Research Studentship: Predictive Process Monitoring – Investigating new application domains

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Within this framework, for year 2018 the Bruno Kessler Foundation is looking for MSc students with strong technical skills and a desire to be engaged in a path of professional growth toward the capability of designing and carrying out scientific research. We are looking for MSc students who plan to give their final MSc degree exam in 2018, who are willing to work in international teams, are attracted by the thrill of research and innovation, and have spirit of initiative and critical thinking.

The studentship includes a scholarship. During this experience, students are allowed to complete their remaining exams at the University. Moreover, the thesis for the final exam, as well as the stage (when required), are also part of the studentship itself and usually overlap with the topic of the same.

Research topic:

Predictive process monitoring aims at predicting how a current ongoing case (logged in a process execution trace) will develop in the future by taking advantage of the history of past process executions. Different machine learning techniques have been applied and framework built so far in the literature for targeting this problem [1, 2, 3, 4, 5]. All these approaches have shown to provide excellent results in real-life scenarios, in which a set of traces, each describing the execution of a process as a sequence of activities and possibly data manipulated by these activities (as in the case of BPI Challenges) are available. By exploiting such a new and wide range of approaches developed within the BPM community, and in particular the framework described in [1,2], we would like to explore their applicability also in other domains.

Purpose of this work is investigating whether and how state-of-the-art techniques and approaches can be applied to new domains and scenarios, such as Internet of Things (IoT) enabled predictive maintenance and domotics. Such a task poses different and interesting challenges:

- understanding the process prediction problem in the new domain;
- identifying the best technique(s) to be used to face the problem;
- preprocessing the dataset(s) so as to convert it( them) in a format which is usable by existing process techniques;
- adapting existing techniques so as to make them suitable for datasets in the new domain.
comparing with predictive techniques that are "native" for the specific domain and investigate the advantages of recasting the specific domain in terms of process prediction.

Detailed examples of application domains and datasets are reported in the following:

- Predictive Maintenance, Acoustic and Vibration Dataset [Link](http://data-acoustics.com/measurements/bearing-faults/bearing-2/)
- Domotic [Link](http://ailab.wsu.edu/casas/datasets.html)
- Multi-temporal image classification

**References:**


**Required:**

- Bachelor Degree
- Programming skills (preferably Java and Python)
- Basic knowledge on machine learning techniques

**Competencies to be acquired:**

- Improved knowledge on machine learning algorithms
- Knowledge on business process predictive monitoring
- Ability to understand and deal with new domains and data
- Team working skills

Tutor: Chiara Di Francescomarino (dfmchiara@fbk.eu)
Research unit: PDI [Link](http://pdi.fbk.eu/)
FBK International PhD Program: [Link](http://phd.fbk.eu)

**Studentship**

Type of contract: Collaboration contract
Duration: 5 months
Start date: early 2018
Gross monthly salary: about € 1300
Place: Povo, Trento (Italy)
Benefits: welcome office support for visa formalities, reduced bank account opening fees, public transport.
Application

Candidates are required to submit their applications by filling in the online form at
https://hr.fbk.eu/en/jobs including the following attachments (.pdf format):
- Detailed CV (including exam marks and final BSc mark)
- Cover Letter (explaining the motivations for this specific position)

Application deadline: 15th of September

Please read the Guidelines for Selection before completing your application.

For further information or technical issues regarding the application, please contact the Human
Resources Service at jobs@fbk.eu.

Candidates who are successful in the preliminary curricula screening will be contacted shortly
afterwards for an interview. Non selected applicants will be notified of their exclusion at the end of
the selection process.

For reasons of professional transparency, the name of the successful candidate will be published
on the FBK website following acceptance of the position.