

# ALI AJDARI

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**About me:** I am an industrial engineer, optimization expert, and cancer researcher. I use advance machine learning and optimization theory to derive data-driven and efficient algorithm for solving challenging problem arising in healthcare, biology, and cancer research.

## EDUCATION

- Ph.D. in Industrial and Systems Engineering 01/2014-12/2017  
University of Washington, Seattle, WA.  
**Thesis:** Robust, Dynamic, and Convex Optimization in Radiation Therapy  
**Advisor:** Archis Ghatge
- M.Sc. in Industrial Engineering 09/2009-01/2012  
Sharif University of Technology, Tehran, Iran.  
**Thesis:** Dynamic Adaptive Experimental Design in Simulation Optimization  
**Advisor:** Hashem Mahlooji
- B.Sc. in Industrial Engineering 09/2004-02/2009  
Isfahan University of Technology, Isfahan, Iran.  
**Thesis:** Neural Network Model for Predicting US-EU Forex Exchange Rate  
**Advisor:** Hamed Tarkesh

## ACADEMIC POSITIONS

- **Instructor** 02/2020- present  
Department of Radiation Oncology  
Harvard Medical School &  
Massachusetts General Hospital, Boston, MA.
- **Post-doctoral research fellow** 02/2018-02/2020  
Department of Radiation Oncology  
Harvard Medical School &  
Massachusetts General Hospital, Boston, MA.
- **Graduate Research Assistant II** 09/2015-12/2017  
Stochastic and Dynamic Optimization Lab  
University of Washington, Seattle, WA.
- **Research Intern** 06/2015-09/2015  
Department of Radiation Oncology  
Mayo Clinic, Phoenix, AZ
- **Graduate Research Assistant I** 01/2014-09/2016  
Human Factors and Statistical Modeling Lab  
University of Washington, Seattle, WA.

## RESEARCH INTEREST

Interpretable Machine Learning	Healthcare Analytics	Bayesian Statistics
Convex Optimization	Stochastic & Dynamic Optimization	Cancer treatment

## HONORS & AWARDS

- Recipient of 2020 Peer Review Excellence Award, Institute of Physics (IOP)
- Winner of the 2019 Most Innovative Research Idea, Department of Radiation Oncology, Massachusetts General Hospital, Boston
- Winner of the 2016 best paper awards, Winter Simulation Conference (WSC), Washington, DC.
- Winner of the 2012 Outstanding Graduate Thesis Award, Sharif University of Technology, Iran.

## PUBLICATIONS

### I. Published/Accepted Peer-Reviewed Journal Articles

1. Eikelder, S, Ferjancic, P, **Ajdari, A**, Bortfeld, T, Hertog, D, Jeraj, R. (2020). A theoretical framework for adaptive functional imaging-based treatment optimization. *Physics in Medicine & Biology* (accepted for publication [forthcoming]). Ref #: PMB-110421.R2.
2. McNamara, A, Hall, D, Shusharina, N, Liu, A, Wei, X, **Ajdari, A**, Mohan, R, Liao, Z, Paganetti, H. (2020). Perspectives on the model-based approach to proton therapy trials: a retrospective study of a lung cancer trial. *Radiation Therapy and Oncology* (forthcoming).
3. **Ajdari, A**, Niyazi, M., Nicolay, N et al (2019). Towards optimal stopping in radiation therapy. *Radiation Therapy and Oncology*, vol. 134, 96–100.
4. **Ajdari, A**, Saberian, F, Ghate, A. (2018). A theoretical framework for learning tumor dose-response uncertainty in individualized spatiobiologically integrated radiotherapy, *INFORMS Journal on Computing* (Published Online: March 30, 2020).
5. **Ajdari, A**, Ghate, A, Kim, M. (2018). Adaptive treatment-length optimization in spatiobiologically integrated radiotherapy, *Physics in Medicine & Biology* 63(7):075009.
6. **Ajdari, A**, Boyle, L.N., Kannan, N et al. (2017). Simulation of the Emergency Department Care Process for Pediatric Traumatic Brain Injury. *Journal for Healthcare Quality* 40(2):110-118.
7. **Ajdari, A**, Boyle, L.N., Kannan, N et al. (2017). Examining Emergency Department Treatment Processes in Severe Pediatric Traumatic Brain Injury. *Journal for Healthcare Quality* 39(6):334-344.
8. **Ajdari, A**, Ghate, A. (2016). Robust spatiotemporally integrated fractionation in radiotherapy. *Operations Research Letter*. 44(4): 544-549.
9. **Ajdari, A.**, Mahlooji, H. (2014). An adaptive exploration-exploitation algorithm for constructing metamodels in random simulation using a novel sequential experimental design. *Communication in Statistics: Simulation and Computations*. 43(5): 943-968.

## II. Published Peer-Reviewed Conference Proceedings

1. **Ajdari, A**, Shusharina N, Liao, Z, Mohan, R, Bortfeld, T (2019). A novel machine learning-Bayesian network model for prediction of radiation pneumonitis: Importance of mid-treatment information. *International Conference on the Use of Computers in Radiation Therapy*. Montreal, Canada, June 17-21, 2019.
2. **Ajdari, A**, Ghate, A. (2016). A model predictive control approach for discovering nonstationary fluence-maps in radiotherapy, Winter Simulation Conference, Washington D.C. 2065-2075.

## III. Submitted Manuscripts

1. **Ajdari, A**, Xie, Y, Richter, C, Duda, D, Hong, T, Bortfeld, T. (2020). Value of mid-treatment biomarkers in predicting response to liver metastasis stereotactic body radiation therapy. *JCO Clinical Cancer Informatics* (in 2<sup>nd</sup> revision).
2. Eikelder, SCM, **Ajdari, A**, Bortfeld, T, den Hertog, D. (2019). Adjustable robust treatment-length optimization in radiation therapy. *European Journal of Operational Research* (under review).

## PRESENTATIONS

- 2019 INFORMS Annual Conference, Seattle, WA. October 2019
- 2019 ASTRO Annual Conference, Chicago, IL. September 2019
- 2019 INFORMS Healthcare, MIT, Cambridge, MA. July 2019
- 2019 AAPM Annual Conference, San Antonio, TX. July 2019
- 2019 ICCR Conference, Montreal, Canada June 2019
- 2018 INFORMS Annual Meeting, Phoenix, AZ. November 2018
- 2017 Pediatric Trauma Society Annual Meeting, Charleston, SC. November 2017
- 2016 INFORMS Annual Meeting, Houston, TX. November 2016
- 2016 Winter Simulation Conference, Washington, D.C. December 2016
- 2015 INFORMS Annual Meeting, Philadelphia, PA. November 2015
- 2015 International Symposium on Mathematical Programming, Pittsburgh, PA. August 2015

## PATENT

- **Ajdari, A**, Bortfeld, T, Bondar, L, Bal, M. A system and methods to support personalization of cancer treatment for patients undergoing radiation therapy. International Application No. PCT/EP2020/063316. Submitted by Philips Medical Research IP Counsel, May 2020.

## REVIEWER

- INFORMS Journal on Computing: 5 papers
- Physics in Medicine & Biology: 5 papers
- Operations Research: 1 paper
- European Journal of Operational Research: 1 paper

## ORGANIZATIONAL SKILL

- INFORMS 2018 Annual Conference – Session: Optimization in Cancer Treatment, Phoenix, AZ November 2018  
**Event description:** Scientific presentation on the topic of cancer therapy optimization, with the focus on radiation therapy.  
**Role:** Session chair
- 2<sup>nd</sup> International Workshop in Optimal Stopping in Radiation Therapy (OSRT), Boston, MA October 2018  
**Event description:** The OSRT is an international consortium of experts from the fields of Optimization, Computer Science, Medical Physics, and Radiation Oncology, brought together to advance the field of cancer treatment and radiotherapy through multi-disciplinary collaborations. It

brings together 15 scientists and physicians from 8 well-known leading cancer and optimization research and medical institutions in the world across US and Europe. This was the second workshop held at the Department of Radiation Oncology at Massachusetts General Hospital.

**Role:** Organizer, co-chair

- 1<sup>st</sup> International Workshop in Optimal Stopping in Radiation Therapy (OSRT), Kaiserslautern, Germany May 2018

**Event description:** This was the first OSRT workshop held in the Department of Industrial Mathematics at ITWM in Kaiserslautern Germany.

**Role:** Organizer

## PROFESSIONAL COLLABORATIONS

- Philips Healthcare, Amsterdam, Netherlands
- Fraunhofer Institute for Industrial Mathematics, Kaiserslautern, Germany
- School of Economics and Management, Tilburg University, Tilburg, Netherlands
- Steele Laboratory for Tumor Biology, Harvard Medical School, Boston, MA
- Center for Information and Mathematics (CWI), Amsterdam, Netherlands
- Department of Radiation Oncology, University of Freiburg Medical Center, Freiburg, Germany
- Department of Clinical Medicine, Aarhus University, Aarhus, Denmark
- Department of Radiation Oncology, Erasmus MC Cancer Institute, Rotterdam, Netherlands
- Department of Medical Physics, University of Wisconsin, Madison, WI, USA
- Department of Radiation Oncology, Ludwig-Maximilians University, Munich
- Department of Radiation Oncology, University of Texas' MD Anderson Cancer Center, Houston, TX, USA

## MENTORSHIP

- Stefan ten Eikelder, Tilburg School of Economics and Management Tilburg University 09/2018-Present  
**Type:** PhD in Business, track Operations Research  
**Thesis:** Biological Robust Adaptation in Radiation Therapy Treatment Planning  
**Role:** Co-supervisor
- Stefan ten Eikelder, Tilburg School of Economics and Management Tilburg University 03/2018-08/2018  
**Type:** Research Master in Business, track Operations Research  
**Thesis:** Adjustable Robust Treatment-length Optimization in Radiation Therapy  
**Role:** Co-supervisor, thesis committee member
- Nicholas Difulvio, Department of Industrial & Systems Engineering, University of Washington 03/2015-06/2015  
**Type:** Capstone project  
**Thesis:** Simulation Modeling of the Emergency Department in a Level I Trauma Center  
**Role:** Co-supervisor

## TEACHING EXPERIENCE

- Linear and Network Programming (1 quarter) 03/2016-06/2016  
*Department of Industrial & Systems Engineering, University of Washington*  
**Course description:** Modeling and optimization of linear network problems. Topics include: optimization of linear systems, mathematical model design, simplex method, primal-dual algorithms, parametric programming, goal programming, network problems and algorithms, and PERT/CPM.  
**Role:** Teaching assistant  
**Level:** undergraduate  
**Instructor:** Fatemeh Saberian  
**Responsibility:** Teaching, holding office hours, grading, helping instructor in devising homework, mid-term, and final exams
- Probability and Statistics for Engineers (1 quarter) 01/2014-03/2014  
*Department of Industrial & Systems Engineering, University of Washington*  
**Course description:** Application of probability theory and statistics to engineering problems, distribution theory and discussion of particular distributions of interest in engineering, statistical estimation and data analysis. Illustrative statistical applications may include quality control, linear regression, and analysis of engineering data sets  
**Role:** Teaching assistant  
**Level:** undergraduate  
**Instructor:** Peter Johnson  
**Responsibility:** Teaching, holding office hours, grading, helping instructor in devising homework, mid-term, and final exams
- Queuing Theory and Stochastic Processes (2 semesters) 09/2010-09/2011  
*Department of Industrial & Systems Engineering, Sharif University of Technology, Iran*  
**Course description:** Introducing stochastic systems analysis to graduate students. The course covers queueing theory, Markov chain, Markov decision making, applications of queueing theory.

**Role:** Teaching assistant

**Level:** graduate

**Instructor:** Mohammad Modarres

**Responsibility:** Teaching, holding office hours, grading, helping with defining a course project.

## WORKING EXPERIENCE

- TavanPardaz Mabna Consulting Firm, Tehran, Iran (*full-time*) 02/2012-11/2013  
**Position:** Project Manager & System Analyst  
**Responsibility:** Project scheduling, Optimal vehicle routing, Data Management
- TavanPardaz Mabna Consulting Firm, Tehran, Iran (*part-time*) 09/2009-01/2012  
**Position:** Data Statistician  
**Responsibility:** SQL-based data management, optimization of information flow within the system.

## COMPUTER SKILLS

### Programming Languages

R, Python, MATLAB

### Machine Learning and Data

#### Analytics

R, Python, TensorFlow

### Mathematical Modelling

CPLEX, Gurobi, LINGO, AMPL

### Computer Simulation

Arena, Simio

### Application Development

R Shiny, MATLAB App Designer

### Databases

Microsoft SQL

### OS/ General

Bash Scripting, Linux, Window,  
LATEX, git