MACHINE LEARNING FOR MEDICAL IMAGE ANALYSIS ML-MED

ECTS	Cours (h)	T.D. (h)	T.P. (h)	Stage (semaines)
3	16		8	

Mention du master transmettant la fiche UE :	**IdS**
Composante de gestion de l'UE :	**Polytech**
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Statut du responsable :	

PROGRAMME DE L'UNITE D'ENSEIGNEMENT :

This teaching unit aims at presenting the fundamentals of machine learning and deep learning applied to the analysis of medical images, through courses and practical work.
For more than a decade, these methods have changed the way we approach image processing problems and have achieved unprecedented performances. This introduction focuses on the basic principles of these methods and their applications, and provides the knowledge basics to understand and implement more advanced state-of-the-art methods.

The lectures are organized as follows :
1- Introduction to Machine Learning for Medical Image Analysis. A Case study. (1h)
2- Feature extraction (2h)
From Image-based (gradient, texture) and bio-inspired (i.e kinetic modeling) to radiomics features
3- Supervised Learning (4h)
Principles and fundamentals, Kernel machines, Decision trees, Neural Networks
4 - Unsupervised Learning (4h)
Principles and fundamentals, clustering, dimensionality reduction, and applications
5 - Deep Learning (4h)
Why CNN and deep? Basic elements of convolutional neural network, Training optimization and regularization
Common deep architectures for classification, segmentation and localisation,
6 – Performance and comparison assessments (1h during lab)
Cross-validation and (paired) t-test

Labs :
Machine Learning 4h
Deep learning : 4h

Carole Lartizien : 7h CM (Feature + Sup. Learning)
Thomas Grenier (ou autre): 4h (Deep Learning) + 4h Lab (with metrics and CV + t-test)
Nicolas Duchateau: 4h CM (Unsup Learning) + 4h Lab

MUTUALISATION :