UNIVERSITÀ DI PISA

PROCESS MINING AND INTELLIGENCE

MARIO GIOVANNI COSIMO ANTONIO CIMINO

Academic year	2022/23
Course	ARTIFICIAL INTELLIGENCE AND DATA ENGINEERING
Code	888II
Credits	6

Modules	Area	Type	Hours	Teacher(s)
PROCESS MINING AND INTELLIGENCE	ING-INF/05	LEZIONI	60	MARIO GIOVANNI COSIMO ANTONIO CIMINO

Obiettivi di apprendimento

Conoscenze
The course aims to provide knowledge and experience essential for developing Process Intelligence (PI) systems. A PI system analyzes a business process or operational workflow, performs a data-driven modeling of complex organizations, with its abstractions and interfaces, its metrics. PI is a modern approach for setting up, simulating, performing, monitoring organization's processes, with goals such as improved productivity, reduced costs, increased agility, integration, interoperability and coordination between actors and systems involved. PI supports the way that machines, people, work, activities, events, tools are arranged by collaborating organizations for efficiently delivering goods and services. Students are trained on how to develop non-trivial process analysis.

Modalità di verifica delle conoscenze
oral presentation of the project and written/oral test

Programma (contenuti dell'insegnamento)
Workflow and dataflow modeling: BPMN execution semantics; determination of scenarios and calculation of the number of tokens; workflow models from informal specification; the semi-formal textual description; UML data object specification; guidelines on how to characterize a process from real world contexts; handoff, service and task levels; group exercises. Lab activities with a process drawing tool and a process modeling suite. *Business process simulation*: simulation parameters; process logs; benchmarks; KPIs; task duration; branching proportion; available resources; number of instances; arrival rate; resources allocation for task. Lab activities with a process simulation tool. *Process-driven architectures*: evolution of enterprise systems architectures; Enterprise Resource Planning architecture; siloed enterprise applications; integration architectures; multiple-application workflow systems architecture; human interaction workflow; service-oriented architectures; enterprise services; enterprise service bus; service composition. Labs activities with a Business Process Management suite. *Advanced process modeling*: errors in BPMN models; syntactical and structural errors; deadlock; livelock; multiple termination; sample patterns: loop deadlock, multi-source deadlock, improper structuring deadlock; message-related mismatch; counterexamples. Exercises. *Process mining*: process execution and event logs; automatic process discovery; alpha miner algorithm; robust process discovery; heuristics miner algorithm; fuzzy miner algorithm; performance analysis; conformance checking. Lab activities with a process mining suite.

Bibliografia e materiale didattico

1. T. Allweyer, D. Allweyer, *BPMN 2.0*, 2nd ed., BoD press, Norderstedt, 2010 [excerpt].
2. BPMN Movies (zipped swf, 5,9 MB)
3. Adobe Flash (swf) Player 10.2 (zip, 2,7 MB)
4. BPMN 2.0 Poster (pdf)
5. Visual Paradigm for UML 11 [Users Guide]
6. Signavio, Process Editor - User Manual, 2015 (see more on academic.signavio.com)
7. Disco User Guide
8. Bonita BPM User Guide
9. Bonita BPM Connectors Guide (see more on documentation.bonitasoft.com, community.bonitasoft.com)

Modalità d'esame
oral presentation of the project and written/oral test

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Pagina web del corso
http://docenti.ing.unipi.it/m.cimino/pmi/

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