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TAIMA 2023 Special Session on

Riemannian in Data Science & Computer Vision

27 May to 1 June, 2023, Hammamet, Tunisia

Brief description

Different fundamental problems relating to data science, pattern recognition and computer vision are addressed by the theory of Riemannian manifolds and Lie groups when the corresponding representations belong to nonlinear spaces. This makes it possible to build original algorithms generally providing more efficient results since such modelling makes it possible to take into account the nonlinearities of the data. However, in practice the mathematical complexity of the models for certain Riemannian manifolds would give less efficient results and this is often interpreted by the difficulty of the approximations of the continuous models. Thanks to the many elegant results of this mathematical field, undeniable advances in the analysis of colour textures, classification of shapes (1D, 2D or 3D..), motion analysis, multi-scale registration, have been recorded. . New architectures generalizing convolutional neural networks (CNN) based on Lie groups are increasingly proposed in the most recent research works in the field.

In Taima'23 editions, a special session on these issues is offered. This will be an opportunity for doctoral students and young researchers enrolled in the 'Geometric Machine and Deep Learning' training to deepen their knowledge in the field of 'Non-linear Machine Learning based on Riemannian varieties and Lie groups'. This special session will give them the opportunity to discover the fields of application relating to these questions and to learn about new research trends in this field.

Topics

- **Motion analysis and Kendall's space**
- **Classification of poses by modelling differential varieties**
- **Shape analysis, affine registration, surface registration and Riemannian calculation**
- **Analysis and classification of textures by the Riemannian approach**
- **Dimension reduction algorithms in a differential manifold.**
- **Classification in nonlinear spaces.**
- **Mixture identification algorithms on nonlinear data**
- **Exploration of shape spaces as a variety of quotient space.**
- **Intrinsic and extrinsic invariant shape space atlases.**
- **Lie group theory and convolutional deep neural networks.**
  - Statistical shape
  - Statistics on manifolds and their applications in data science and computer vision
- **Convolutional Neural Networks and invariance to geometric transformations**

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Important dates:

Paper Submission: April, 28^{th}, 2023
Paper Notification: May, 12^{th}, 2023
Camera-ready Paper: May, 22^{nd}, 2023