

Deep Learning for Image Analysis

Course Introduction

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About the lecturers



Thomas Walter

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- Researcher on bioimage informatics, director of CBIO
- Main application fields: High Content Screening, as a method to systematically study biological processes by analyzing cellular phenotypes



Santiago Velasco-Forero

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- Researcher on image processing, pattern recognition, multivariate statistics, graph-based data/image analysis
- Main application fields: Remote Sensing, cosmetology, astronomy, hyperspectral imaging.



Etienne Decencière

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- Researcher on image analysis, mathematical morphology, deep learning
- Main application fields: Ophthalmology, dermatology, cosmetology, astronomy

Course organization

- During course sessions:
 - Lectures
 - Invited speakers
 - Notebooks presentation and correction
- Practical work (at home):
 - Python
 - keras, numpy
 - Google colab
- Communication
 - General information available from:
`http://cours.cmm.mines-paristech.fr`
 - Forum (questions about the course and the notebooks): Slack
 - E-mail (absence justification, etc.)
- Grading: written exam (march 17, 9am)

Invited speakers

- Vincent Morard (General Electric) : AI for medical images: an industrial point of view
- Bruno Figliuzzi (CMM, Mines Paris) : Segmentation d'images de rhéologie par réseaux de neurones convolutionnels
- Sébastien Lefèvre (IRISA) : DL and remote sensing
- Claire-Hélène Demarty (InterDigital) : Deep Learning for post production in movie industry
- Timothée Faucon (aiVision) : Deep learning for retinal image analysis
- Diego Tuccillo (Instituto de Astrofisica de Canarias): Deep learning applications in Astronomy
- Martin Bauw (CMM, Mines Paris): anomaly detection
- Valentin Penaud-Polge (CMM, Mines Paris): parametric layers

Main notations

i, j, n, p, q	Integer scalars
x, y, z	Real scalars
\mathbf{x}, \mathbf{y}	Real vectors
\mathbf{X}, \mathbf{W}	Matrices
f, g	Functions
θ	Set of parameters

Bibliography

- Ian Goodfellow and Yoshua Bengio and Aaron Courville, Deep learning, MIT Press.
<https://www.deeplearningbook.org/>
- Trevor Hastie, Robert Tibshirani, Jerome Friedman, The elements of statistical learning, Springer.
<https://web.stanford.edu/~hastie/ElemStatLearn/>