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Evaluation of Romain Tavenard's HdR application

This is my evaluation report of Dr. Romain Tavenard's HdR report, research contributions and portfolio.

Background

The main research of Romain is focused within the area of temporal data mining with emphasis on time series representations and summarizations for facilitating more efficient indexing as well as more effective classification and early-classification. He has produced a substantial research output on time series classification with one major highlight being his JMLR paper on tslearn, where he has provided a machine learning toolkit for time series data. His has additionally published a decent amount of methods and techniques for manipulating shapelets towards improving time series classification, as well as topic modeling for action recognition in videos and mining temporal patterns from sensor data.

Dr. Tavenard earned his PhD degree in 2011 at Inria/IRISA, with his thesis focusing on indexing time series and on how to provide efficient and compact time series representations and indexing structures for the purpose of searching in massive amounts of vectors, large-scale time series search, and mining patterns from time series sensor data.

Between 2011 and 2013 Romain worked as a postdoctoral researcher at INRIA within the Perception group funding by the Swiss national Science Foundation. Since 2013 he is assistant professor with the University of Rennes 2. Since his postdoctoral period he has shown immense productivity in his research with major contributions within the area of time series representations, classification. More importantly, since 2011 his publication record increased rapidly with his work appearing in major publication venues within the area of machine learning, data mining, and temporal data mining. Evidently his scientific achievements in terms of publications are remarkable and more than enough for obtaining the title HdR.

HdR report

The HdR report is very well written and nicely structured, evidently reflecting Romain's high research quality and merits. The report starts with a quite short and to-the-point introduction to the main research progression of Romain. The introduction starts with the main and most impactful highlights of his research, which is the tslearn library, and then some of the motivating applications involving time series that inspired his work, such as video representations, sensor data, and ship trajectories. Finally, some notations are provided.

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Chapter 2 continues by focusing on metrics for computing the similarity of times series. The chapter first presents a local temporal kernel for time series which is evaluated data from the UCR time series classification archive. Then it moves on to presenting dynamic time warping (and its constrained version) and then discussed DTW as an adaptive resampling strategy and also its version supporting global invariance. Finally, the reader is presented with ways for optimal transport for structured data using the Wasserstein and the fused Gromov-Wasserstein distances.

Chapter 3 contains three substantial contributions of this report: (1) temporal topic models, (2) shapelet-based representations and convolutional models, (3) early time series classification. One highlight of this chapter is on how to learn shapelets mimicking time series snippets as well as a robust formulation and approach towards early time series classification.

Chapter 4 concludes the report by highlighting current and future work within the area of temporal mining, with focus on dealing with time series of arbitrary objects and on temporal domain adaptation. Finally, we are presented with some broader questions on time series learning.

It is evident that his research is driven by real-world problems, it develops and employs theoretical concepts, algorithms and tools from machine learning for addressing key challenges in the area of temporal data mining and time series classification. As a result efficient, effective, and scalable solutions to these real problems are achieved. Additionally, his teaching record is spectacular, as well as his recognition as a researcher and leading player in his area.

Other merits

A key highlight in Dr. Tavenard's is his appointment as deputy director of the Statistics-CS department for the short period of September 2017 and January 2018. In combination with his appointment as Pix Coordinator and Master track coordinator indicates that he has been exposed to a significant amount of administrative duties. Moreover, he has some has taught a rich variety of courses in his area and the area of machine learning, deep learning, text mining, databases, and programming, which is a great asset in his CV. It is clear that he possesses the merits for being a good teacher in the area of computer science. Furthermore, it is a great merit that he has been actively involved in supervising one postdoctoral researcher, three PhD students, and several MSc students. Overall impressive teaching merits in terms of teaching experience, preparation of course material, teaching reviews, and supervision of students.

Romain's aforementioned merits and achievements in terms of research, teaching, supervision of graduate students, and participation in several research projects, pave the way for him to develop as a leading researcher in the field of temporal data mining. I would recommend him to continue publishing in A* publication venues, while establishing and maintaining his strong visibility in the area of time series mining. Moreover, I would strongly praise him for creating and sharing tslearn. He should continue disseminating his work to the broader scientific community.

To conclude, Dr. Tavenard's is a very promising researcher and pedagogue, who has a very bright future outlook in his area and in computer science in general.

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Summary and recommendation

Based on the above, I consider Dr. Tavenard very suitable for obtaining the title of HdR, since he satisfies by far all the requirements with respect to scientific merits, pedagogic skills, ability to attract external funding, and external collaborations and leadership skills. Moreover, his CV provides a strong proof that Dr. Tavenard is recognized in his area, and constitutes a strong rising star within his research field.

I would, hence, strongly endorse his HdR with my strongest confidence and enthusiasm.

Sincerely,

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