Jacob Goldberger - Curriculum Vitae

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Personal Data

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Professional Experience

2018 –	Professor, Faculty of Engineering, Bar-Ilan University.
2012 – 2017	Associate professor, Faculty of Engineering, Bar-Ilan University.
2005 – 2011	Assistant professor, Faculty of Engineering, Bar-Ilan University. University.
2003 – 2004	Machine learning group, University of Toronto, Canada.
2000 – 2002	CUTe Ltd. Wireless video streaming, Vice President R&D.
2000	INRIA Rhone-Alpes Grenoble, France, MOVI project.
1999	Mate Ltd. Head of the audio department. Research in speaker spotting.
1998	CogniTens Ltd. Research staff member. Research in the area of vision, mainly image reconstruction.
1996	SRI international fellow, speech technology laboratory, USA.
1992 – 1995	A.R.T. Ltd. Research in the areas of handwriting and speech recognition. Manager of the speech recognition department.
1985 – 1990	The Israeli Defense Forces, researcher.

Education

2003 – 2004	Post-Doc, University of Toronto.
1999	Post-Doc, Weizmann Institute.
1995 – 1998	Ph.D. in Electrical Engineering, Tel-Aviv University. Supervisor: Prof. David Burshtein, Thesis: Random trajectory segmental modeling for improved automatic speech recognition.

Research Interests

Statistical machine learning and deep learning with applications to computer vision, medical imaging and natural language processing.

Awards

- CoNLL conference best paper runner up, 2021

- Bar-Ilan Rector's Prize for Scientific Innovation, 2021
- IWAENC conference best student paper award, 2016
- CoNLL conference best paper runner up, 2016
- ACL conference best paper runner up, 2013
- ACL conference best student long paper award, 2011
- Winner of the ImageCLEF 2009 medical annotation task, 2009
- Excellent student paper award in Eurospeech, 1997
- The Wolf award for distinguished graduate students, 1996

Past students

- Shiri Gordon (M.Sc. joint with H. Greenspan), Unsupervised image clustering using probabilistic continuous models and information theoretic principles, 2005.
- Arnaldo Mayer (M.Sc. joint with H. Greenspan), A probabilistic framework for spatio-temporal video representation and indexing, 2005.
- Amit Ruf, (M.Sc. joint with H. Greenspan), MR brain image segmentation, 2006.
- Rotem Natan (M.Sc. project), Automatic solution for Sudoku using algorithms on graphs, 2006.
- Omer Rotem (M.Sc. joint with H. Greenspan), Combining region and edge cues for image segmentation in a probabilistic Gaussian mixture framework, 2007.
- Oren Freifeld (M.Sc. joint with H. Greenspan), Lesion detection in noisy MR brain images using constrained GMM and active contours, 2007.
- Jeremie Dreyfuss (M.Sc. joint with H. Greenspan), Reduced GMM for medical data classification, 2007.
- Tomer Belkind, (M.Sc. project, joint with H. Greenspan) Video Google: Efficient search of videos, 2009.
- Sivan Zommer (M.Sc. project, joint with M. Koppel), Empirical study of various methods for weighted bagging, 2009.
- Moshe Taieb (M.Sc. joint with M. Koppel), The Netflix rating data-base, 2009.
- Amir Alush (M.Sc. joint with H. Greenspan), Automatic landmark detection in uterine cervix medical images, 2009.
- Anat Helpern (M.Sc. joint with Y. Shavitt), Clustering anonymous nodes in the internet graph, 2009.
- Uri Avni (M.Sc. joint with H. Greenspan), Efficient retrieval in large medical image datasets, 2009.
- Lev Faivishevsky, Ph.D., Efficient computation of information theoretic entities with applications to machine learning, 2011.
- Avishay Friedman, M.Sc., Information theoretic pairwise clustering, 2012.

- Jonathan Berant Ph.D. (joint with Ido Dagan), Global learning of textual entailment graphs, 2012.
- Sharon Nissimov, M.Sc. (joint with Victor Alchanati), Obstacle detection in a greenhouse environment using the Kinect sensor, 2013.
- Eyal Shnarch, Ph.D. (joint with Ido Dagan), Probabilistic models for lexical inference, 2013.
- Roey Mehrez M.Sc. (joint with Hayit Greenspan), Patch-based segmentation with spatial consistency for detection and segmentation, 2015.
- Alan Joseph Bekker, M.Sc, Classification with noisy labels, 2015.
- Oded Kaminsky, M.Sc., Finesse based ensemble segmentation, 2015.
- Shlomi Hazan, M.Sc. (joint with Sharon Gannot), A hybrid approach for speech enhancement using MoG model and neural network phoneme classifier, 2015.
- Yair Fuchs, M.Sc. (joint with Gal Chechik), A modular method of training denoising autoencoder, 2016.
- Amir Alush, Ph.D. Efficiently solving discrete optimization problems with applications to image segmentation, 2016.
- Oren Melamud, Ph.D. (joint with Ido Dagan), Improving lexical inference using context-sensitive distributional models with rich context representations, 2016.
- Idit Diamant, Ph.D. (joint with Hayit Greenspan), Automated computerized analysis of medical images using image analysis and machine learning tools, 2017.
- Eran Goldman, M.Sc., Large-scale classification of structured objects using a CRF with deep class embedding, 2017.
- Ran Bakalo, M.Sc., Classification and abnormality localization in mammograms via dual branch deep neural network from weakly and semi supervised data, 2018.
- Alan Joseph Bekker, Ph.D., Training deep neural-networks based on unreliable labels, 2018.
- Yaniv Shachor, M.Sc., A mixture of views network with applications to CADx systems, 2018.
- Ori Ernst, M.Sc., Speech dereverberation using fully convolutional networks, 2019.
- Yair Dgani, M.Sc., Training a neural network based on unreliable human annotation of medical images, 2019.
- Idan Achituve, M.Sc., Interpretable online banking fraud detection based on hierarchical attention mechanism, 2019.
- Hagai Taitelbaum, M.Sc. Incremental learning with limited access, 2019.
- Eytan Kats, M.Sc, A Soft STAPLE algorithm combined with anatomical knowledge, 2020.
- Yaniv Opochinsky, M.Sc, Clustering methods based on deep learning and the information-bottleneck principle, 2020.
- Shlomi Chazan, Ph.D, Deep neural networks approaches for speech processing, 2020.

- Eran Goldman, Ph.D., Large-scale context-aware object recognition in densely packed scenes, 2021.
- Gal Cohen, M.Sc. Learning probabilistic fusion of multi-label lesion contours, 2022.
- David Sriker, M.Sc., Class-based attention mechanism for chest radiograph multi-label categorization, 2022.
- Shira Kasten Serlin, M.Sc., Unsupervised adaptation of deep neural network to a new clinical site, 2022.
- Lior Frenkel, M.Sc., Calibration methods for neural networks, 2022.
- Shaya Goodman, M.Sc., Supervised and unsupervised domain adaptation of deep neural networks across clinical sites, 2023.

Current Students

- Avi Caciularu, (with Ido Dagan)
- Ori Ernst, (with Ido Dagan)

Publications

Journal Papers

1. Avi Caciularu, Jacob Goldberger, An entangled mixture of variational autoencoders approach to deep clustering, *Neurocomputing*, 2023.
2. Yaron Trink, Achia Urbach, Benjamin Dekel, Peter Hohenstein, Jacob Goldberger and Tomer Kalisky, Characterization of continuous transcriptional heterogeneity in high-risk blastemal-type Wilms' tumors using unsupervised machine learning, *International Journal of Molecular Sciences*, 2023.
3. Yael Ziv, Jacob Goldberger and Tammy Riklin-Raviv, Stochastic wight pruning and the role of regularization in shaping network structure, *Neurocomputing*, vol. 462, pp. 555-567, 2021.
4. Shiri Gordon, Boris Kodner, Tal Goldfryd, Michael Sidorov, Jacob Goldberger, Tammy Riklin-Raviv, An atlas of classifiers - A machine learning paradigm for brain MRI Segmentation, *Medical, Biological Eng & Computing (MBEC)*, 2021.
5. Hodaya Hammer, Shlomo E. Chazan, Jacob Goldberger and Sharon Gannot, Dynamically localizing multiple speakers based on the time-frequency domain, *EURASIP Journal on Audio, Speech, and Music Processing*, 2021.
6. Avi Caciularu, Nir Raviv, Tomer Raviv, Jacob Goldberger and Yair Be'ery, perm2vec: Attentive graph permutation selection for decoding of error correction codes, *IEEE JSAC Series on Machine Learning for Communications and Networks*, vol. 39, pp. 79-88, 2021.

7. Ran Bakalo, Jacob Goldberger and Rami Ben-Ari, Weakly and semi supervised detection in medical imaging via deep dual branch net, *Neurocomputing*, vol. 421, pp. 15-25, 2021.
8. Eran Goldman and Jacob Goldberger, CRF with deep class embedding for large scale classification. *Computer Vision and Image Understanding (CVIU)*, 2020.
9. Yaniv Shachor, Hayit Greenspan and Jacob Goldberger, Mixture of views network with applications to multi-view medical imaging. *Neurocomputing*, vol. 374, pp. 1-9, 2020.
10. Yehoshua Dissen, Jacob Goldberger and Joseph Keshet, Formant estimation and tracking: a deep learning approach, *The Journal of the Acoustical Society of America*, vol. 145(2), pp. 642-653, 2019.
11. Sharon Fogel, Hadar Averbuch-Elor, Daniel Cohen-Or and Jacob Goldberger, Clustering-driven deep embedding with pairwise constraints, *IEEE Computer Graphics and Applications*, vol. 39(4), pp. 16-27, 2019.
12. Maayan Frid-Adar, Idit Diamant, Eyal Klang, Michal Amitai, Jacob Goldberger and Hayit Greenspan, GAN-based synthetic medical image augmentation for increased CNN performance in liver lesion classification, *Neurocomputing*, vol. 321, pp. 321-331, 2018.
13. Michal Chorev, Alan Bekker, Jacob Goldberger and Liran Carmel, Identification of introns harboring functional sequence elements through positional conservation, *Scientific Reports* 7:4201,DOI:10.1038/s41598-017-04476-02017, 2017.
14. Idit Diamant, Eyal Klang, Michal Amitai, Eli Konen, Jacob Goldberger and Hayit Greenspan, Task driven dictionary learning based on mutual information for medical image classification, *IEEE Transactions on Biomedical Engineering*, vol. 64(6), pp. 1380-1392, 2017.
15. Shlomo E. Chazan, Jacob Goldberger and Sharon Gannot, A hybrid approach for speech enhancement using MoG model and neural network phoneme classifier, *IEEE Transactions on Audio, Speech and Language Processing*, vol. 24(12), pp. 2516-2530, 2016.
16. Amir Alush, Avishay Friedman and Jacob Goldberger, Pairwise clustering based on the mutual-information criterion. *Neurocomputing*, vol. 182, pp. 284-293, 2016.
17. Amir Alush and Jacob Goldberger, Hierarchical image segmentation using correlation clustering. *IEEE Trans. on Neural Networks and Learning Systems*, vol. 27(6), pp. 1358-136, 2016.
18. Alan Joseph Bekker, Moran Shalhon, Hayit Greenspan and Jacob Goldberger, Multi-view probabilistic classification of breast microcalcifications. *IEEE Trans. Medical Imaging*, vol. 35:2 pp. 645-653, 2016.
19. Roey Mechrez, Jacob Goldberger and Hayit Greenspan, Patch-based segmentation with spatial consistency: application to MS lesions in brain MRI. *International Journal of Biomedical Imaging*, Article ID 7952541, doi:10.1155/2016/7952541, 2016.
20. Sharon Nissimov, Jacob Goldberger, Victor Alchanatis. Obstacle detection in a greenhouse environment using the Kinect sensor, *Computers and Electronics in Agriculture*, vol. 113, pp. 104-115, 2015.

21. Jonathan Berant, Noga Alon, Ido Dagan and Jacob Goldberger. Efficient global learning of entailment graphs, *Computational Linguistics*, vol. 41, no. 2, pp. 221-263, 2015.
22. Amir Alush and Jacob Goldberger,"Ensemble segmentation using efficient integer linear programming", *IEEE Trans. Pattern Analysis and Machine Intelligence*, vol. 34:10, pp. 1966-1977, 2012.
23. Lev Faivishevsky and Jacob Goldberger, "Dimensionality reduction based on non-parametric mutual information", *Neurocomputing*, vol. 80, pp. 31-37, 2012.
24. Eyal Baharad, Jacob Goldberger, Moshe Koppel and Shmuel Nitzan, "Beyond Condorcet: Optimal aggregation rules using voting records", *Theory and Decision*, vol. 72, pp. 113-130, 2012.
25. Jonathan Berant, Ido Dagan and Jacob Goldberger, "Learning entailment relations by global graph structure optimization", *Computational Linguistics*, vol 38:1, pp. 1-39, 2012.
26. Lev Faivishevsky and Jacob Goldberger, "An unsupervised data projection that preserves the cluster structure", *Pattern Recognition Letters*, vol. 33, pp. 256-262, 2012.
27. Jacob Goldberger and Amir Leshem, "Iterative tomographic solution of integer least squares problems with applications to MIMO detection", *IEEE Journal of Selected Topics in Signal Processing*, vol. 5, pp. 1486-1496, 2011.
28. Jacob Goldberger and Amir Leshem, "MIMO detection for high-order QAM based on a Gaussian tree approximation", *IEEE Trans. Information Theory*, vol. 57, pp. 4973-4982, 2011.
29. Uri Avni, Hayit Greenspan, Eli Konen, Michal Sharon, and Jacob Goldberger, "X-ray categorization and retrieval on the organ and pathology level, using patch-based visual words", *IEEE Trans. Medical Imaging*, vol. 30, pp. 733-746, 2011.
30. Eyal Baharad, Jacob Goldberger, Moshe Koppel and Shmuel Nitzan, "Distilling the wisdom of crowds: Weighted aggregation of decisions on multiple issues", *Autonomous Agents and Multi-Agents Systems*, vol. 22, pp. 31-42, 2011.
31. Jacob Goldberger and Tamir Tassa, "Efficient anonymizations with enhanced utility", *Transactions on Data Privacy*, vol. 3, pp. 149-175, 2010.
32. Amir Alush, Hayit Greenspan and Jacob Goldberger, "Automated and interactive lesion detection and segmentation in uterine cervix Images", *IEEE Trans. Medical Imaging*, vol. 29, pp. 488-501, 2010.
33. Keren Erez, Jacob Goldberger, Ronen Sosnik, Moshe Shemesh, Susan Rothstein, and Moshe Abeles, "Analyzing movement trajectories using a Markov bi-clustering method", *Journal of Computational Neuroscience*, vol 27, pp. 543-552, 2009.
34. Lior Weizman and Jacob Goldberger, "Classification of hyperspectral remote-sensing images using discriminative linear projections", *International Journal of Remote Sensing*, vol. 30, Issue 21, pages 5605-17, 2009.
35. Oren Freifeld, Hayit Greenspan and Jacob Goldberger, "Multiple sclerosis lesion detection using constrained GMM and curve evolution", *International Journal of Biomedical Imaging*, doi:10.1155/2009/715124, 2009.

36. Lior Weizman and Jacob Goldberger, "Urban area segmentation using visual words", *IEEE Geoscience and Remote Sensing Letters*, vol. 6, no. 3, pp. 388-392, 2009.
37. Jacob Goldberger, Hayit Greenspan and Jeremie Dreyfuss, "Simplifying mixture models using the unscented transform" *IEEE Trans. Pattern Analysis and Machine Intelligence*, vol 30, pp. 1496-1502, 2008.
38. Jacob Goldberger and Tamir Tassa, "A hierarchical clustering algorithm based on the Hungarian method", *Pattern Recognition Letters* 29, pages 1632-38, 2008.
39. Moshe Butman and Jacob Goldberger, "Face recognition using classification based linear projections", *EURASIP Journal on Advances in Signal Processing*, volume 8, Issue 2, 2008.
40. Joel Pinhas, Victoria Soroker, Amots Hetzroni, Amos Mizrach, Mina Teicher and Jacob Goldberger, "Automatic acoustic detection of the red palm weevil", *Computers and Electronics in Agriculture*, pages 131-139, 2008.
41. Jacob Goldberger and Haggai Kfir, "Serial schedules for belief-propagation: analysis of convergence time", *IEEE Trans. Information Theory*, pp. 1316-19 , 2008.
42. Eran Sharon, Simon Litsyn and Jacob Goldberger, "Efficient serial message -passing schedules for LDPC decoding", *IEEE Trans. Information Theory*, pp. 4076-91, 2007.
43. Hayit Greenspan, Amit Ruf and Jacob Goldberger, "Constrained Gaussian mixture model framework for automatic segmentation of MR brain images", *IEEE Trans. Medical Imaging*, pp. 1233-45, 2006.
44. Jacob Goldberger, Hayit Greenspan and Shiri Gordon, "Unsupervised image-set clustering using an information theoretic framework", *IEEE Trans. on Image Processing*, vol. 15, pp. 449-458, 2006.
45. Jacob Goldberger and Hayit Greenspan, "Context-based segmentation of image sequences", *IEEE Pattern Analysis and Machine Intelligence*, vol. 28, pp. 463-468, 2006.
46. Jacob Goldberger, "Projective reconstruction from pairwise overlapping multiple views", *Journal of Computer Vision and Image Understanding*, vol. 97, pp. 283-296, 2005.
47. Hayit Greenspan, Jacob Goldberger and Arnaldo Mayer, "Probabilistic space-time video modeling via piecewise GMM", *IEEE Pattern Analysis and Machine Intelligence*, vol 26, pp. 384-396, 2004.
48. Hayit Greenspan, Jacob Goldberger and Lenny Riddel, "A continuous probabilistic framework for image matching", *Journal of Computer Vision and Image Understanding* 84, pp. 384-406, 2001.
49. Hayit Greenspan, Jacob Goldberger and Itay Eshet, "Mixture model for face color modeling and segmentation", *Pattern Recognition Letters* 22, pp. 1525-1536, 2001.
50. Jacob Goldberger, David Burshtein and Horacio Franco, "Segmental modeling using a continuous mixture of non-parametric models", *IEEE Trans. Speech Audio Proc*, vol. 7, pp. 262-271, 1999.
51. Jacob Goldberger and David Burshtein, "Scaled random trajectory segmental models", *Computer Speech and Language 12*, pp. 51-73, 1998.

52. Jacob Goldberger, Douglas Lind and Meir Smorodinsky, "The entropies of renewal systems", *Israel Journal of Mathematics* 75, pp. 49-64, 1991.

Book Chapters

53. Uri Avni, Jacob Goldberger, Hayit Greenspan,"Medical image classification at Tel-Aviv and Bar-Ilan universities", in ImageCLEF: Experimental Evaluation in Visual Information Retrieval, edited by H. Muller, P. Clough and T. Deselaers, Springer, 2010.

International Conference Papers

54. Tomer Bar-Natan, Hayit Greenspan and Jacob Goldberger, "PLPP: A pseudo labeling post-processing strategy for unsupervised domain adaptation", *IEEE International Symposium on Biomedical Imaging (ISBI)*, 2023.
55. Lior Frenkel and Jacob Goldberger, "Calibration of a regression network based on the predictive variance with applications to medical images", *IEEE International Symposium on Biomedical Imaging (ISBI)*, 2023.
56. Lior Frenkel and Jacob Goldberger, Calibration of medical imaging classification systems with weight scaling, *International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI)*, 2022.
57. Shaya Goodman, Hayit Greenspan and Jacob Goldberger, "Supervised domain adaptation using gradients transfer for improved medical image analysis", *MICCAI Int. Workshop on Domain Adaptation and Representation Transfer (DART)*, 2022.
58. Shaya Goodman, Shira Kasten-Serlin, Hayit Greenspan and Jacob Goldberger, "Unsupervised site adaptation by intra-site variability alignment", *MICCAI Int. Workshop on Domain Adaptation and Representation Transfer (DART)*, 2022.
59. Ori Ernst, Avi Caciularu, Ori Shapira, Ramakanth Pasunuru, Mohit Bansal, Jacob Goldberger and Ido Dagan, Proposition-level clustering for multi-document summarization, *North American Chapter of the Association for Computational Linguistics (NAACL)*, 2022.
60. Avi Caciularu, Ido Dagan, Jacob Goldberger and Arman Cohan, Question-evidence similarity learning for long-context question answering, *North American Chapter of the Association for Computational Linguistics (NAACL)*, 2022.
61. Lior Frenkel and Jacob Goldberger, "Network calibration by temperature scaling based on the predicted confidence", *The European Signal Processing Conference (EUSIPCO)*, 2022.
62. David Sriker, Hayit Greenspan and Jacob Goldberger, "Class-based attention mechanism for chest radiograph multi-label categorization", *IEEE International Symposium on Biomedical Imaging (ISBI)*, 2022.
63. Shira Kasten-Serlin, Jacob Goldberger and Hayit Greenspan, "Adaptation of a multi-site network to a new clinical site via batch-normalization similarity", *IEEE International Symposium on Biomedical Imaging (ISBI)*, 2022.

64. Ori Ernst, Ori Shapira, Ramakanth Pasunuru, Michael Lepioshkin, Jacob Goldberger, Mohit Bansal and Ido Dagan, "Summary-source proposition-level alignment: task, datasets and supervised baseline, *Conference on Computational Natural Language Learning (CoNLL)*, 2021. **Best paper runner up**.
65. Avi Caciularu, Ido Dagan and Jacob Goldberger,"Denoising word embeddings by averaging in a shared space", **SEM: Joint Conference on Lexical and Computational Semantics*, 2021.
66. Nimrod Sagie, Hayit Greenspan and Jacob Goldberger, "Transfer learning with a layer dependent regularization for medical image segmentation", *MICCAI Int. Workshop on Machine Learning in Medical Imaging (MLMI)*, 2021.
67. Nimrod Sagie, Hayit Greenspan and Jacob Goldberger, "Transfer learning via parameter regularization for medical image segmentation", *The European Signal Processing Conference (EUSIPCO)*, 2021.
68. Lior Frenkel and Jacob Goldberger, "Network calibration by class-based temperature scaling", *The European Signal Processing Conference (EUSIPCO)*, 2021.
69. Eran Goldman and Jacob Goldberger, "Factorized CRF with batch normalization based on the entire training data", *IEEE International Conference on Acoustic, Speech and Signal Processing (ICASSP)*, 2021.
70. *Shlomo E. Chazan, Jacob Goldberger and Sharon Gannot, Speech enhancement with mixture of deep experts with clean clustering pretraing", IEEE International Conference on Acoustic, Speech and Signal Processing (ICASSP)*, 2021.
71. Soham Dan, Hagai Taitelbaum and Jacob Goldberger, "A locally linear procedure for word translation", *The International Conference on Computational Linguistics (COLING)*, 2020.
72. Shauli Ravfogel, Yanai Elazar, Jacob Goldberger, Yoav Goldberg, "Unsupervised distillation of syntactic information from contextualized word representations", BlackboxNLP EMNLP Workshop, 2020.
73. Yaniv Opochinsky, Shlomo E. Chazan, Sharon Gannot and Jacob Goldberger, "K-Autoencoders deep clustering", *IEEE International Conference on Acoustic, Speech and Signal Processing (ICASSP)*, 2020.
74. Yochai Yemini, Shlomo E. Chazan, Jacob Goldberger and Sharon Gannot, "'A composite DNN architecture for speech enhancement", *IEEE International Conference on Acoustic, Speech and Signal Processing (ICASSP)*, 2020.
75. Gal Cohen, Hayit Greenspan and Jacob Goldberger, "Learning probabilistic fusion of multilabel lesion contours", *IEEE International Symposium on Biomedical Imaging (ISBI)*, 2020.
76. Hagai Taitelbaum, Gal Chechik and Jacob Goldberger, "Multilingual word translation using auxiliary languages", *Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 2019.
77. Hagai Taitelbaum, Gal Chechik and Jacob Goldberger, "A multi-pairwise extension of procrustes analysis for multilingual word translation", *Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 2019.

78. Shlomo E. Chazan, Sharon Gannot and Jacob Goldberger, "Deep clustering based on a mixture of autoencoders", *IEEE Machine Learning for Signal Processing Workshop (MLSP)*, 2019.
79. Idan Achituve, Sarit Kraus and Jacob Goldberger, "Interpretable online banking fraud detection based on hierarchical attention mechanism", *IEEE Machine Learning for Signal Processing Workshop (MLSP)*, 2019.
80. Eytan Kats, Jacob Goldberger and Hayit Greenspan, "A soft STAPLE algorithm combined with anatomical knowledge", *International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI)*, 2019.
81. Shlomo E. Chazan, Hodaya Hammer, Gershon Hazan, Jacob Goldberger and Sharon Gannot, "Multi-microphone speaker separation based on deep DOA estimation", *The European Signal Processing Conference (EUSIPCO)*, 2019.
82. Eran Goldman, Roei Herzig, Aviv Eisenschtat, Jacob Goldberger and Tal Hassner, "Precise detection in densely packed scenes", *IEEE Computer Vision and Pattern Recognition (CVPR)*, 2019.
83. Noa Yehezkel Lubin, Jacob Goldberger and Yoav Goldberg, "Aligning vector-spaces with noisy supervised lexicon", *North American Chapter of the Association for Computational Linguistics (NAACL)*, 2019.
84. Hagai Taitelbaum, Gal Chechik and Jacob Goldberger, "Network adaptation strategies for learning new classes without forgetting the original ones", *IEEE International Conference on Acoustic, Speech and Signal Processing (ICASSP)*, 2019.
85. Jacob Goldberger and Yaniv Opochinsky, "Information-bottleneck based on the Jensen-Shannon divergence with applications to pairwise clustering", *IEEE International Conference on Acoustic, Speech and Signal Processing (ICASSP)*, 2019.
86. Ran Bakalo, Rami Ben-Ari and Jacob Goldberger, "Classification and detection in mammograms with weak supervision via dual branch deep neural net", *IEEE International Symposium on Biomedical Imaging (ISBI)*, 2019.
87. Eytan Kats, Jacob Goldberger and Hayit Greenspan, "Soft labeling by distilling anatomical knowledge for improved MS lesion segmentation", *IEEE International Symposium on Biomedical Imaging (ISBI)*, 2019.
88. Yaniv Shachor, Hayit Greenspan and Jacob Goldberger, "A mixture of views network with applications to the classification of breast microcalcifications", *IEEE International Symposium on Biomedical Imaging (ISBI)*, 2019.
89. Shlomo E. Chazan, Sharon Gannot and Jacob Goldberger, "Attention-based neural network for joint diarization and speaker extraction", Int. Workshop on Acoustic Signal Enhancement (IWAENC), 2018.
90. Shlomo E. Chazan, Jacob Goldberger and Sharon Gannot, "LCMV beamformer with DNN-based multichannel concurrent speakers detector", *The European Signal Processing Conference (EUSIPCO)*, 2018.
91. Ori Ernst, Shlomo E. Chazan, Sharon Gannot and Jacob Goldberger, "Speech dereverberation using fully convolutional networks", *The European Signal Processing Conference (EUSIPCO)*, 2018.

92. Hagai Taitelbaum, Ehud Ben-Reuven and Jacob Goldberger, "Adding new classes without access to the original training data with applications to language identification", *INTERSPEECH*, 2018.
93. Jacob Goldberger and Oren Melamud, "Self-normalization properties of language modeling", *The International Conference on Computational Linguistics (COLING)*, 2018.
94. Shlomo E. Chazan, Sharon Gannot and Jacob Goldberger, "Training strategies for deep latent models and applications to speech presence probability estimation", *Int. Conference on Latent Variable Analysis and Signal Separation (LVA/ICA)*, 2018.
95. Hodaya Hammer, Gilad Rath, Shlomo E. Chazan, Jacob Goldberger and Sharon Gannot, "Speech enhancement with deep neural networks using MoG based labels", ICSEE, 2018.
96. Shlomo E. Chazan, Jacob Goldberger and Sharon Gannot, "DNN-based concurrent speaker detector and its application to speaker extraction with LCMV beamforming", *IEEE International Conference on Acoustic, Speech and Signal Processing (ICASSP)*, 2018.
97. Yair Dgani, Hayit Greenspan and Jacob Goldberger, "Training a neural network based on unreliable human annotation of medical images", *IEEE International Symposium on Biomedical Imaging (ISBI)*, 2018.
98. Maayan Frid-Adar, Eyal Klang, Michal Amitai, Jacob Goldberger and Hayit Greenspan, "Synthetic data augmentation using GAN for improved liver lesion classification", *IEEE International Symposium on Biomedical Imaging (ISBI)*, 2018.
99. Avi Ben-Cohen, Eyal Klang, Michal Amitai, Jacob Goldberger and Hayit Greenspan, "Anatomical data augmentation for CNN based pixel-wise classification", *IEEE International Symposium on Biomedical Imaging (ISBI)*, 2018.
100. Oren Melamud, Ido Dagan and Jacob Goldberger, "A simple language model based on PMI matrix approximations", *Conference on Empirical Methods in Natural Language Processing* (EMNLP), 2017.
101. Shlomo E. Chazan, Jacob Goldberger and Sharon Gannot, "Deep recurrent mixture of experts for speech enhancement", *IEEE Workshop on Applications of Signal Processing to Audio and Acoustics* (WASPAA), 2017.
102. Dany Cherkassky, Shlomo E. Chazan, Jacob Goldberger and Sharon Gannot,"Successive relative transfer function identification using single microphone speech enhancement", *The European Signal Processing Conference (EUSIPCO)*, 2017.
103. Ariel Malek, Shlomi Chazan, Ilan Malka, Vladimir Tourbabin, Jacob Goldberger, Eli Tzirkel-Hancock and Sharon Gannot, "Speaker extraction using LCMV beamformer with DNN-based SPP and RTF identification scheme", *The European Signal Processing Conference (EUSIPCO)*, 2017.
104. Boris Veselov, Shiri Gordon, Jacob Goldberger and Tammy Riklin-Raviv, "Atlas of classifiers for brain MRI segmentation", *MICCAI Int. Workshop on Machine Learning in Medical Imaging (MLMI)*, 2017.
105. Maayan Frid-Adar, Idit Diamant, Eyal Klang, Michal Amitai, Jacob Goldberger and Hayit Greenspan, "Modeling the intra-class variability for liver lesion detection using

a multi-class patch-based CNN", *MICCAI Int. Workshop on Patch-based Techniques in Medical Imaging (PatchMI)*, 2017.

106. Alan Bekker, Michal Chorev, Liran Carmel and Jacob Goldberger, "A deep neural network with a restricted noisy channel for identification of functional introns", *IEEE Machine Learning for Signal Processing Workshop, (MLSP)*, 2017.
107. Oren Melamud and Jacob Goldberger, "Information-theory interpretation of the skip-gram negative-sampling objective function", *Annual Meeting of the Association for Computational Linguistics (ACL)*, short paper, 2017.
108. Jacob Goldberger and Ehud Ben-Reuven, "Training deep neural-networks using a noise adaptation layer", *Int. Conference on Learning Representations (ICLR)*, 2017.
109. Oded Kaminsky and Jacob Goldberger, "Combining clusterings with different detail levels", *IEEE Machine Learning for Signal Processing Workshop, (MLSP)*, Italy, 2016.
110. Alan Bekker, Irit Opher, Itsik Lapidot and Jacob Goldberger, "Intra-cluster training strategy for deep learning with applications to language identification", *IEEE Machine Learning for Signal Processing Workshop, (MLSP)*, Italy, 2016.
111. Shlomo E. Chazan, Sharon Gannot and Jacob Goldberger, "A pre-training approach for deep neural network with application to speech enhancement", Int. Workshop on Acoustic Signal Enhancement (IWAENC), Xian, 2016. **Best student paper award**.
112. Oren Melamud, Jacob Goldberger and Ido Dagan, "Context2vec: learning generic context embedding with bidirectional LSTM",*Conference on Computational Natural Language Learning (CoNLL)*, 2016.
113. Ehud Ben-Reuven and Jacob Goldberger, "A semisupervised approach for language identification based on ladder networks", *Odyssey Speaker and Language Recognition Workshop*, 2016.
114. Alan Joseph Bekker, Hayit Greenspan and Jacob Goldberger, "A multi-view deep learning architecture for classification of breast microcalcifications", *IEEE International Symposium on Biomedical Imaging (ISBI)*, 2016.
115. Alan Joseph Bekker and Jacob Goldberger, "Training deep neural-networks based on unreliable labels", *IEEE International Conference on Acoustic, Speech and Signal Processing (ICASSP)*, 2016.
116. Jacob Goldberger, "Combining soft decisions of several unreliable experts", *IEEE International Conference on Acoustic, Speech and Signal Processing (ICASSP)*, 2016.
117. Idit Diamant, Jacob Goldberger and Hayit Greenspan, "Mutual information criterion for feature selection with application to classification of breast microcalcifications", *SPIE Medical Imaging*, San-Diego, 2016.
118. Vered Shwartz, Omer Levy, Ido Dagan and Jacob Goldberger, "Learning to exploit structured resources for lexical inference", *Conference on Computational Natural Language Learning (CoNLL)*, 2015.
119. Oren Melamud, Ido Dagan, Jacob Goldberger, "Modeling word meaning in context with substitute vectors", *North American Chapter of the Association for Computational Linguistics (NAACL)*, 2015.

120. Alan Joseph Bekker, Moran Shalhon, Hayit Greenspan and Jacob Goldberger, "Learning to combine decisions from multiple mammography views", *IEEE International Symposium on Biomedical Imaging (ISBI)*, 2015.
121. Idit Diamant, Jacob Goldberger, Eyal Klang, Michal Amitai and Hayit Greenspan, "Multi-phase liver lesions classification using relevant visual words based on mutual information", *IEEE International Symposium on Biomedical Imaging (ISBI)*, 2015.
122. Roey Mechrez, Jacob Goldberger, Hayit Greenspan, "MS lesion segmentation using a multi-channel patch-based approach with spatial consistency", SPIE Medical Imaging, 2015.
123. Oren Melamud, Ido Dagan, Jacob Goldberger, Idan Szpektor and Deniz Yuret, "Modeling joint-context in distributional similarity", *Conference on Computational Natural Language Learning (CoNLL)*, 2014, **Best paper runner up**.
124. Omer Levy, Ido Dagan and Jacob Goldberger, "Focused entailment graphs for open IE propositions", *Conference on Computational Natural Language Learning (CoNLL)*, 2014.
125. Jacob Goldberger, "MIMO detection based on averaging Gaussian projections", *IEEE International Conference on Acoustic, Speech and Signal Processing (ICASSP)*, Florene, 2014.
126. Oren Melamud, Jonathan Berant, Ido Dagan, Jacob Goldberger and Idan Szpektor. "A two level model for context sensitive inference rules", *Annual Meeting of the Association for Computational Linguistics (ACL)*, 2013. **Best paper runner up**.
127. Oren Melamud, Ido Dagan, Jacob Goldberger and Idan Szpektor, "Using lexical expansion to learn inference rules from sparse data", *Annual Meeting of the Association for Computational Linguistics (ACL)*, short paper, 2013.
128. Eyal Shnarch, Erel Segal-Halevi, Ido Dagan and Jacob Goldberger, "PLIS: a probabilistic lexical inference system", *Annual Meeting of the Association for Computational Linguistics (ACL)*, 2013.
129. Jacob Goldberger,"Improved MIMO detection based on successive tree approximations", IEEE Int. Symposium on Information Theory (ISIT), 2013.
130. Amir Alush and Jacob Goldberger, "Break and conquer: efficient correlation clustering for image segmentation", *Int. Workshop on Similarity-Based Pattern Analysis and Recognition (SIMBAD)*, 2013.
131. Avishay Friedman and Jacob Goldberger, "Information theoretic pairwise clustering", *Int. Workshop on Similarity-Based Pattern Analysis and Recognition (SIMBAD)*, 2013.
132. Idit Diamant, Hayit Greenspan and Jacob Goldberger, "Breast tissue classification in mammograms using visual words", *SPIE Medical Imaging*, 2013.
133. Lev Faivishevsky and Jacob Goldberger, "Unsupervised feature selection based on non-parametric mutual information", *IEEE Machine Learning for Signal Processing Workshop, (MLSP)*, 2012.

134. Jonathan Berant, Ido Dagan, Meni Adler and Jacob Goldberger, Efficient tree-based approximation for entailment graph learning", *Annual Meeting of the Association for Computational Linguistics (ACL)*, 2012.

135. Eyal Shnarch, Ido Dagan and Jacob Goldberger, A probabilistic lexical model for ranking textual inferences, **SEM Conference on Lexical and Computational Semantics*, 2012.

136. Uri Avni, Hayit Greenspan and Jacob Goldberger, "X-ray categorization and spatial localization of chest pathologies", *International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI)*, 2011.

137. Eyal Shnarch, Jacob Goldberger and Ido Dagan, "Towards a probabilistic model for lexical entailment", *TextInfer-Workshop on Textual Entailment*, Edinburgh, 2011.

138. Eyal Shnarch, Jacob Goldberger and Ido Dagan, "A probabilistic modeling framework for lexical entailment", *Annual Meeting of the Association for Computational Linguistics (ACL)*, short paper, 2011.

139. Jonathan Berant, Ido Dagan and Jacob Goldberger, "Global learning of typed entailment rules", *Annual Meeting of the Association for Computational Linguistics (ACL)*, 2011. **Received the best student long paper award**.

140. Uri Avni, Hayit Greenspan, Eli Konen, Michal Sharon and Jacob Goldberger, "System for pathology categorization and retrieval in chest radiographs", *SPIE Medical Imaging*, 2011.

141. Michal Sharon, Uri Avni, Jacob Goldberger, Eli Konen and Hayit Greenspan, "A Novel automated software for identification of Abnormal chest films using the bag of words model", in Radiological Society of North America (RSNA), 2010.

142. Lev Faivishevsky and Jacob Goldberger, "Mutual information based dimensionality reduction with application to non-linear regression", *IEEE Machine Learning for Signal Processing Workshop, (MLSP)*, 2010.

143. Jonathan Berant, Ido Dagan and Jacob Goldberger "Global learning of focused entailment graphs", *Annual Meeting of the Association for Computational Linguistics (ACL)*, 2010.

144. Lev Faivishevsky and Jacob Goldberger, "A nonparametric information theoretic clustering algorithm", *International Conference Machine Learning (ICML)*, 2010.

145. Uri Avni, Jacob Goldberger, Michal Sharon, Eli Konen, Hayit Greenspan, "Chest X-ray characterization: From the organ identification to the pathology categorization", *ACM Int. Conference on Multimedia Information Retrieval (MIR)*, 2010.

146. Jacob Goldberger and Amir Leshem,"Pseudo prior belief propagation for densely connected discrete graphs" *IEEE Information Theory Workshop (ITW)*, 2010.

147. Jacob Goldberger and Amir Leshem,"A Gaussian tree approximation for integer least-squares", *Neural Information Processing Systems 23 (NIPS)*, 2009.

148. Jacob Goldberger and Tamir Tassa, "Efficient anonymizations with enhanced utility", *International Workshop on Privacy Aspects of Data Mining (PADM)*, Miami, 2009.

149. Uri Avni, Jacob Goldberger and Hayit Greenspan, "Addressing the ImageClef 2009 Challenge using a patch-based visual words", *The Cross Language Evaluation Forum Workshop (CLEF)*, 2009, **Winner of the CLEF medical image annotation challenge**.
150. Amir Alush, Hayit Greenspan and Jacob Goldberger, "Automated and interactive lesion detection and segmentation using an arc-level MRF", *IEEE International Symposium on Biomedical Imaging (ISBI)*, 2009.
151. Uri Avni, Hayit Greenspan, Michal Sharon, Eli Konen and Jacob Goldberger, "X-ray image categorization and retrieval using patch-based visual words representation", *IEEE International Symposium on Biomedical Imaging (ISBI)*, 2009.
152. Amir Leshem and Jacob Goldberger, "MIMO decoding based on stochastic reconstruction from multiple projections", *IEEE International Conference on Acoustic, Speech and Signal Processing* (ICASSP), 2009.
153. Anat Almog, Jacob Goldberger and Yuval Shavitt, "Unifying unknown nodes in the internet graph using semisupervised spectral clustering", The International Workshop on Mining Complex Data (MCD), 2008.
154. Lev Faivishevsky and Jacob Goldberger,"ICA based on a smooth estimation of the differential entropy", *Neural Information Processing Systems 22 (NIPS)*, 2008.
155. Lior Weizman and Jacob Goldberger, "Detection of urban zones in satellite images using visual words", *SPIE Int. Geoscience and Remote Sensing Symposium (IGARSS)*, 2008.
156. Idan Szpektor, Ido Dagan, Roy Bar Haim and Jacob Goldberger, "Contextual preferences", *Annual Meeting of the Association for Computational Linguistics (ACL)*, 2008.
157. Jacob Goldberger, Keren Erez and Moshe Abeles, "A Markov clustering method for analyzing movement trajectories", *IEEE Machine Learning for Signal Processing Workshop, (MLSP)*, 2007.
158. Jaakko Peltonen, Jacob Goldberger and Samuel Kaski, "Fast semi-supervised discriminative component analysis", *IEEE Machine Learning for Signal Processing Workshop, (MLSP)*, 2007.
159. Lior Weizman and Jacob Goldberger, "A classification based linear projection of labeled Hyperspectral data", *SPIE Int. Geoscience and Remote Sensing Symposium (IGARSS)*, 2007.
160. Omer Rotem, Hayit Greenspan and Jacob Goldberger, "Combining region and edge cues for image segmentation in a probabilistic Gaussian mixture framework", *IEEE Computer Vision and Pattern Recognition (CVPR)*, 2007.
161. Jacob Goldberger, Hayit Greenspan and Jeremie Dreyfuss, "An optimal reduced representation of a MoG with applications to medical image database classification", *IEEE Computer Vision and Pattern Recognition (CVPR)*, 2007.
162. Oren Freifeld, Hayit Greenspan and Jacob Goldberger, "Lesion detection in noisy MR brain images using constrained GMM and active contours", *IEEE International Symposium on Biomedical Imaging (ISBI)*, 2007.

163. Eran Sharon, Simon Litsyn and Jacob Goldberger, "Convergence analysis of serial message-passing schedules for LDPC decoding", *The International Symposium on Turbo Codes*, 2006.

164. Jacob Goldberger and Hagai Aronowitz, "A distance measure between GMMs based on the unscented transform and its application to speaker recognition", Eurospeech-Interspeech, 2005.

165. Amit Ruf, Hayit Greenspan and Jacob Goldberger, "Tissue classification of noisy MR brain images using constrained GMM", *International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI)*, 2005.

166. Eran Sharon, Simon Litsyn and Jacob Goldberger, "An efficient message-passing schedule for LDPC decoding", The IEEE convention of Electrical Engineering, 2004.

167. Jacob Goldberger, Sam Roweis, Geoff Hinton and Ruslan Salakhutdinov, "Neighbourhood component analysis", *Neural Information Processing Systems 18 (NIPS)*, 2004.

168. Jacob Goldberger and Sam Roweis, "Hierarchical clustering of a mixture model", *Neural Information Processing Systems 18 (NIPS)*, 2004.

169. Jacob Goldberger, Hayit Greenspan and Shiri Gordon, "An efficient similarity measure based on approximations of KL-divergence between two Gaussian mixtures", *International Conference on Computer Vision (ICCV)*, 2003.

170. Shiri Gordon, Jacob Goldberger and Hayit Greenspan, "Applying the information bottleneck principle to unsupervised clustering of discrete and continuous image representations",*International Conference on Computer Vision (ICCV)*, 2003.

171. Hayit Greenspan, Shiri Gordon and Jacob Goldberger, "Probabilistic models for generating, modeling and matching image categories", *International Conference on Pattern Recognition* (ICPR), 2002.

172. Hayit Greenspan, Jacob Goldberger and Arnaldo Mayer, "A probabilistic framework for spatio-temporal video representation and indexing", *European Conference on Computer Vision* (ECCV), 2002.

173. Jacob Goldberger, Hayit Greenspan and Shiri Gordon, "Unsupervised image clustering using the information bottleneck method", The Annual Pattern Recognition Conference DAGM, 2002.

174. Dennis Nilsson and Jacob Goldberger, "Sequentially finding the N-best list in hidden Markov models", *International Conference on Artificial Intelligence* (IJCAI), Seattle, 2001.

175. Jacob Goldberger, "Registration of multiple point sets using the EM algorithm", *International Conference on Computer Vision (ICCV)* , 1999.

176. Jacob Goldberger and David Burshtein, "Scaled random trajectory segmental models", *IEEE International Conference on Acoustic, Speech and Signal Processing* (ICASSP), 1998.

177. Jacob Goldberger, David Burshtein and Horacio Franco, "Segmental modeling using a continuous mixture of non-parametric models", EuroSpeech, 1997.

Patents (can be found in http://www.uspto.gov/patft/index.html)

1. Ran Bakalo, Rami Ben-Ari Jacob Goldberger, "Weakly and fully labeled mammogram classification and localization with a dual branch deep neural network", U.S. patent 10-789-462, 2020.
2. Hayit Greenspan, Jacob Goldberger, Uri Avni, Eli Konen and Michal Sharon, "Method and system of classifying medical images", U.S. patent 9-122-955, 2015.
3. Yacov Faitelson, Jacob Goldberger and Ohad Korkus, "Automatic management of storage access control", U.S. patent 7-606-801, 2005.
4. Gabriel Ilan and Jacob Goldberger, "Pattern recognition system", U.S. patent 6-195-638, 2001.
5. Tamir Shalom, Ilan Zelnik and Jacob Goldberger, "System and method for stitching a plurality of reconstructions of three-dimensional surface features of objects in a scene defined relative to respective coordinate systems to relate them to a common coordinate system", U.S. patent 6-201-541, 2001.
6. Gabriel Ilan and Jacob Goldberger, "Handwritten pattern recognizer with selective feature weighting", U.S. patent 6-023-529, 2000.
7. Gabriel Ilan and Jacob Goldberger, "Pattern recognition system", U.S. patent 5-809-465, 1998.

Grants

Mafaat, "Content based image retrieval", 200K NIS. Joint grant with Hayit Greenspan, TAU, 2006.

Ministry of Science Grant for Strategic Research directions (Mechkar Tashtiti), "Development of innovative computerized tools for brain MRI segmentation and image analysis in multiple sclerosis" Joint grant with Hayit Greenspan TAU and the MS unit of Tel-Hashomer, 97K$ per year, 2006-2008.

Compositionality in brain processes: toward a language-based model of analyzing drawing behavior in monkeys, Center for Complexity Science (CCS) jointly with Moshe Abeles and Susan Rothstein, 30K$ a year for three years. 2008-2010.

Object detection in satellite images, Mafaat (Israel Ministry of Defense), 00K NIS, 2008.

The FP6 European network of excellence Pattern Analysis, Statistical modeling and Computational Learning (PASCAL).

The FP7 program network of excellence Pattern Analysis, Statistical modeling and Computational Learning (PASCAL2).

ISF grant, Integrative learning of lexical inference knowledge, (joint with Ido Dagan), 2012-2015.

Intel Collaborative Research Institute for Computational Intelligence (ICRI-CI), 2016-2017.

MAFAAT (Israel Ministry of Defense), 2016-2017.

Starkey Hearing Technologies, 2017.

ISF Institution equipment awarded to buy GPU equipment, 924K NIS,, 2019.

Israel Ministry of Science, Developing deep learning techniques for automatic medical imaging analysis with applications to cancer detection and diagnosis, jointly with Hayit Greenspan (TAU), 1.3M NIS, 2020-2022.

Israel Ministry of Science, Combined neural interface and deep learning methods for multi-microphone assisted listening and selective attention devices, jointly with Sharon Gannot and Elana Zion Golumbic, 1.4M NIS, 2020-2022.

Short Term Visits

- Riken Institute, University of Tokyo, Sep 2019.
- Vector Institute, University of Toronto, June 2019.
- Vector Institute, University of Toronto, June 2018.
- University of Chicago, TTI institute, August, 2015.
- UC Berkeley, ICSI institute, August 2014.
- University of Chicago, TTI institute, September, 2013.
- University of Chicago, TTI institute, August, 2012.
- University of Toronto, September, 2010.
- University of Chicago, TTI institute, August, 2009.
- University College of London, September, 2008.
- Helsinki University of Technology, August, 2006.
- University of Toronto, August, 2005.
- INRIA Rhone-Alps, Grenoble, January-April, 2000.

Invited talks

- Vector Institute, Toronto, June 2018.
- IBM Labs, Tel-Aviv, January 2016.
- Citybank Labs, Tel-Aviv, February 2015.
- Intel Labs, Haifa, January 2015.
- UC Berkeley, ICSI institute, August 2014.
- General Motors Research, Israel, 2013.
- Google Research Tel-Aviv, 2012.
- Ecole de Physique des Houches, France, 2012.
- University of Chicago, TTI institute, 2012.
- Yahoo Research Lab, Haifa, 2011.

- The Open University, Israel, Computer Science seminar, 2009.
- Hebrew University, Machine learning seminar, 2009.
- Tel-Aviv University, Engineering Colloquium, 2009.
- University of Chicago, TTI institute, 2009.
- Ben-Gurion University, Electrical Engineering seminar, 2009.
- University College of London, Machine Learning seminar, 2008.
- Helsinki University of Technology, Machine Learning seminar, 2006.
- Weizmann Institute, Vision and Robotic seminar, 2006.
- Hebrew University, Machine learning seminar, 2006.
- Tel-Aviv University, Engineering Colloquium, 2005.
- University of Toronto, Machine Learning Group seminar, 2003.
- INRIA Grenoble, MOVI group seminar, 2000.
- Weizmann Institute, Vision and Robotic seminar, 1999.
- Tel-Aviv University, Engineering Colloquium, 1998.
- MIT, Computational learning seminar, 1998.
- SRI international, USA, speech group seminar, 1996.

Teaching Experience

- Deep Learning, Bar-Ilan University, 2014-2022.
- Introduction to machine learning Bar-Ilan University, 2014-2022.
- Statistical machine Learning, Bar-Ilan University, 2006-2022.
- Linear Systems, Bar-Ilan University, 2013.
- Random Signals and noise, Bar-Ilan University, 2005-2012.
- Image Processing, Bar-Ilan University, 2005-2016.
- Information Theory, The Weizmann Institute, 2002.
- Information Theory, Hebrew University, 2003.
- Information Theory, Bar-Ilan University, 2005-2009.
- Statistical machine Learning, The Weizmann Institute, 2003.