

AI for Court Case Distribution

Summary

Tallinn University of Technology, Department of Software Science offers a IT-Academy funded 4-year PhD position in the field of ICT

Research field:	Information and Communication Technology
Supervisors:	Sadok Ben Yahia Dirk Draheim
Availability:	This position is available.
Offered by:	School of Information Technologies Department of Software Science
Application deadline:	Applications are accepted between September 01, 2020 00:00 and October 02, 2020 23:59 (Europe/Zurich)

Description

Motivation

Court case distribution is an area with a huge potential to increase the state's effectiveness and efficiency in the important field of judiciary. The problem with current course case distribution is the following:

- cases are scheduled on an ad-hoc basis
- knowledge about which judges have the most expertise to handle a given case is only poorly exploited or not exploited at all
- due to (ii) cases are not handled as fast as possible (inefficiency)
- due to (ii) cases are not handled in the best possible way (lack of quality, lack effectiveness)
- there is only a poor estimate or no estimate at all about the efforts needed for a given case. Even if available, such information is often not exploited in scheduling court cases. This leads to poor scheduling (effort-wise) of cases and misbalance in workloads (which leads again to inefficiency)
- current case distribution system allows layers to influence assignment of judges. It gives possibility to corruption

Basic court case management systems help in improving this situation, but not significantly/fundamentally [LT19, MS17, San17]. What is needed is an automatic court case distribution that addresses the problems (i-vi) from scratch. However, the challenge is too complex to be solved by classical recommender systems AI-approaches (rule-based; decision-logics-based; based on CBR, i.e., case-based reasoning). What is needed is a screening of the whole range of currently available AI resp. machine learning techniques and tools to fundamentally improve the situation.

In the Estonian ICT sector, there exists considerable know-how in design and implementation of e-court systems. The PhD research will benefit from this, as it will be built on strong partnership between Estonian ICT industry and academia.

Objective

The objective is to achieve an AI-based automatization of court case distribution that is tightly integrated into existing e-court systems (concrete: the industrial partner's running project of e-court implementation in several countries and regions).

Research Questions

- Baseline (main) research questions:
 - Which advanced/recent/emerging AI resp. machine learning techniques/tools (including unsupervised as well as supervised learning!) have been applied successfully in the recommender systems domain?
 - Which AI resp. machine learning techniques/tools can be applied successfully for court case distribution? (a screening of the whole range of machine learning techniques [Jam13, GBC16] and tools is necessary for the purpose of this research question) Otherwise: how to extend/improve existing AI resp. machine learning techniques/tools so that they can be applied successfully for court case distribution?
 - How to formalize rules for court case distribution against which AI-based implementation can be evaluated?
 - How to implement AI-based techniques for court case distribution?

- Advanced research questions:
 - How to integrate an AI-based solution for court case distribution into existing e-court systems, i.e., integration at ERP (enterprise resource planning system) level? (wrt this research question the PhD candidate will be supported by an already exist-ing Taltech PhD student, who is financed by Aktors as an industrial PhD student with the PhD topic "Implementation of e-Court Systems: Driving Forces, Success Factors, and Technology Acceptance")
 - How to integrate an AI-based solution for court case distribution into e-Court system landscapes, i.e., integration at federation level? (wrt this research question the PhD candidate will be supported by an already existing Taltech PhD student, who is financed by IT Academy funding in the Taltech Information Systems Group (head: Dirk Draheim) with the PhD topic "Generalized Association Rule Mining – Big Data Integration")
- Auxiliary research questions:
 - Are there legal obstacles wrt course case distributions and how should they be addressed? (Prof. Katrin-Nyman Metcalf, Taltech and eGA (e-Governance Academy), an international renowned expert in IT and law, will help with this research question)

Methodology

- Inception phase: Systematic literature review (Kitchenham) with respect to the first of the above research questions: "Which advanced/recent/emerging AI resp. machine learning techniques/tools (including unsupervised as well as supervised learning!) have been applied successfully in the recommender systems domain?" (The first screening for related work shows, that the problem field is a highly innovative research field, i.e., we have a clearly visible research gap; so that SLR methodology wrt the remaining of the above research questions is not indicated)
- Contribution phase: Action design research (with Aktors OÜ as industrial partner)

Research Outcome

Target scientific channels for the research outcomes are:

- Journals
 - Government Information Quarterly, Elsevier (Impact Factor: 4.311)
 - Artificial Intelligence, Elsevier (Impact Factor: 4.483)
 - Big Data Research, Elsevier (Impact Factor: 2.952)
 - International Journal of Law and Information Technology, Oxford Academic
- Conferences
 - EGOV (Joint IFIP Conference EGOV-CeDem-ePart, e-Government, e-Democracy, e-Participation – the leading e-Government conference)
 - CAiSE (Conference on Advanced Information Systems Engineering), Springer

References

- [GBC16] Ian Goodfellow, Yoshua Bengio, Aaron Courville. Deep Learning. MIT Press, 2016.
- [Jam13] Gareth James, Daniela Witten, Trevor Hastie and Robert Tibshirani – An Introduction to Statistical Learning with Applications in R. Springer, 2013.
- [LT19] Lessa, L., Tsegaye, A. Evaluation of the public value of e-government services in Ethiopia: Case of court cas.
- [MS17] Mishra, S.K.a, Singh, V.K.b . Developing a multi agent system model in GAIA for court case management system as a case study and providing an extension to GAIA. In: Pro-ceedings of ICACCA'2017 - the 3rd International Conference on Advances in Computing, Communication and Automation, 2017, pp. 1-4.
- [San17] Sarantis, D. The challenge of accelerating Greek judicial procedure. In: Proceedings of EGOVIS'2017 - 6th International Conference on Electronic Government and the Infor-mation Systems Perspective, LNCS 10441, Springer, 2017, pp. 251-260.

[Sar19] Sarvarian, A. Procedural economy at the international court of justice, Law and Practice of International Courts and Tribunals, vol. 18, no. 1, 2019, pp. 74-100.



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