

Chen Hajaj - Januray 2025

CONTACT INFORMATION Department of Industrial Engineering and Management Ariel University
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RESEARCH INTERESTS Machine Learning, Medical Data Science, Cybersecurity, Encrypted Traffic Classification, E-commerce, Behavioral Game Theory, Crowdsourcing

POSITIONS

Director, Data Science Research Center 2018 – 2024

Chair, Faculty of Engineering Review Board 2022 – present

Faculty 2018–present
Industrial Engineering and Management, Ariel University
School of Computer Science, Ariel University

Data Science Fellow, Vanderbilt University 2017 – 2018
Data think tank - Tennessee Educational Research Alliance (TERA)
Data think tank - Anthropogenic landscape features in South America

Postdoc Researcher 2016 – 2018
Electrical Engineering and Computer Science, Vanderbilt University
Host: Vorobeychik Yevgeniy, Ph.D

EDUCATION

Bar-Ilan University, Ramat Gan, Israel
Ph.D., Computer Science 2016
Thesis Topic: *Intelligent Mechanisms for Platforms in Modern Markets*
Advisors: Sarne David, Ph.D. and Hassidim Avinatan, Ph.D.
M.Sc., Electrical Engineering 2012
Topic: *Three-Dimensional Group Registration of Mesh Objects*
Advisor: Keller Yosi, Ph.D.
B.Sc., Computer Engineering 2010

REFEREED JOURNAL PUBLICATIONS

1. Udi Aharon, Ran Dubin, Amit Dvir, **Chen Hajaj**. A classification-by-retrieval framework for few-shot anomaly detection to detect API injection. In *Computers & Security*. 2024
2. Or Haim Anidjar, Revital Marbel, Ran Dubin, Amit Dvir, **Chen Hajaj**. Extending Limited Datasets with GAN-Like Self-Supervision for SMS Spam Detection. In *Computers & Security*. 2024
3. Assaf Frajman, Shimon Izhakian, Ori Mekiten, Ori Hadar, Ariel Lichtenstadt, **Chen Hajaj**, Shon Schori, Moshe Heching, Dror Rosengarten and Mordechai R. Kramer. Phenotypical Characteristics of Nontuberculous Mycobacterial Infection in Patients with Bronchiectasis. In *Respiratory Research*. 2024
4. **Chen Hajaj**, Porat Aharon, Ran Dubin, and Amit Dvir. The Art of Time-Bending: Data Augmentation and Early Prediction for Efficient Traffic Classification. In *Expert Systems with Applications*. 2024

5. Anat Goldstein and **Chen Hajaj**. Measuring flight-destination similarity: A multidimensional approach. In *Expert Systems with Applications*. 2024
6. Ofek Bader, Adi Lichy, Amit Dvir, Ran Dubin, and **Chen Hajaj**. OSF-EIMTC: An Open-Source Framework for Standardized Encrypted Internet Traffic Classification. In *Computers Communications*. 2024
7. Orit Raphaeli, Liran Statlender, **Chen Hajaj**, Itai Bendavid, Anat Goldstein, Eyal Robinson, and Pierre Singer. Using Machine-Learning to Assess the Prognostic Value of Early Enteral Feeding Intolerance in Critically Ill Patients: A Retrospective Study. In *Nutrients*. 2023
8. Harel Berger, Amit Dvir, Enrico Mariconti, and **Chen Hajaj**. Breaking the structure of MaMaDroid. In *Expert Systems with Applications*. 2023
9. Ofir Joseph, Avshalom Elmalech, and **Chen hajaj**. Detecting Parallel Covert Data Transmission Channels in Video. In *Electronics*. 2023
10. Or Haim Anidjar, Yannick Estève, **Chen Hajaj**, Amit Dvir, Itshak Lapidot. Speech and Multilingual Natural Language Framework for Speaker Change Detection and Diarization. In *Expert Systems With Applications*. 2023
11. Adi Lichy, Ofek Bader, Ran Dubin, Amit Dvir, **Chen Hajaj**. When a RF Beats a CNN and GRU, Together - A Comparison of Deep Learning and Classical Machine Learning Approaches for Encrypted Malware Traffic Classification. In *Computers & Security*. 2023
12. Uzi Ben-Shalom, **Chen Hajaj**, Nitza Davidovich, Corine Berger. The Online temporary learning groups in higher education: Interactions, compensation, and maximization of achievements in an Israeli case study. In *Journal of Education Culture and Society*. 2023
13. Rotem Bar and **Chen Hajaj**. SimCSE for Encrypted Traffic Detection and Zero-Day Attack Detection. In *IEEE ACCESS*. 2022
14. **Chen Hajaj**, Nitay Hason, and Amit Dvir. Less is More: Robust and Novel Features for Malicious Domain Detection. In *Electronics*. 2022
15. Anat Goldstein and **Chen Hajaj**. The Hidden Conversion Funnel of Mobile vs. Desktop Consumers. In *Electronic Commerce Research and Applications (ECRA)*, 2022
16. Corine Berger, Uzi Ben-Shalom, **Chen Hajaj**, Nitza Davidovich. Patterns of Activity in Temporary Digital Learning Groups, and Its Correlation With Academic Achievement Among University Students in an Israeli University. In *Social Issues in Israel*. 2022
17. Harel Berger, **Chen Hajaj**, and Amit Dvir. Crystal Ball: From Innovative Attacks to Attack Effectiveness Classifier. *IEEE ACCESS*. 2021
18. Ron Hirschprung and **Chen Hajaj**. Prediction Model for the Spread of the COVID-19 Outbreak in the Global Environment. *Heliyon*. 2021

19. Or Anidjar, Itshak Lapidot, **Chen Hajaj**, Amit Dvir and Issachar Gilad. Hybrid Speech and Text Analysis Methods for Speaker Change Detection. In *IEEE/ACM Transactions on Audio Speech and Language Processing*. 2021
20. **Chen Hajaj**, Zlatko Joveski, Sixie Yu, Yevgeniy Vorobeychik. Robust Coordination in Adversarial Social Networks: From Human Behavior to Agent-Based Modeling. in *Network Science*, 2021.
21. Amit Dvir, Angelos K. Marnerides, Ran Dubin, Nehor Golan, and **Chen Hajaj**. Encrypted Video Traffic Clustering Demystified. In *Computers & Security*, 96 ,2020.
22. **Chen Hajaj** and David Sarne. Selective Opportunity Disclosure at the Service of Strategic Information Platforms. In *Autonomous Agents and Multi-Agent Systems (JAAMAS)*, 31(5):1133–1164, 2017.
23. **Chen Hajaj**, Noam Hazon, and David Sarne. Enhancing Comparison Shopping Agents through Ordering and Gradual Information Disclosure. In *Autonomous Agents and Multi-Agent Systems (JAAMAS)*, 31(3):696–714, 2017.
24. **Chen Hajaj**, Noam Hazon, and David Sarne. Improving Comparison Shopping Agents’ Competence through Selective Price Disclosure. In *Electronic Commerce Research, and Applications (ECRA)*, 14(6) 563–581, 2015.

REFEREED
CONFERENCE
PUBLICATIONS

1. Anat Goldstein and **Chen Hajaj**. Warm Recommendation: Enhancing Cold Start Recommendations Using Multimodal Product Representations. In *International conference of the Association for Information Systems (ICIS)*. 2024
2. Nathan Dillbary, Roi Yozevitch, Amit Dvir, Ran Dubin, and **Chen Hajaj**. In *Hidden in Time, Revealed in Frequency: Spectral Features and Multiresolution Analysis for Encrypted Internet Traffic Classification*. In *the Proceedings of IEEE Consumer Communications & Networking Conference*. 2024
3. Anat Goldstein and **Chen Hajaj**. Warming Up the Cold Start: A Multimodal Approach. In *Special Interest Group on Decision Support and Analytics (SIGDSA) Symposium*. 2023
4. Orit Raphaeli, Liran Statlander, **Chen Hajaj**, Itai Ben David, and Pierre Singer. Protein Intake and Clinical Outcomes of Critically Ill Patients. In *the 44th European Congress for Clinical Nutrition and Metabolism (ESPEN)*. 2022
5. Anat Goldstein and **Chen Hajaj**. Measuring Product Similarity: A Multidimensional Approach. In *the Eighteenth Symposium on Statistical Challenges in Electronic Commerce Research*. 2022
6. Ofek Bader, Adi Lichy, **Chen Hajaj**, Ran Dubin, and Amit Dvir. MalDIST: From Encrypted Traffic Classification to Malware Traffic Detection and Classification. In *the Proceedings of IEEE Consumer Communications & Networking Conference*. 2022

7. Orit Raphaeli, **Chen Hajaj**, Itai Ben David, Anat Goldstein, Elad Chen, Pierre Singer, and Uri Gabbay. Using the Cardio-Vascular Index (CVRI) To Predict Mortality in Septic Shock. In *the 40th International Symposium on Intensive Care & Emergency Medicine*. 2022
8. Orit Raphaeli, **Chen Hajaj**, Itai Ben David, Anat Goldstein, Elad Chen, Pierre Singer. Using Machine Learning to Support Early Prediction of Feeding Intolerance in Critically Ill Patients. In *Intensive Care Medicine Experimental*. 2021
9. Orit Raphaeli, **Chen Hajaj**, Itai Ben David, Anat Goldstein, Elad Chen, Pierre Singer. Using Machine Learning to Compare Gastric Residual Volume Thresholds as Predictors of Clinical Outcomes in Critically Ill Patients. In *International Symposium of Intensive Care and Emergency Medicine*. 2021
10. Or Anidjar, Itshak Lapidot, **Chen Hajaj** and Amit Dvir. A Thousand Words are Worth More Than One Recording: Word-Embedding Based Speaker Change Detection. In *Interspeech*. 2021
11. Orit Raphaeli, **Chen Hajaj**, Itai Ben David, Anat Goldstein, Elad Chen, Pierre Singer. Feeding Intolerance as a Predictor of Clinical Outcomes in Critically Ill Patients: A Machine Learning Approach. In *the 43rd European Society for Clinical Nutrition and Metabolism (ESPEN)*. 2021
12. Uzi Ben Shalom, **Chen Hajaj**, Nitza Davidovich and Corinne Berger. Online temporary learning groups in higher education – Interactions, compensation, and maximization of achievements in an Israeli case-study. In *the 1st international e-conference on teacher education generation next: perspectives, opportunities & challenges*. 2021
13. Vitali Demianiuk, **Chen Hajaj**, and Kiril Kogan. PCL: Packet Classification with Limited Knowledge. *INFOCOM*. 2021
14. Anat Goldstein and **Chen Hajaj**. The Different Path to Purchase of Mobile and Desktop Consumers: Analyzing Consumers' Progress in the Conversion Funnel Using Hidden Markov Models. In *Statistical Conference in E-Commerce Research (SCECR)*. 2020
15. Nitay Hason, Amit Dvir, and **Chen Hajaj**. Robust Malicious URL Detection. In *the 4th International Symposium on Cyber Security Cryptology and Machine Learning (CSCML)*. 2020
16. Liang Tong, Bo Li, **Chen Hajaj**, Chaowei Xiao, Ning Zhang, Yevgeniy Vorobeychik. Improving Robustness of ML Classifiers against Realizable, Evasion Attacks Using Conserved Feature. In *the 28th USENIX Security Symposium*. 2019
17. Yevgeniy Vorobeychik, Myrna Wooders, Greg Leo, Matthew Chambers, **Chen Hajaj**, Jian Lou, and Martin Van der Linden. Non-Cooperative Team Formation and a Team Formation Mechanism. In *the 11th annual conference of the Israeli chapter of the game theory society*. 2019

18. **Chen Hajaj**, Sixie Yu, Zlatko Joveski, Yifan Guo, and Yevgeniy Vorobeychik. Adversarial Coordination on Social Networks. In *the International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*. 2019
19. Cheng Ye, Joseph Coco, Anna Epishova, **Chen Hajaj**, Henry Bogardus, Laurie Novak, Joshua Denny, Yevgeniy Vorobeychik, Thomas Lasko, Bradley Malin, and Daniel Fabbri. Crowdsourcing Clinical Chart Reviews. In *AMIA Joint Summits on Translational Science*. 2018
20. **Chen Hajaj** and Yevgeniy Vorobeychik. Adversarial task assignment. In *International Joint Conference on Artificial Intelligence and European Conference on Artificial Intelligence (IJCAI-ECAI)*. 2018
21. Cheng Ye, Joseph Coco, Anna Epishova, **Chen Hajaj**, Henry Bogardus, Laurie Novak, Joshua Denny, Yevgeniy Vorobeychik, Thomas Lasko, Bradley Malin and Daniel Fabbri. A Crowdsourcing Framework for Medical Data Sets. In *American Medical Informatics Association (AMIA)*. 2018
22. Avshalom Elmalech, David Sarne, Esther David, and **Chen Hajaj**. Enhancing Crowdworkers' Vigilance. In *International Joint Conference on Artificial Intelligence (IJCAI)*. 2017
23. Avshalom Elmalech, David Sarne, Esther David, and **Chen Hajaj**. Extending Workers' Attention Span Through Dummy Sub-Goals. In *AAAI Conference on Human Computation and Crowdsourcing (HCOMP)*. 2016. **Best paper finalist**.
24. **Chen Hajaj**, John P. Dickerson, Avinatan Hassidim, Tuomas Sandholm and David Sarne. Strategy-Proof and Efficient Kidney Exchange Using a Credit Mechanism. In *AAAI Conference on Artificial Intelligence (AAAI)*. 2015
25. Tal Darom, Yaniv Gur, **Chen Hajaj** and Yosi Keller. Automatic Anatomical Shape Correspondence and Alignment Using Mesh Features. In *International Symposium on Biomedical Imaging (ISBI)*. 2015
26. **Chen Hajaj** and David Sarne. Strategic Information Platforms - Selective Disclosure and The Price of "Free". In *ACM Conference on Economics and Computation (EC)*. 2014
27. **Chen Hajaj**, Noam Hazon, and David Sarne. Ordering Effects and Belief Adjustment in the Use of Comparison Shopping Agents. In *AAAI Conference on Artificial Intelligence (AAAI)*. 2014
28. **Chen Hajaj**, Noam Hazon, David Sarne, and Avshalom Elmalech. Search More, Disclose Less. In *AAAI Conference on Artificial Intelligence (AAAI)*. 2013

SHORT PAPERS
AND REFEREED
WORKSHOPS

1. Brigitta R Schvarcz and **Chen Hajaj**. Exploring Student Perspectives of the Impact of VR in ESP. In *TESOL*. 2024

2. Bar Vinder, **Chen Hajaj**, and Idit Avrahami. A method for evaluating the performance of a novel percutaneous Left Ventricular Assist Device and optimizing its design. In *VPH 2022 PHYSIOLOGICAL HUMAN CONFERENCE*. 2022
3. Harel Berger, **Chen Hajaj**, and Amit Dvir. Evasion is not enough: A case study of Android malware. In the *4th International Symposium on Cyber Security Cryptology and Machine Learning (CSCML)*. 2020
4. **Chen Hajaj** and Yevgeniy Vorobeychik. Adversarial Randomized Task Assignment, 6th Day on Computational Game Theory. 2019
5. **Chen Hajaj**, Sixie Yu, Zlatko Joveski and Yevgeniy Vorobeychik. Adversarial Coordination on Social Networks. In *The AAMAS-IJCAI workshop on agents and incentives in artificial intelligence(AI³)*. 2018
6. Jian Lou, **Chen Hajaj**, Myrna Wooders and Yevgeniy Vorobeychik. Automated Mechanism Design for the Roommates Problem. In *The AAMAS-IJCAI workshop on agents and incentives in artificial intelligence (AI³)*. 2018
7. Jian Lou, Martin Van der Linden, Pranav Batra, **Chen Hajaj**, Greg Leo, Yevgeniy Vorobeychik and Myrna Wooders. Rotating Proposer Mechanisms for Team Formation. In *Workshop on Cooperative Games in Multiagent Systems (CoopMAS)*.2017. **Most visionary paper.**
8. **Chen Hajaj**, David Sarne, and Lea Perets. Advanced Service Schemes for a Self-Interested Information Platform. In *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*. 2014

BOOK CHAPTERS

Sofia Ceppi, Esther David, **Chen Hajaj**, Valentin Robu, and Ioannis A. Vetsikas, editors, Agent-Mediated Electronic Commerce: Designing Trading Strategies and Mechanisms for Electronic Markets, Springer, LNBIP 271, 2017.

PATENTS

Chen Hajaj, David Sarne, Noam Hazon. “Selective Options Disclosure Method for Affecting a User’s Decision-Making” **US Provisional Patent Application No. 61/842,974**
 Amir Glik, **Chen Hajaj**, Orit Rephaeli, Anat Goldstein. ”PREDICTING ONSET OF NEURODEGENERATIVE DISEASES” **US Provisional Patent Application No. 63/456,555**

STUDENTS

Ph.D. students

- | | |
|-------------------------------------|--------------|
| 1. Natan Dilbbery, Ariel University | 2024–present |
| 2. Ronyt Gomez, Bar-Ilan University | 2024–present |
| 3. Aviad Levi, Ariel University | 2023–present |
| 4. Eyal Paz, Ariel University | 2022–present |

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|-------------------------------------|--------------|
| 5. Udi Aharon, Ariel University | 2022–present |
| 6. Yehonatan Zion, Ariel University | 2022–present |
| 7. Harel Berger, Ariel University | 2019–2022 |
| 8. Or Anidjar, Ariel University | 2019–2022 |

Pre-Ph.D.

| | |
|--------------------------------------|-----------|
| 1. Zafrir Avrahami, Ariel University | 2023-2024 |
| 2. Omri Arbiv, Ariel University | 2022-2024 |
| 3. Meir Litman, Ariel University | 2020-2023 |

Masters (Thesis)

| | |
|--|--------------|
| 1. Polina Korogodsky, Ariel University | 2023–present |
| 2. Porat Aharon, Ariel University | 2022–2023 |
| 3. Ofir Yosef, Bar-Ilan University | 2021–2023 |
| 4. Bar Vinder, Ariel University | 2021–2023 |
| 5. Adi Lichi, Ariel University | 2021–2023 |
| 6. Ofek Bader, Ariel University | 2021–2022 |
| 7. Nitay Hason, Ariel University | 2019–2020 |
| 8. Nabeeha Yassin, Ben-Gurion University | 2018–2021 |

Masters (Final project)

| | |
|---------------------------------------|--------------|
| 1. Elad Chen, Ariel University | 2021-2023 |
| 2. Yuval Ben Yaakov, Ariel University | 2021-2023 |
| 3. Tal Abed, Ariel University | 2021-2022 |
| 4. Ariel Yehezkel, Ariel University | 2021-2022 |
| 5. Bar Ben David, Afeka College | 2022-2024 |
| 6. Ben Ron Udi, Afeka College | 2022-present |
| 7. Chen Shiener, Afeka College | 2022-2023 |
| 8. Nathanael Guinzburg, Afeka College | 2022-2023 |
| 9. Michael Gudovsky, Afeka College | 2022-2023 |
| 10. Rotem Bar, Afeka College | 2021-2022 |
| 11. Pavel Shochet, Afeka College | 2021-2022 |
| 12. Eliran Barai, Afeka College | 2020–2021 |

Research assistants

| | |
|--|--------------|
| 1. Barak Wirzeberger, Ariel University | 2024–present |
| 2. Roni Epstein, Ariel University | 2024–present |
| 3. Shon Schori, Ariel University | 2022–present |
| 4. Elad Chen, Ariel University | 2020–2021 |
| 5. Alon Trugman, Ariel University | 2020–2021 |
| 6. Idan Masuri, Ariel University | 2019–2020 |
| 7. Segev Zilberstain, Ariel University | 2020 |
| 8. Ali Masarwe, Ariel University | 2019 |
| 9. Luke Mills, Vanderbilt University | Summer 2017 |
| 10. Roy Gotlib, Bar-Ilan | Fall 2015 |
| 11. Eduard Shahbazian, Bar-Ilan | Fall 2015 |

GRANTS AND AWARDS

| | |
|--|--------------|
| • Encrypted Traffic Classification Israel Innovation Authority | 2021–present |
| • AI Platforms for Detection of Hostile Activities Israel Innovation Authority | 2019 |
| • User Experience with Encrypted Huge Traffic Israel Innovation Authority | 2019 |
| • Robust APK Malware Detection Israel National Cyber Directorate | 2019 |
| • The Prof. Rahamimoff Program for Young Scientists the U.S.-Israel Binational Science Foundation (BSF) | 2015 |
| • Selim and Rachel Benin Scholarship Fund Bar-Ilan University | 2015 |
| • Rachel and Reuven Jacobs Excellence Scholarship Bar-Ilan University | 2013 |
| • Doctoral Fellowship of Excellence Bar-Ilan University | 2012 |
| • Exceptional final project, Computer Engineering Bar-Ilan University | 2010 |

TEACHING EXPERIENCE

| | |
|--|---------------------|
| Ariel University, Lecturer | 2018–present |
| Advanced Topics in Machine Learning | |
| Machine Learning | |
| Introduction to Computing | |
| Vanderbilt University, Guest Lecturer | 2017–2018 |
| Computational Economics | |
| Advanced Topics in Artificial Intelligence | |

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|--|------------------|
| Bar Ilan University, Teaching assistant | 2011–2016 |
| Introduction to Computer Science | 2014–2016 |
| Object-Oriented Programming | 2013–2016 |
| Operating Systems | 2013–2016 |
| Simulation and Simulation Languages | 2011–2012 |
| A Microprocessor Laboratory Using the ADuC841 | 2011 |

SERVICE

Conference Organizer

ICMI (2021), ILAIS (2022).

Workshop organizer

Agent Mediated Electronic Commerce (AMEC) (2016, 2017), AIW: Games, Agents and Incentives (2019), AI^3 (2018), Vanderbilt Postdoc Association Symposium(2017), Vanderbilt Data Science Symposium (2018).

Program Committee

ILAIS (2022,2023), ICIS (2022), AAAI (2013, 2014, 2017, 2018, 2019, 2023, 2024), AAMAS (2013, 2014, 2015, 2017, 2018, 2019, 2020), ACM-EC (2018), AMIA (2019, 2020, 2021, 2022), AMEC (2013, 2015), CPSCCom (2017), GameSec (2016), ICAART (2020), IJCAI (2016, 2017, 2018, 2019, 2022), SODA (2015), ECAI (2024).

Reviewer

Annals of Mathematics and Artificial Intelligence, Journal of Information Security and Applications (JISA), Artificial Intelligence Review (AIRE), Journal of Artificial Intelligence Research (JAIR), Computers & Security, Expert Systems with Applications, Computer Networks, Health Systems, Transactions on Knowledge and Data Engineering.