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SOLUTION FOR THE OPTIMIZATION OF PATHOLOGY CASE DISTRIBUTION LEVERAGING FLEXIBLE DEFINITION OF POLICIES

A. Bucur^{*1}, J. van Leeuwen¹, R. Vdovjak²

¹Philips Research Europe, Eindhoven, Netherlands, ²Philips Healthcare, Eindhoven, Netherlands

Introduction/ Background

The adoption of digital pathology has the potential to enable significant workflow improvements leading to increased efficiency—in terms of better utilization of resources, higher throughput and lower turnaround time of cases—, and more effective collaboration. Streamlined workflow solutions make it easy to monitor both performance and quality, and help avoid errors. The policies driving the distribution of cases to pathologists (dispatching) have a large impact on the throughput and turnaround of cases in a pathology lab. Leveraging the availability of digital pathology we develop an application focused on the management of worklists of cases and their automatic dispatching for diagnosis. Our solution includes the modeling, simulation and optimization of the dispatching policies and their adaptation.

Aims

We develop applications to enable clinical users to leverage a digital pathology system for increased efficiency and better patient outcomes. The work addresses information integration requirements, and aims to identify and propose solutions for performance bottlenecks in existing processes. A process with potential for improvement is the case distribution to pathologists for diagnosis.

Methods

We implemented key components enabling to manage and retrieve case and pathologist information, to propose an optimized assignation of cases, and to visualize worklists and assign cases to pathologists.

Worklist visualization: Provides an overview of (active and completed) cases with relevant information (e.g. status, number of slides, organ, clinical question). The tool also shows for each pathologist the assigned and diagnosed cases, specialties, deadlines, etc., depicts the process of building and executing the solver to generate a suitable dispatch solution.

Dispatching optimization module: Proposes assignments based on case features (e.g. type, complexity, average diagnosis time) and on pathologist characteristics (e.g. specialty, available time) [3]. Aims at optimizing user-defined goals, such as the pathologist time and the turnover of cases. We use the OptaPlanner package [2] of jBPM [1] and define the domain model of the problem and the scoring rules according to policies based on the requirements of the clinical users.

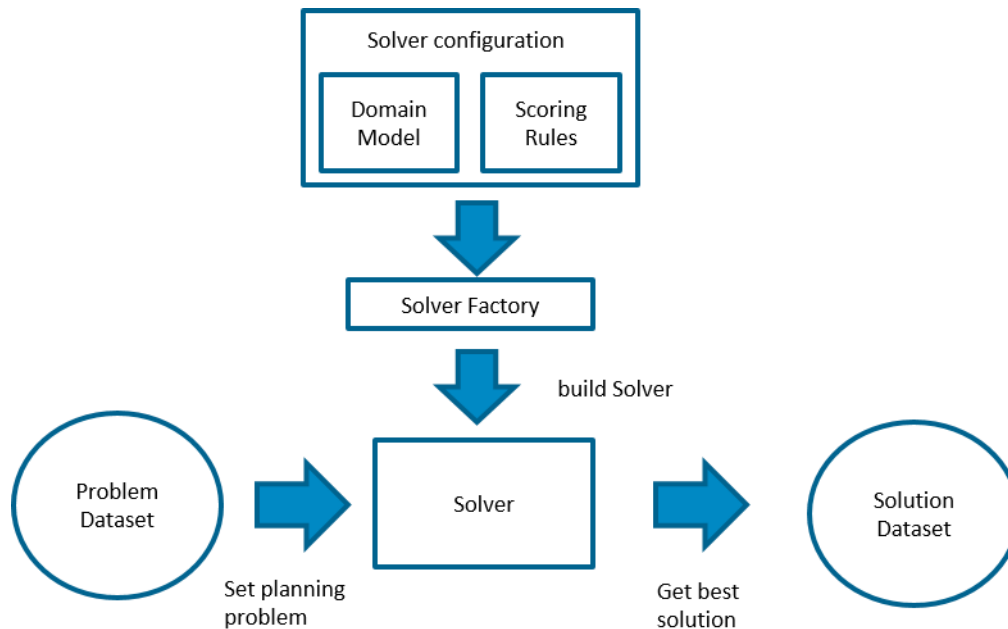
Services for data management: Allow to retrieve the relevant metadata of incoming cases and the agenda information of pathologists.

Results

Our case distribution application supports both the manual dispatching of cases to pathologists and the automatic assignation according to defined policies. The optimization component applies the policy models to send cases to pathologists for diagnosis. The schedules are generated according to the optimization goals, e.g. to improve throughput or turnaround. The configuration can be customized to apply dispatching rules and



optimization goals specific to each deployment site. The visual application provides insight into the status of cases and allows users to change the assignation of cases when needed (e.g. when agenda changes occur and cases need to be reassigned).



References:

- [1] JBoss, jBPM Business Process Management Suite 2015, [cited 01-01-2016]. Available from: www.jbpm.org
- [2] JBoss, OptaPlanner constraint satisfaction solver, 2015, [cited 01-01-2016]. Available from: <http://www.opta-planner.com>
- [3] Juby Joseph Ninan, Integrating rules and automated planning in business processes, Eindhoven University of Technology, Master Thesis, 2014, [cited 01-01-2016]. Available from: https://www.google.nl/?gfe_rd=cr&ei=ShKYVqywK8vl-gaq-JH4Cw&gws_rd=ssl#q=Integrating+rules+and+automated+planning+in+business+processes+