CURRICULUM VITAE

- **Personal Details**
    Robert Moskovitch
    Date of birth – September 14, 1972
    Nationality - Israel
    Address – Shivtey Israel 74, Apt 3, Jaffa-Tel Aviv, Israel
    Phone +972 52 2668071

    h-index: 21 -   overall citations: 1422 (Google Scholar)

    Senior Lecturer,
    Software and Information Systems Engineering,
    Ben Gurion University, Israel.

    Affiliated Assistant Professor,
    Biomedical Informatics,
    Columbia University, USA.

- **Education**
    B.Sc. 1998-2002, Information Systems Engineering, Ben Gurion University

    M.Sc. 2002-2004, Information Systems Engineering, Ben Gurion University
    (Cumma Lauda)
    Advisor: Prof. Yuval Shahar
    Title of thesis: Vaidurya – Concept Based and Context Sensitive Retrieval

    Ph.D. 2005-2010, Information Systems Engineering, Ben Gurion University
    Advisor: Prof. Yuval Shahar
    Title of thesis: Temporal Knowledge Discovery, Clustering and Classification of Multivariate Time
    Series via Temporal Abstraction and Time Intervals Mining

- **Employment History**
    - September 2013 – Now : Post Doctoral Research Scientist

      Department of Biomedical Informatics, Columbia University in NYC, USA.

    - 2005-2013 : R&D Project Manager

      Deutsche Telekom Innovation Laboratories at Ben Gurion University

    - 2004-2005 : Researcher

      SafeCrop, Fondazione Edmund Mach di San Michele all'Adige, in collaboration with Fondazione Bruno

      Kessler, San Michele allAdige, Trentino, Italy

    - 2002-2004 : Msc Student

      Medical Informatics Research Center, Ben Gurion University

    - 2000-2002 : Research Student

      Medical Informatics Research Center, Ben Gurion University

    - 1999-2000 : Developer, KnowNet – a startup company

    - 1997-1999 : Claims Adjuster, M.Dizengoff P&I Ltd (shipping industry)

- 1990-1996 : Captain Released (Major, reserves)

  Israeli Navy [*Hovel*], Israel Defense Forces

- **Professional Activities**
  - (a) <u>Significant professional consulting</u>

    2008-2011 - Treato – Startup company, co-founder – medical text analytics.

    2005-2007 - Hingi – Startup company, crawling and scraping websites.

  - (b) <u>Editor or member of editorial board of scientific or professional journal</u>

    2016 – **Robert Moskovitch**, Fei Wang, Yuval Shahar, George Hripcsak,

    Special Issue on Temporal Data Analytics,

    Journal of Biomedical Informatics (JBI)

    2016 – **Robert Moskovitch**, Fei Wang, Jian Pei, Carol Friedman,

    Special Issue on Biomedical Information Retrieval,

    Journal of the Association of Information Science and Technology (JASIST)

    2015 – Fei Wang, Liqiang Nie and Luming Zhang, **Robert Moskovitch**, Special Issue on Analytics with

    Medical Data, *IEEE Transactions on Big Data*

    2008-2010: *Methods of Information in Medicine*, Student Editorial Board Member

  - (c) <u>Ad-hoc reviewer for journals</u>

    Annals of the New York Academy of Sciences, 2016

    Data Mining and Knowledge Discovery, 2014, 2015, 2016 (2)

    IEEE Journal of Biomedical and Health Informatics, 2016

    Journal of Biomedical Informatics, 2013, 2014, 2015(3), 2016, 2016 (Guest Editor)

    SpringerPlus, 2016

    IEEE Transaction on Biomedical Engineering, 2015

    IEEE Transactions on Big Data, 2015

    Knowledge and Information Systems 2012, 2015

    Information Fusion, 2015

    IEEE Journal of Translational Engineering in Health and Medicine, 2014

    Expert Systems with Applications, 2014, 2015

    Computers in Biology and Medicine, 2014

    The Computer Journal, 2014

    Methods of Information in Medicine, 2008-2010, 2011, 2012, 2014

    Artificial Intelligence in Medicine, 2012, 2016

    IEEE Transactions on Knowledge and Data Engineering in 2009, 2010

    IEEE Transactions on Computers (IEEE-TC) in 2008

(d)   Senior Program Committee, or senior roles, of conferences

> Publication Chair, IEEE International Conference on Healthcare Informatics 2016 Senior Program Committee, IEEE International Conference on Healthcare Informatics 2016
>
> Senior Program Committee, IEEE International Conference on Connected Health, Applications, Systems and Engineering Technologies (CHASE) 2016

(d)   Program Committee of conferences

> Artificial Intelligence in MEdical Informatics (AIME) 2017
>
> IEEE Intelligence and Security Informatics 2016
>
> ACM SIG Knowledge Discovery in Databases (KDD) 2016
>
> IEEE International Conference on Software Science, Technology and Engineering (SwSTE) 2016
>
> IEEE International Conference on Healthcare Informatics 2016
>
> IEEE International Conference on Healthcare Informatics 2015
>
> IEEE Intelligence and Security Informatics 2015
>
> International Conference on Pattern Recognition Applications and Methods 2015
>
> IEEE Joint Intelligence and Security Informatics 2014
>
> IEEE Intelligence and Security Informatics 2013
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> IEEE Intelligence and Security Informatics 2012
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> IEEE Intelligence and Security Informatics 2011
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> IEEE Intelligence and Security Informatics 2010
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> IEEE Intelligence and Security Informatics 2009
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> IEEE Intelligence and Security Informatics 2008
>
> American Medical Informatics Association (AMIA) TBI 2015
>
> American Medical Informatics Association (AMIA) 2014
>
> American Medical Informatics Association (AMIA) 2013
>
> American Medical Informatics Association (AMIA) 2012
>
> TIME 2012
>
> American Medical Informatics Association (AMIA) 2011

(e)   Program Committee of workshops

> ACM BCB Workshop on Methods and Applications in Healthcare Analytics, 2016
>
> SDM Workshop on Data Mining for Medicine and Healthcare, 2016
>
> AMIA Workshop on Data Mining for Medical Informatics, 2015, 2014
>
> ACM KDD Workshop on Connected Health in the Big Data Era, 2015, 2014
>
> AIME Matrix Computations for Biomedical Informatics, 2015
>
> Intelligent Data Analysis in Medicine and Pharmacology 2010
>
> ACM Intelligence and Security Informatics-Knowledge Discovery in Databases 2010

PAcific Intelligence and Security Informatics (PAISI) 2010

ACM SIGKDD Workshop on CyberSecurity and Intelligence Informatics 2009

(f) <u>Reviewer of a Book</u>

Temporal Data Mining, Taylor & Francis Books, Inc.

- <u>Educational activities</u>
    - (a) <u>Courses taught</u>
    - Lecturer
      2012: Data Warehouse and Data Mining – Tel Aviv University

    - (b) <u>Research students (PhD and Msc)</u>

    - Grisha Krasner, Msc, Ben Gurion Univeristy (with Prof. Yuval Shahar)

    - Nir Nissim, PhD, expected 2015, Ben Gurion Univeristy (with Prof. Yuval Elovici)

    - Alex Shknevsky, Msc, 2014, Ben Gurion Univeristy (with Prof. Yuval Shahar)

    - Tomer Shimshon, Msc, 2010, Ben Gurion Univeristy (with Prof. Yuval Elovici and Prof. Lior Rokach)

    - Clint Feher, Msc, 2010, Ben Gurion Univeristy (with Prof. Yuval Elovici)

    - Roee Saadon, Msc, 2009, Ben Gurion Univeristy (with Prof. Yuval Shahar)

    - Revital Azulay, Msc, 2009, Ben Gurion Univeristy (with Prof. Yuval Shahar)

    - Nir Nissim, Msc, 2009, Ben Gurion Univeristy (with Prof. Yuval Elovici)

    - Dima Stopel, Msc, 2008, Ben Gurion Univeristy (with Prof. Yuval Elovici)

    - (c) <u>Research students (Fourth Year Senior Project)</u>
    - Shira Harel, Adva Amar, (with Noam Tractinsky), 2014, Evaluating users ascetics consistency in images
    - Yogev Lidor, Amit Tatian, 2009, Activity based Verification on Mobile Phones
    - Michael Milman, Gilad Moskovich, 2009, A System for Textual Patterns Extraction from the Internet
    - Liran Chen, Ilana Shub, Dudu Buchbut, 2008, Classification of ICU Patients through Temporal Patterns
      * Best Information Systems Engineering Senior Project Awards 2008
    - Micky Shkatov, Alex Vapnik, 2008, Experiments with Temporal Clustering with Medical Data
    - Marina Gitelman, Eugene Berger, 2007, Unknown Malicious Code Detection via OpCodes
      * Best Engineering Faculty Senior Project BURDA Awards 2007

      * Best Information Systems Engineering Senior Project Awards 2007

      ** Published in EuroISI2008 and in Security Informatics Journal 2012

    - Paz Salmanovich, Yair Barhum, 2006, Libra: Efficient Tool for the Evaluation of Information Retrieval Systems
    - Ido Gus, Shay Pluderman (with Yuval Elovici), 2006, Detection of Unknown Computer Worms Using Classification Methods
      * Best Information Systems Engineering Senior Project Awards 2006

      ** Published in two conference papers – IEEE CIDM07, IEEE ISI07

- Shiva Cohen-Kashi, Uzi Dror, Iftach Levy, Amit Maimon (with Yuval Shahar), 2004, Multiple Hierarchical Classification of Free-Text Clinical Guidelines using a statistical approach
   * Best Information Systems Engineering Senior Project Awards 2004

   ** Published in IDAMAP04 and Artificial Intelligence in Medicine Journal

- Yiftach Shalem, Ofer Perets (with Yuval Shahar), 2004, A Customized Query Interface for Vaidurya
   * Published in a workshop CGP2004

- Shlomi Hatan, Edva Efrati (with Yuval Shahar), 2004, A Template Based Query Interface for Vaidurya
   * Published in ECAI workshop on AI in Healthcare 2006

- Israel Dahari, Dan Pretzelman, Ehud Gobi (with Yuval Shahar), 2004, A Web-Crawler for Clinical Guidelines
- Aharon Yehezkel, Levy Revital (with Yuval Shahar), 2003, Hierachical Classification of Clinical Guidelines using Naive Base and KNN
- Chen Sasoon, Oz Bohana, Ayelet Litmanovitz (with Yuval Shahar), 2003, Evaluation of a search engine
- Zeev Nahum, Rami Umschweif, Nir Regev (with Yuval Shahar), 2003, Hierarchical Classification of Clinical Guidelines using Clustering
- Lior Bar-On, Liora Mendelovitz (with Yuval Shahar), 2003, A web query Interface for Vaidurya in .Net
- Sara Eisenstein (with Yuval Shahar), 2003, Putting Clinical Information needs into Templates

• **Awards, Citations, Honors, Fellowships**
   (a)   Honors, Citation Awards (including during studies)

AMIA 2004 – Student Paper Awards Finalist
Robert Moskovitch, Alon Hessing and Yuval Shahar , Vaidurya - A Concept-Based, Context-Sensitive Search Engine For Clinical Guidelines, *MedInfo 2004 (hosted by AMIA04)*, San Fransico, USA, 2004.
- 8 papers were selected out of 100 student papers

2008 IMIA Yearbook of Medical Informatics Inclusion
Robert Moskovitch, Suzana Martins, Eytan Behiri, Aviram Weiss, and Yuval Shahar, A Comparative Evaluation of a Full-text, Concept Based, and Context Sensitive Search Engine, *Journal Of American Medical Informatics Association*, 14: 164-174, 2007.

IEEE ISI 2008 – Best Honorable Mentioned Paper Awards
Robert Moskovitch, Dima Stopel, Clint Feher, Nir Nissim, Yuval Elovici, Unknown Malcode Detection via T*ext Categorization and the Imbalance Problem, IEEE Intelligence and Security Informatics 2008*, Taiwan, 2008.

AIME 2015 – Mario Stefanelli Best Student Paper Awards
Nir Nissim, Mary Regina Boland, **Robert Moskovitch**, Nicholas P Tatonetti, Yuval Elovici, Yuval Shahar, George Hripcsak, An Active Learning Framework for Efficient Condition Severity Classification, *Artificial Intelligence in Medicine*, Pavia, Italy, 2015.

- **Scientific Publications**

(a) <u>Refereed articles and refereed letters in scientific journals, running numbers</u>

1. Yuval Shahar, Ohad Young, Erez Shalom, Maya Galperin, Alon Mayaffit, **Robert Moskovitch** and Alon Hessing, A Framework for a Distributed, Hybrid, Multiple-Ontology Clinical-Guideline Library and Automated Guideline-Support Tools, *Journal of Biomedical Informatics* 37:325-344, 2004. [IF2013: 2.482, Q1] *Citations: 98.*

2. **Robert Moskovitch**, Shiva Cohen-Kashi, Uzi Dror, Iftah Levy, Amit Maimon, and Yuval Shahar, Multiple hierarchical classification of free-text clinical guidelines. Artificial Intelligence in Medicine, 37:177-190, 2006. [IF2013: 1.356, Q2] Citations: 29.

3. **Robert Moskovitch**, Suzana Martins, Eytan Behiri, Aviram Weiss, and Yuval Shahar, A Comparative Evaluation of a Full-text, Concept Based, and Context Sensitive Search Engine, Journal Of American Medical Informatics Association, 14: 164-174, 2007. [IF2013: 3.932, Q1] Citations: 35.

* Included in 2008 IMIA Yearbook of Medical Informatics

4. Tsvika Kuflik, Ilaria Pertot, **Robert Moskovitch**, Rosaly Zasso, Elisabetta Pellegrini, Cesare Gessler, Optimization of Fire blight Scouting with a Decision Support System based on Infection Risk, Computers and Electronics In Agriculture, 62-2, 118-127, 2008. [IF2013: 1.766, Q1] Citations: 7

5. **Robert Moskovitch**, Yuval Elovici, Lior Rokach, Detection of Unknown Computer Worms based on Behavioral Classification of the Host, Computational Statistics and Data Analysis, 52, 4544-4566, 2008. [IF2013: 1.304, Q2] Citations: 77

6. **Robert Moskovitch** and Yuval Shahar, Vaidurya - A Multiple Ontology, Concept Based, Context Sensitive Clinical-Guideline Search Engine, Journal of Biomedical Informatics, 42 (1), 11-21, 2009. [IF2013: 2.482, Q1] Citations: 24

7. Dima Stopel, **Robert Moskovitch**, Zvi Boger, Yuval Shahar, and Yuval Elovici, Using Artificial Neural Networks to Detect Unknown Computer Worms, Neural Computing and Applications, 18:663–674, 2009. [IF2013: 1.763, Q3] Citations: 11

8. **Robert Moskovitch**, Dima Stopel, Clint Feher, Nir Nissim, Nathalie Japkowicz, Yuval Elovici, Unknown Malcode Detection and the Imbalance Problem, Journal of Computer Virology and Hacking Techniques, 5:295–308, 2009. Citations: 30

9. Asaf Shabtai, **Robert Moskovitch**, Yuval Elovici, Chanan Glezer, Detection of malicious code by applying machine learning classifiers on static features: A state-of-the-art survey, Information Security Technical Report, 14 (1), 16-29, 2009. Citations: 89

10. Asaf shabtai, Dennis Potashnik, Yuval Fledel, **Robert Moskovitch**, Yuval Elovici, Monitoring Analysis and Filtering System for Purifying Network Traffic of Known and Unknown Malicious Content, Security and Communication Networks DOI: 10.1002/sec.229, 2010. Citations: 14

11. Assaf Shabtai, **Robert Moskovitch**, Clint Feher, Shlomi Dolev, Yuval Elovici, Detecting Unknown Malicious Code by Applying Classification Techniques on OPCODEs Representation, Security Informatics, 1:1, 2012.
    [New Springer Journal] Citations: 50

12. Clint Feher, Yuval Elovici, **Robert Moskovitch**, Lior Rokach, Alon Schclar, User identity verification via mouse dynamics, Information Sciences, 201, 19-36, 2012 [IF2013: 3.893, Q1] Citations: 37

13. Nir Nissim, **Robert Moskovitch**, Lior Rokach, Yuval Elovici, Detecting Unknown Computer Worm Activity via Support Vector Machines and Active Learning, Pattern Analysis and Applications, 15 (4), 459-475, 2012. [IF2013: 0.814, Q3] Citations: 14 *

14. Nir Nissim, **Robert Moskovitch**, Lior Rokach, Yuval Elovici, Efficient Active Learning approaches for Improving the Detection of unknown Malicious Code Files, Expert Systems and Applications, 41, 5843–5857, 2014. [IF2013 1.965, Q1]. Citations: 11 *

15. **Robert Moskovitch**, Yuval Shahar, Fast Time Intervals Mining using the Transitivity of Temporal Relations, Knowledge and Information Systems, 42, 1, 21-48, 2015. [IF2013, 2.639, Q1] Citations: 8

16. **Robert Moskovitch**, Yuval Shahar, Classification of Multivariate Time Series via Temporal Abstraction and Time Intervals Related Patterns, Knowledge and Information Systems, 45, 1, 35-74, 2015. [IF2013, 2.639, Q1] Citations: 7

17. **Robert Moskovitch**, Yuval Shahar, Classification Driven Temporal Discretization of Multivariate Time Series, Data Mining and Knowledge Discovery, 29, 4, 871-913, 2015. [IF2013, 1.743, Q1] Citations: 7

18. Mary Regina Boland, Alexandra Jacunski, Tal Lorberbaum, Joseph Romano, **Robert Moskovitch**, Nicholas P. Tatonetti, Systems Biology Approaches for Identifying Adverse Drug Reactions and Elucidating Their Underlying Biological Mechanisms, Wiley Interdisciplinary Reviews: Systems Biology and Medicine [IF2013: 3.676], In Press.

19. Nir Nissim, **Robert Moskovitch**, Lior Rokach, Yuval Elovici, ALDROID: Efficient Update of Android Anti-Virus Software Using Designated Active Learning Methods, Knowledge and Information Systems, [IF2013, 2.639, Q1], In Press.

20. Nir Nissim, Aviad Cohen, **Robert Moskovitch**, Assaf Shabtai, Matan Edry, Oren Bar-Ad, Yuval Elovici, Catching Up with Creation of New Malicious PDF Files Using Active Learning Based Detection Framework, Security Informatics [New Springer Journal], In Press.

21. **Robert Moskovitch**, Hyunmi Choi, George Hripsack, Nicholas Tatonetti, Prognosis of Clinical Procedures   with   Temporal   Patterns and One Class Feature Selection, ACM/IEEE Transactions on Computational Biology and Bioinformatics, [IF2013: 1.536, Q1], In Press.

22. Nir Nissim, Mary Regina Boland, Nicholas P Tatonetti, Yuval Elovici, Yuval Shahar, George Hripcsak, **Robert Moskovitch**, Boosting Condition Severity Classification Using an Active Learning Framework, Journal of Biomedical Informatics, [IF2013: 2.482, Q1], In Press.

(b) Refereed articles in scientific journals, *Revision*

23. Nir Nissim, Mary Regina Boland, Nicholas P Tatonetti, Yuval Elovici, Yuval Shahar, George Hripcsak, **Robert Moskovitch**, Boosting Condition Severity Classification Using An Active Learning Framework, Artificial Intelligence in Medicine, [IF2013: 2.019, Q1], Major Revision.

24. **Robert Moskovitch**, Fernanda Polubriaginof, Aviram Weiss, Patrick Ryan, Nicholas Tatonetti, Procedure Events Prediction via Time Intervals Analytics, Journal of Biomedical Informatics, [IF2013: 2.482, Q1], Major Revision

(c) Refereed articles in scientific journals, *Submitted*

25. **Robert Moskovitch**, Aviram Weiss, Fernanda Polubriaginof, Patrick Ryan, Nicholas Tatonetti, Conditions Prediction in Electronic Health Records with Temporal Patterns, Journal of American Medical Informatics Association, [IF2013: 2.019, Q1]

• **Lectures and Presentations at Meetings**

   (a) <u>Full papers in peer reviewed conference proceedings</u>

1. Yuval Shahar, Ohad Young, Erez Shalom, Alon Mayafit, **Robert Moskovitch**, Alon Hessing and Maya Galperin, DEGEL: A Hybrid, Multiple-Ontology Framework for Specification and Retrieval of Clinical Guidelines, *Artificial Intelligence in Medicine Europe 2003*, 10, Protaras, Cyprus, 2003. (Acceptance Rate 30%)

2. **Robert Moskovitch**, Alon Hessing and Yuval Shahar, Vaidurya - A Concept-Based, Context-Sensitive Search Engine For Clinical Guidelines, *MedInfo & AMIA 2004*, San Francisco, USA, 2004. (Acceptance Rate 30%)

          * Best Student Paper Awards Competition Finalist

3. Dima Stopel, Zvi Boger, **Robert Moskovitch**, Yuval Shahar and Yuval Elovici, Application of Artificial Neural Networks Techniques to Computer Worm Detections, Proc. IEEE International Joint Conference on Neural Networks, Vancouver, 2006. (Acceptance Rate 30%).

4. Dima Stopel, Zvi Boger, **Robert Moskovitch**, Yuval Shahar and Yuval Elovici, Improving Worm Detection with Artificial Neural Networks through Feature Selection and Temporal Analysis Techniques, Proc. Third International Conference on Neural Networks, Barcelona, 2006.

5. **Robert Moskovitch**, Ido Gus, Shai Pluderman, Dima Stopel, Chanan Glezer, Yuval Shahar and Yuval Elovici, Detection of Unknown Computer Worms Activity Based on Computer Behavior using Data Mining, IEEE Symposium on Computational Intelligence and Data Mining, Honolulu, Hawaii, 2007. (Acceptance Rate 35%)

6. **Robert Moskovitch**, Shai Pluderman, Ido Gus, Dima Stopel, Clint Feher, Yisrael Parmet, Yuval Shahar and Yuval Elovici, Host Based Intrusion Detection Using Machine Learning, IEEE Intelligence and Security Informatics, Rutgers University, New Jersey, US, 2007. (Acceptance Rate 30%)

7. **Robert Moskovitch**, Roee Saadon, Eytan Behiri, Suzana Martins, Aviram Weiss, Yuval Shahar, Experiments with Hierarchical Concept-Based Search, Medinfo 2007, Brisbane, Australia, 2007. (Acceptance Rate 30%)

8. Yuval Elovici, Assaf Shabtai, **Robert Moskovitch**, Gil Tahan, Chanan Glezer, Applying Machine Learning Techniques for Detection of Malicious Code in Network Traffic, The 30th German Conference on Artificial Intelligence (KI-2007), Osnabruck, Germany, 2007. (Acceptance Rate 32%)

9. **Robert Moskovitch**, Nir Nissim, Roman Englert, Yuval Elovici, Active Learning To Improve the Detection of Unknown Worms, The 11th International Conference on Information Fusion, Cologne, Germany, 2008. (Acceptance Rate 32%)

10. **Robert Moskovitch**, Dima Stopel, Clint Feher, Nir Nissim, Yuval Elovici, Unknown Malcode Detection via Text Categorization and the Imbalance Problem, IEEE Intelligence and Security Informatics 2008, Taiwan, 2008. (Acceptance Rate 23%)

          * Best Honorable Paper Awards

11. **Robert Moskovitch**, Clint Feher, Nir Tzachar, Eugene Berger, Marina Gitelman, Shlomi Dolev, Yuval Elovici, European Conference on Intelligence and Security Informatics, Esbjerg, Denmark, 2008. (Acceptance Rate 35%).

12. **Robert Moskovitch**, Clint Feher, Arik Messerman, Niklas Kirschnick, Tarik Mustafik, Ahmet Camtepe, Bernhard Lohlein, Ulrich Heister, Sebastian Moller, Lior Rokach, Yuval Elovici, Identity Theft, Computers and Behavioral Biometrics, IEEE Intelligence and Security Informatics 2009, Dallas, USA, 2009. (Acceptance Rate 20%).

13. **Robert Moskovitch**, Yuval Shahar, Medical Temporal-Knowledge Discovery via Temporal Abstraction, American Medical Informatics Association (AMIA) 2009, San Francisco, USA, 2009. (Acceptance Rate: 30%)

14. Tomer Shimshon, **Robert Moskovitch**, Lior Rokach, Yuval Elovici, Continuous Verification Using Keystroke Dynamics. The International Conference on Computational Intelligence and Security (CIS 2010), Nanning, China, 2010.

15. Tomer Shimshon, **Robert Moskovitch**, Lior Rokach and Yuval Elovici, Clustering Di-Graphs for Continuously Verifying Users according to their Typing Patters, IEEE in Israel, Eilat, Israel 2010.

16. * Nir Nissim, Aviad Cohen, **Robert Moskovitch**, Assaf Shabtai, Mattan Edry, Oren Barad and Yuval Elovici, ALPD: Active Learning framework for Enhancing the Detection of Malicious PDF Files aimed at Organizations, IEEE Joint Conference on Intelligence and Security Informatics, Hague, Netherlands, 2014.

17. * Nir Nissim, Mary Regina Boland, **Robert Moskovitch**, Nicholas P Tatonetti, Yuval Elovici, Yuval Shahar, George Hripcsak, An Active Learning Framework for Efficient Condition Severity Classification, Artificial Intelligence in Medicine Europe, Pavia, Italy, 2015.

* Mario Stefanelli Best Student Paper Awards

18. *** Robert Moskovitch**, Fei Wang, Colin Walsh, George Hripcsak, Nicholas Tatonetti, Prediction of Outcome Events via Time Intervals Mining, *IEEE International Conference on Data Mining (ICDM)*, Atlantic City, USA, 2015.

(b) <u>Full Papers in peer reviewed workshop proceedings</u>

19. **Robert Moskovitch** and Yuval Shahar, A Multi Ontology Customized Search Query Interface for Searching Clinical Guidelines, CGP-2004, Prague, 2004.

20. **Robert Moskovitch**, Shiva Cohen-Kashi, Uzi Dror, Iftah Levy, Amit Maimon and Yuval Shahar, Multiple Hierarchical Classification of Free-Text Clinical Guidelines, IDAMAP-2004, Stanford University, California, USA, 2004.

21. Diego Sona, Paulo Avesani, **Robert Moskovitch**, Multi-Classification of Clinical Guidelines in Concept Hierarchies, IDAMAP-2005, Aberdeen, Scotland, UK, 2005.

22. **Robert Moskovitch**, Talia Lavie, Akiva Leibowitz, Yaron Denekump, Yuval Shahar, A Multiple-Ontology Template-Based Query Interface for a Clinical-Guidelines Search Engine, Proc. of the European Conference of Artificial Intelligence (ECAI) workshop on AI in Healthcare, Riva Del Garda, 2006.

23. **Robert Moskovitch**, Dima Stopel, Marion Verduijn, Niels Peek, Evert de Jonge, and Yuval Shahar, Analysis of ICU Patients Using the Time Series Knowledge Mining Method, IDAMAP 2007, Amsterdam, The Netherlands, 2007.

24. Revital Azulay, **Robert Moskovitch**, Dima Stopel, Marion Verduijn, Evert de Jonge, and Yuval Shahar, Temporal Discretization of medical time series - A comparative study, IDAMAP 2007, Amsterdam, The Netherlands, 2007.

25. **Robert Moskovitch**, Yuval Shahar, Discovery of Temporal Patterns from Multivariate Time Oriented Data via Temporal Abstraction, The Israeli Association of Artificial Intelligence 7th Symposium, Ashkelon, 2007.

26. **Robert Moskovitch**, Nir Nissim, Yuval Elovici, Acquisition of Malicious Code Using Active Learning, KDD08 Workshop on Privacy, Security and Trust in KDD (PinKDD08) Las Vegas, USA, 2008.

27. **Robert Moskovitch**, Niels Peek, Yuval Shahar, Classification of ICU Patients via Temporal Abstraction and Temporal Patterns Mining, IDAMAP 2009, Verona, Italy, 2009. (Acceptance Rate 23%)

28. * Alex Shknevsky, **Robert Moskovitch**, Yuval Shahar, Semantic Considerations in Time Intervals Mining, ACM KDD Workshop on Connected Health at Big Data Era, 2014.

29. * Nir Nissim, Mary Borland, **Robert Moskovitch**, Nicholas Tatonetti, Yuval Elovici, Yuval Shahar, George Hripcsak, An Active Learning Enhancement for Conditions Severity Classification, ACM KDD Workshop on Connected Health at Big Data Era, 2014.

30. * **Robert Moskovitch**, Colin Walsh, George Hripcsak, Nicholas Tatonetti, Biomedical Outcome Events Prediction via Time Intervals Mining, ACM KDD Workshop on Connected Health at Big Data Era, 2014.

31. * **Robert Moskovitch,** Colin Walsh, George Hripcsak, Nicholas Tatonetti, Prediction of Clinical Procedures via Time Intervals Mining, AMIA Workshop on Data Mining for Medical Informatics, Washington, USA, 2014.

(c) Refereed Short Articles and Posters in peer reviewed Conference Proceedings

32. Yuval Shahar, Ohad Young, Erez Shalom, **Robert Moskovitch**, David Boaz and Maya Galperin, A Hybrid Framework for Representation and use of Clinical Guidelines, Proceedings of the American Medical Informatics Association, 2002.

33. **Robert Moskovitch**, and Yuval Shahar, Vaidurya: A concept-based, context-sensitive search engine for retrieval of clinical guidelines. Proceedings of the Annual Meeting of the Israeli Medical Informatics Association (ILAMI), Tel Aviv, Israel, 2003.

34. **Robert Moskovitch**, Yuval Shahar, Temporal Data Mining Based on Temporal Abstractions, IEEE ICDM workshop on Temporal Data Mining, Houston, US, 2005.

35. Diego Sona, Paulo Avesani, **Robert Moskovitch**, Automated Multi-Classification of Clinical Guidelines in Concept Hierarchies, Artificial Intelligence in Medicine 2005, Aberdeen, Scotland, UK.

36. **Robert Moskovitch**, Nir Nissim and Yuval Elovici, Malicious Code Detection and Acquisition Using Active Learning, IEEE Intelligence and Security Informatics, Rutgers University, New Jersey, US, May 2007.

37. **Robert Moskovitch**, Nir Nissim, Dima Stopel, Clint Feher, Roman Englert and Yuval Elovici, Improving the Detection of Unknown Computer Worms Activity using Active Learning, The 30th German Conference on Artificial Intelligence (KI-2007), Osnabruck, Germany, September 2007. (Acceptance Rate 32%)

38. Roee Sa'adon, **Robert Moskovitch**, Yuval Shahar, Hierarchical Expansion for Concept-Based Search, Medinfo 2007, Brisbane, Australia, August 2007.

39. **Robert Moskovitch**, Clint Feher, Yuval Elovici, Unknown Malcode Detection – A Chronological Evaluation, IEEE Intelligence and Security Informatics, Taiwan, 2008. (Acceptance Rate 23%)

40. **Robert Moskovitch**, Clint Feher, Yuval Elovici, A Chronological Evaluation of Unknown Malcode Detection, PacKDD09 Workshop Pacific Intelligence and Security Informatics 2009, Bangkok, 2009.

41. **Robert Moskovitch**, Verification of Users by Typing Patterns, Proceedings of the Annual Meeting of the Israeli Medical Informatics Association (ILAMI), Tel Aviv, Israel, 2011.

42. **Robert Moskovitch**, Nicholas Tatonetti, Physiological Predictors based on Temporal Clustering of Patients, AMIA-Translational Biomedical Informatics, San Francisco, USA, 2014.

43. **Robert Moskovitch**, Colin Walsh, Hyunmi Choi, George Hripcsak, Nicholas Tatonetti, Clinical Procedures Prediction with Temporal Data Analytics, AMIA-Translational Biomedical Informatics, San Francisco, USA, 2015.

44. **Robert Moskovitch**, Hyunmi Choi, George Hripcsak, Nicholas Tatonetti, Clinical Diagnoses Prediction with Temporal Data Analytics, AMIA-Translational Biomedical Informatics, San Francisco, USA, 2015.

45. **Robert Moskovitch**, Nicholas Tatonetti, Conditions and Procedures Prediction in Electronic Health Records with Frequent Temporal Patterns, Israeli Association for Medical Informatics, Tel Aviv, 2016.

• **Seminar presentations at universities and institutions (Invited Talks)**

1. Temporal Knowledge Discovery from Multivariate Time Series via Temporal Abstraction, *Computer Science, Twente university*, Holland, 2007.

2. Classification of Multivariate Time Series via Temporal Abstraction, *Computer Science, Princeton University*, New Jersey, USA, 2009.

3. KarmaLegoF – A framework for Temporal Knowledge Discovery, Clustering and Classification of Multivariate Time Series, *Department of Industrial Engineering, Tel Aviv University*, Tel Aviv, Israel, 2010.

4. KarmaLegoF - A Framework for Temporal Knowledge Discovery, Clustering and Classification of Multivariate Time Series, *Department of Biomedical Informatics, Columbia University*, New York, USA, 2010.

5. Temporal Knowledge Discovery, Clustering and Classification of Multivariate Time Series via Temporal Abstraction, *Department of Information Systems, Haifa University*, Haifa, Israel, 2010.

6. KarmaLegoF - A Framework for Temporal Knowledge Discovery, Clustering and Classification of Multivariate Time Series, *Department of Biomedical Informatics, Stanford University*, Palo Alto, USA, 2011.

7. * TD4C - Temporal Discretization for Classification of Multivariate Temporal Data via Time Intervals Mining, *IBM Thomas J. Watson Research Center*, New York, USA, 2014.

8. * TD4C - Temporal Discretization for Classification of Multivariate Temporal Data via Time Intervals Mining, *MIT Media Lab, Massachusetts Institute of Technology*, Boston, USA, 2014.

9. * Prediction of Biomedical Events in EHR via Time Intervals Mining, *Food and Drug Administration (FDA)*, Washington, USA, 2014.

10. * Temporal Data Analytics in Biomedical Data via Time Intervals Mining, Center for Healthcare Informatics and Policy, *Weill Cornell Medical College, Cornell University*, New York, USA, 2014.

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16. * Outcomes Prediction in Electronic Health Records via Time Intervals Analytics, *Memorial Sloan Kettering Cancer Center*, New York, USA, 2016.

17. * Temporal Data Mining in Observational Biomedical Data, Israeli Ministry of Health, Jerusalem, Israel, 2016.

• **Patents**

Granted Patents:

1. **Robert Moskovitch**, Yuval Elovici, Unknown Malcode Detection Using Classifiers with Optimal Training Sets, Inventors: US8776231 B2, filed 2009, granted 2014.

2. **Robert Moskovitch**, Dima Stopel, Zvi Boger, Yuval Shahar, Yuval Elovici, Method and system for detecting malicious behavioral patterns in a computer, using machine learning, European Patent EP1814055A2, US8490194B2, granted 2013.

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3. **R. Moskovitch**, A Method for Authentication and Verification of User Identity, Patent Application EP2649771A1, US20130263240A1, 2013.

4. C. Feher, **R. Moskovitch**, L. Rokach, Y. Elovici, System for verifying user identity via mouse dynamics, Patent Applciation: IL0211289, EP2490149A1, 2012.

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6. **R. Moskovitch**, D. Stopel, Z. Boger, Y. Shahar, and Y. Elovici, Improved Method and system for detecting malicious behavioral patterns in a computer using machine learning, European Patent Application EP1814055A3.

7. **R. Moskovitch**, N. Nissim, Y. Elovici, Acquisition of malicious code using active learning, European Patent Application EP2182458A1.

• **Research Grants**

Robert Moskovitch, Aviram Weiss, Nicholas Tatonetti, Morbidity Prediction via Temporal Data Analytics in Israeli Military Units, 110,000 NIS, Israeli Medical Corps, 2016.

Co-author of proposal (as a PhD student on my thesis work) (with Principal Investigators: Yuval Shahar and Ron Pinter, Technion), **HP labs Innovation Research** Program, Award No. 2008-1023, 1/10/2008-31/12/2009. Part A. (An integrated framework for knowledge-based and graph-theoretical analysis of time-oriented event sequences.)(41 out of 450 proposals selected worldwide.) total award for the first year: $58,000.