEE Winter Vision Meeting Motion and Video Computing, Austin, TX, February 2007
- [16] Luis F. Teixeira and Luis Corte-Real. Integrated multimedia authoring and description framework. In Proc. of the International Workshop on Image Analysis for Multimedia Interactive Services, pages 265–268, Incheon, South Korea, April 2006

National Conferences

- [17] Pedro Teixeira and Luis F. Teixeira. Search and Navigation for Photo Collections Portuguese Conference on Pattern Recognition, 2010

Projects

IST NoE VISNET II (2006–2009) and NoE VISNET (2004-2005) – Audiovisual systems and algorithms. Researcher/Ph.D. student. Research tasks: develop segmentation and tracking algorithm for visual surveillance systems.

IST NUGGETS (2003–2004) – Distributed systems for digital television. Researcher and implementation responsibilities within a team of 2 elements. Development tasks: MXF SDK support. IST ASSET (2003) – Distributed systems for digital television. Researcher and implementation responsibilities within a team of 3 elements. Development tasks: Metadata handling SDK in C++.

MXF SDK (2002) – Distribution formats for digital television. Implementation responsibilities within a team of 5 elements. Development tasks: MXF SDK implementation in C++.

IST METAVISION (2002–2003) – Distributed systems for digital television. Researcher and implementation responsibilities within a team of 3 elements. Development tasks: Distributed audiovisual file management system in C++.

ORBIT (2001–2002) – Video processing, distributed systems for digital television. Researcher and implementation responsibilities within a team of 15 elements. Development tasks: CORBA modules in C++ and video annotation GUI in JAVA.

Invited talks

- Augmented Reality Seminar, Portuguese Catholic University, School of Arts, July 2011 (to happen)

- Computer Vision and Multimodal Interfaces Seminar, Portuguese Catholic University, School of Arts, March 2010
- Marsyas and MarsyasX, University of Minho, March 2008

Other activities

Reviewer for scientific publications and conferences

- International Conference on Image Analysis and Recognition (ICIAR)
- International Computer Music Conference (ICMC)
- Pattern Recognition Letters

Participation in conferences and other events

- ACM Multimedia 2008, Vancouver, BC, Canada, 27-31 October, 2008.
- IEEE Winter Vision Meeting Motion and Video Computing (Motion 2007), Austin, TX, 23-24 February, 2007.
- Data and Models in Engineering, Science and Business, Parts I & II short summer course organized by the Massachusetts Institute of Technology Professional Institute (MIT-PI), Cambridge, MA, USA, 10-13 July, 2006.
- Summer School NN2005 on Neural Networks, Porto, Portugal, 4-8 July, 2005.
- International Symposium on 3D Data Processing, Visualization and Transmission (3DPVT 2002), Padova, Italy, 19-21 June, 2002.

Honors and awards

Doctoral scholarship awarded by the FCT (Portuguese foundation for science and technology), 2004-2008
Master's scholarship awarded by the FCT (Portuguese foundation for science and technology), 2003-2004

Personal skills and competences

Languages

Portuguese (mother-tongue), English (proficient), French (basic), Finnish (basic)

Technical Knowledge

Experienced C/C++ programmer with 10+ years of development experience in R&D projects, as well as open-source projects. Developed a broad range of applications and modules, covering aspects from specification and implementation of multimedia framework architectures, implementation of distributed systems, algorithm-level implementation, GUI design to 3D programming. Large experience (6+ years) using the Python programming language, developing smaller projects and bindings of C/C++ modules for higher-level integration. Experience also in web development using PHP and Javascript with associated technologies such as Ajax, jQuery and JSON. Knowledge of other programming languages, including Java, Perl, SQL and C#. Knowledge of specific software tools, including MATLAB, Maple, SPSS, MySQL and LaTeX.

CURRICULUM VITAE

PERSONAL DETAILS

Name: Miguel Tavares Coimbra
Date of Birth: 15/05/1975
Nationality: Portuguese
Address: Rua Clube dos Caçadores, 905, 1º DTTZ
4430-057 Vila Nova de Gaia
Portugal
E-mail: mcoimbra@fc.up.pt
Webpage: www.dcc.fc.up.pt/~mcoimbra

EDUCATION

- 2004-2006 Post-Doc studies at IEETA, University of Aveiro, Portugal. Work consisted in using computer vision methods for the creation of computer tools for clinical analysis of a variety of video exams. Examples include automatic annotation of endoscopic capsule exams, single particle tracking for low SNR confocal microscopy exams, and numerical quantification of patient 3D motion during epileptic seizures.
- 1999-2004 PhD in Electronic Engineering, Queen Mary, University of London, “Compressed Domain Processing with Applications to Surveillance”. Research consisted in the study of compressed domain information of encoded digital video. This resulted in the development of fast tools that approximate traditional image and video processing methods. The test scenario for these tools was a real underground train CCTV surveillance system.
- 1993-1998 BEng in Electrical and Computer Engineering with specialization in Telecommunications, at Faculdade de Engenharia da Universidade do Porto, Portugal. Final average: 16. Distinction for graduating in the top 5% of students.

PROFESSIONAL AND ACADEMIC EXPERIENCE

- 2006-... Assistant Professor of the Computer Science Dep., Faculty of Sciences of the University of Porto, Portugal.
- 1998-1999 Researcher at INESC-Porto. Worked in the VIDION project in collaboration with RTP, the Portuguese public television provider. Work consisted in the development of the ‘Search workstation’ for RTP’s multimedia digital archive. It included search, real-time navigation and on-line visualization of results.

TEACHING EXPERIENCE

- 2006-... Graduate and Undergraduate Courses at Universidade do Porto
- 2009/10
 - Human-Computer Interaction
 - Computer Vision (MSc. Level)
 - 2008/09
 - Human-Computer Interaction
 - Computer Vision (MSc. Level)
 - Seminar (MSc. Level)
 - Telemedicine and e-Health (MSc. Level)
 - Signal and Image Processing (MSc. Level)
 - Computer Vision (PhD. Level)
 - 2007/08
 - Human-Computer Interaction
 - Computer Vision (MSc. Level)

- Computer Vision (PhD. Level)
- Signal and Image Processing (MSc. Level)
- 2006/07
 - Introduction to Informatics (43 undergraduates)
 - Data Structures and Algorithms (183 undergraduates)
 - Graphical Interfaces (138 undergraduates)
 - Signal and Image Processing (7 graduates)
 - Monograph (individual)
- 2002-2003 Lab Monitor for 'Image Processing' at Queen Mary, University of London, under the supervision of Dr. Ebroul Izquierdo.
- 2002-2003 Lab Monitor for 'Multimedia' at Queen Mary, University of London, under the supervision of Dr. Ebroul Izquierdo.
- 1999-2000 Lab Monitor for 'C++ Programming' at King's College London, under the supervision of Dr. Sergio Velastin.

STUDENT SUPERVISION

PhD	Fahran Riaz <i>"Computer Assisted Analysis of Narrow-Band Imaging Endoscopy Exams", DCC, FCUP</i> Paulo Alves <i>"Event Detection for Capsule Endoscopy Video Exams", ProDEI, FEUP</i> Can Ye <i>"Applied Computer Vision for Critical Infrastructures", CMU-Portugal, FCUP</i> Fábio Hedayioglu, <i>"DigiScope - DIGItally enhanced stethoSCOPE for clinical usage", MIM, UP</i>
MSc	Francisco Oliveira, <i>"Real-Time Computer Vision Tools for Capsule Endoscopy Exam Analysis", MCC, FCUP</i> Bruno Lopes, <i>"Software Platform for Assisted Analysis of Cellular Images", MCC, FCUP</i> Celso Ferreira <i>"CellNote: Image processing modules for cellular images", MCC, FCUP</i> Marcos Marafona <i>"Photographic Records of Wounds", MIM, FCUP/FMUP (Co-Supervision)</i>
Researchers	Pedro Gomes <i>Researcher, CMU Portugal Vital Responder project</i> Pedro Nogueira <i>MSc Student, CMU Portugal Vital Responder project</i> Joel Gouveia <i>BSc Student, CMU Portugal Vital Responder project</i> Nuno Marques <i>BSc Student, CMU Portugal Vital Responder project</i>

ALUMNI

MSc	Fábio Hedayioglu, <i>"DigiScope - DIGItally enhanced stethoSCOPE for clinical usage", MIM, UP</i> João Patriarca <i>"Criptografia Adaptiva para Codificação Avançada", MCC, FCUP (Co-Supervision. Supervisor: João Barros, FEUP), 2009</i> André Sousa, <i>"Analysis of colour and texture features of vital-stained magnification-endoscopy images for computer-assisted diagnosis of precancerous and cancer lesions", MIEIC, FEUP, 2008</i>
Scientific	Nelson Gomes,

- Projects
- "Plataformas de processamento de imagem digital: ao encontro de um propósito mais abrangente", DCC, FCUP, 2007*
- Bruno Lopes,
"Determining Leishmania Infection Levels by Automatic Analysis of Fluorescence Microscopy Images", IBMC, 2008
- Carla Teixeira
 "Visita Guiada ao Interior de um Computador", 2008
- Luciana Santos
"Introdução à imagem digital", 2008
- Marta Falcão,
"Levantamento de tecnologias Web actuais passíveis de apoiar o estudo de um aluno do ensino secundário", 2008
- Nádea Serra,
"Ferramenta de ensino para alunos com necessidades educativas especiais", 2008
- Patrícia Silva, Isabel Neves, Teresa Soares,
"Tenho Dislexia", 2009

PUBLICATIONS - JOURNAL PAPERS

1. M. Coimbra, M. Mackiewicz, M. Fisher, C. Jamieson, J. Soares, J.P. Silva Cunha, "Computer Vision Tools for Capsule Endoscopy Exam Analysis", invited paper in Eurasip NewsLetter, vol. 18/1, March 2007, pp. 1-19.
2. J.P. Silva Cunha, M. Coimbra, P. Campos, J. Soares, "Automated Topographic Segmentation and Transit Time Estimation in Endoscopic Capsule Exams", accepted for publication in IEEE Transactions in Medical Imaging.
3. M. Coimbra, and J.P. Silva Cunha, "MPEG-7 visual descriptors – Contributions for automated feature extraction in capsule endoscopy", in IEEE Trans. Circuits and Systems for Video Technology, vol. 16/5, 2006, pp. 628-637.
4. M. Coimbra, and M. Davies, "Approximating optical flow within the MPEG-2 compressed domain" in IEEE Transactions on Circuits and Systems for Video Technology, Volume: 15 , Issue: 1 , Jan. 2005, pp. 103-107.

PUBLICATIONS - CONFERENCE PAPERS

1. J. P. S. Cunha, S. Lima, D. Pacheco, I. Oliveira, J. M. Fernandes, L. Alves, M. Coimbra, and J. Soares, "Automated Endoscopic Capsule Massive Analysis using a Grid Computing Environment," (abstract) in VIII Reunião Ibérica de Cápsula Endoscópica, Porto, Portugal, 2010.
2. J. P. S. Cunha, S. Lima, M. Coimbra, and J. Soares, "ECCA - A Tool for fast annotation of endoscopic capsule exams and its use in a new polyp detection algorithm," (abstract) in VIII Reunião Ibérica de Cápsula Endoscópica, Porto, Portugal, 2010.
3. M. Dinis-Ribeiro, F. Riaz, A. Sousa, P. Pimentel-Nunes, M. Areia, M. Coimbra, "Computer-assisted analysis of gastric magnification chromoendoscopy images: feasibility and potential applications", (abstract) in World Congress of Gastroenterology, London, UK, Nov 2009.
4. A. Sousa, M. Dinis-Ribeiro, M. Areia, M. Coimbra, "Identifying cancer regions in vital-stained magnification endoscopy images using adapted color histograms", in Proc. of IEEE ICIP 2009, Cairo, Egypt, Nov 2009.
5. F. Riaz, M. Dinis-Ribeiro, M. Coimbra, "Quantitative Comparison of Segmentation Methods for In-Body Images", in Proc. of IEEE EMBC 2009, Minneapolis, USA, Sep 2009.
6. S. Lima, J.P. Silva Cunha, M. Coimbra, J. Soares, "ECCA – Endoscopic Capsule Capview cAtaloguer", in Proc. of 11th World Congress on Medical Physics and Biomedical Engineering, Munich, Germany, Sep 2009.
7. F. Riaz, A. Sousa, P. Pimentel-Nunes, M. Areia, M. Coimbra, M. Dinis-Ribeiro, "Análise assistida por computador de imagens de cromendoscopia gástrica: praticabilidade e aplicabilidade", (abstract) in 29th National Meeting in GastroEnterology, Porto, Portugal, 2009.

8. F. Riaz, M. Dinis-Ribeiro, M. Coimbra, "A Review of Current Computer Aided Diagnosis Systems for Polyp Detection in Virtual Colonoscopy", 7th Conference on Telecommunications, Santa Maria da Feira, Portugal, May 2009.
9. F. Riaz, M. Dinis-Ribeiro, M. Coimbra, "Semantic relevance of current image segmentation algorithms", in Proc. of IEEE WIAMIS 2009, London, UK, May 2009.
10. S. Lima, M. Coimbra, J. Soares, J.P. Silva Cunha, "A Tool for Endoscopic Capsule Dataset Preparation for Clinical Video Event Detector Algorithms", in Proc. of HealthInf 2009, Porto, Portugal.
11. F. Hedayioglu, S. Mattos, and M. Coimbra, "A Survey of Audio Processing Algorithms for Digital Stethoscopes", in Proc. of HealthInf 2009, Porto, Portugal.
12. A. Sousa, M. Dinis-Ribeiro, M. Areia, M. Correia, M. Coimbra, "Towards more adequate colour histograms for in-body images", in Proc. of IEEE EMBC 2008, Vancouver, Canada, 2008.
13. M. Coimbra, J. Kustra, P. Campos, J.P. Silva Cunha, "Combining Color with Spatial and Temporal Position of the Endoscopic Capsule for Improved Topographic Classification and Segmentation", in Proc. of SAMT 2006, Athens, Greece, 2006.
14. J.P. Silva Cunha, M. Coimbra, J. Kustra, P. Campos, J. Soares, "Posição e Velocidade Espacial da Cápsula Endoscópica como Ferramenta de Apoio ao Diagnóstico Clínico", (abstract) in 26th National Meeting in GastroEnterology, Porto, Portugal, 2006.
15. J. Soares, F. Baldaque, L. Lopes, M. Coimbra, J.P. Silva Cunha, "Precisão e Eficiência da Anotação Topográfica Manual de Exames de Cápsula Endoscópica", (abstract) in 26th National Meeting in GastroEnterology, Porto, Portugal, 2006.
16. J.P. Silva Cunha, M. Coimbra, C. Vollmar, S. Noachtar, "Quantification of 3d Motion Data for Seizure Semiology Analysis in Epilepsy", (abstract) in 18th National Meeting in Epileptology, Porto, Portugal, 2006.
17. J.P. Silva Cunha, M. Coimbra, P. Campos, J. Soares, "Faster Wireless Capsule Exam Analysis using Automatic Tools", (abstract), in Proc. of International Conference on Capsule Endoscopy 2006, Miami, USA, 2006.
18. M. Coimbra, J.P. Silva Cunha, P. Campos, J. Soares, "Capview.org: A Research Framework for the Development of Automatic Tools for Capsule Endoscopy", (abstract), invited paper in Proc. of 4th Iberian Meeting of Capsule Endoscopy, Coimbra, Portugal, 2006.
19. J.P. Silva Cunha, M. Coimbra, P. Campos, J. Soares, "The First Capview.Org Automatic Tool for Capsule Endoscopy", (abstract), invited paper in Proc. of 4th Iberian Meeting of Capsule Endoscopy, Coimbra, Portugal, 2006.
20. M. Coimbra, P. Campos, and J.P. Silva Cunha, "Topographic Segmentation and Transit Time Estimation for Endoscopic Capsule Exams", in Proc. of IEEE ICASSP 2006, Toulouse, France, 2006.
21. M. Coimbra, P. Campos, and J.P. Silva Cunha, "Extracting clinical information from endoscopic capsule exams using MPEG-7 visual descriptors", in Proc. of IEE EWIMT 2005, London, UK, 2005.
22. M. Coimbra, J.P. Silva Cunha, R. Bausinger, C. Bräuchle, A. Zumbusch, "Objective analysis of illumination noise in fluorescence microscopy", in Proc. of WIAMIS 2005, April, Montreux, Switzerland, 2005.
23. M. Coimbra, and M. Davies, "A Numerical Comparison of Compressed Domain Approximations to Optical Flow", WIAMIS 2004, Lisbon.
24. M. Coimbra, and M. Davies, "Segmentation of moving pedestrians within the compressed domain", in Proc. of IEEE ICASSP 04, Montreal, Canada, 2004.
25. M. Coimbra, and M. Davies, "A New Pedestrian Detection system using MPEG-2 Compressed Domain Information", in Proc. of IASTED International Conference on Visualization, Imaging, and Image Processing (VIIP 2003), Spain, 2003, pp. 598-602.
26. M. Coimbra, M. Davies and S. Velastin, "Pedestrian Detection using MPEG-2 Motion Vectors", in Proc. of WIAMIS 2003, London, 2003, pp. 164-169.

OTHER PUBLICATIONS

1. M. Coimbra, "Poderá um computador 'ver' imagens de cápsula endoscópica?", in EndoNews, Vol: 15, Jul. 2006, pp. 9.

FINANCED PROJECTS

1. MovEpi3D - Motion quantification of 3D body motion during epileptic seizures; Funding Organization: FCT; Role: Investigator; Funding: 128.796€; Duration: 3 years.
2. GERES-Med - Grid-Enabled REpositorieS for medical applications; Funding Organization: FCT; Role: Investigator; Funding: 199.560€; Duration: 3 years.
3. CapView – Automated Tools for Endoscopic Capsule Exam Analysis; Funding Organization: FCT; Role: Investigator; Funding: 87.300€; Duration: 3 years.
4. Vital Responder - Monitoring Stress in First Responder Professionals; Funding Organization: FCT; Role: Co-PI (IT Team Leader); Funding: 519.456€; Duration: 3 years.
5. DigiScope - DIGItally enhanced stethosCOPE for clinical usage; Funding Organization: FCT; Role: PI; Funding: 120.000€; Duration: 3 years

SELECTED PRESENTATIONS

1. 04/12/2009 - "Detecting Cancer in Chromoendoscopy", Universidade da Beira Interior, Covilhã
2. 14/04/2009 - "Computer Assisted Analysis of Emerging Gastroenterology Imaging Technologies", MSc Seminar (MSc in Medical Physics), FCUP, Porto
3. 18/03/2009 - "Image Processing and Analysis", 1st Basic Course on Optical Microscopy Imaging for Biosciences, IBMC, Porto
4. 06/03/2009 - "Looking In: Emerging Imaging Technologies for Gastroenterology", MSc Seminar (MIM), FMUP, Porto
5. 30/01/2009 - "A Little Vision for Biologists", MIT, Boston, USA.
6. 29/01/2009 - "Vital Responder - Monitoring Stress in First Responder Professionals", Carnegie-Mellon University, Pittsburgh, USA.
7. 01/08/2008 - "Medical Imaging Research @ NIP.", UNICENTRO - Universidade Estadual do Centro-Oeste, Guarapuava, Brazil
8. 01/07/2008 - "Medical Imaging Research @ NIP", Real Hospital Português de Beneficência de Pernambuco, Recife, Brazil
9. 21/07/2008 - "Applied Computer Vision Applications", Fraunhofer Institute, Porto
10. 31/01/2008 - "Applied Computer Vision Applications", IBMC, Porto
11. 08/01/2008 - "Analysis tools for endoscopic capsule exams", MSc Seminar (MAOPI), FCUP, Porto

PATENTS

1. M. Coimbra and M. Davies, PCT International Application No. PCT/EP2004/051325, "Optical Flow Estimation Method", Queen Mary & Westfield College, 1st July 2004.

TECHNICAL PROGRAM COMMITTEES

1. CISP 2010, 3rd International Congress on Image and Signal Processing, Yantai, China
2. ICIAR 2009, International Conference on Image Analysis and Recognition, Halifax, Canada
3. ICIAR 2008, International Conference on Image Analysis and Recognition, Póvoa de Varzim, Portugal
4. SecTech 2008, International Conference on Security Technologies, Samui, Thailand

ACADEMIC COMMITTEES

- | | |
|-----|---|
| PhD | 1. Janete Borges, DMA, FCUP, Oct 2009 |
| | 2. Sílvia de Francesco, UA, 2009 |
| | 3. Pedro João Soares Rodrigues, UM, Dec 2008 |
| MSc | 1. Paulo Saraiva, DETI, UA, Dec 2009 |
| | 2. João Oliveira, DI, UBI, Set 2009 |
| | 3. João Correia, DMA, FCUP, 2009 |
| | 4. Sérgio Lima, DETI, UA, Jan 2009 |
| | 5. Denis Roda Dos Santos, DETI, UA, July 2008 |

REVIEWER ACTIVITIES

Journals	<i>IEEE Transactions on Circuits and Systems for Video Technology</i> <i>IEEE Transactions on Medical Imaging</i> <i>IEEE Transactions on Biomedical Engineering</i> <i>IEEE Transactions in Image and Video Processing</i> <i>IEE Electronic Letters</i> <i>Eurasip Journal on Applied Signal Processing</i> <i>Image and Vision Computing</i> <i>Journal of Universal Computer Science</i> <i>International Journal of Imaging</i>
Conferences	<i>EMBC 2010</i> <i>EMBC 2009</i> <i>ICIAR 2009</i> <i>PCS 2009</i> <i>ICIAR 2008</i> <i>PCS 2007</i> <i>ICIAR 2007</i> <i>ICIAR 2006</i> <i>BMVC 2004</i> <i>IASTED VIIP 2003</i>

OTHER DATA

2009	Organizing committee of a one day symposium in medical informatics (2° Simpósio de Informática Médica)
2008	Organizing committee of a one day symposium in medical informatics (1° Simpósio de Informática Médica)
2007	Organized a three day workshop on the topic: Design and Development of Video-Games (CDVJ'07 – Criação e Desenvolvimento de vídeo-jogos). Invited speaker: Verónica Orvalho, UPC, Barcelona. Participation: 30 students of 7 different Portuguese Faculties and Universities.
2003	Collaborated in the organization of the IEEE WIAMIS 2003 conference, at Queen Mary, University of London.
1998	Four month studies at Coventry University, UK, integrated in the European ERASMUS student interchange program. Participated in a collaboration project with a local hospital that consisted in the creation of an on-line telemedicine website. This system allowed encrypted access to a medical database, providing a variety of image processing tools for clinical analysis of visual exams.