YOUSSEF MROUEH

MROUEH@US,REMOVEME.IBM.COM

RESEARCH SUMMARY

Youssef Mroueh's research lies in Deep Learning, Machine Learning, Computer Vision and Artificial Intelligence. He conducts modeling and algorithmic research in Multimodal Deep Learning, Generative Adversarial Networks, Optimal Transport, Unsupervised and Self-supervised Learning, Signal Processing and Learning Theory.

EDUCATION

2011.9 – 2015.2   Massachusetts Institute of Technology (MIT), Cambridge, MA, USA

Computer Science and Artificial Intelligence Lab.
Poggio Lab.
Laboratory for Computational and Statistical Learning.

- PhD Degree in Computer Science
- Supervisor: Prof. Tomaso Poggio
- Thesis title: From bits to information: Learning meets Compressive Sensing
- Thesis Committee: Prof. Lorenzo Rosasco, Prof. Bill Freeman, Prof. Piotr Indyk and Prof. Laurent Demanet

2009.9 – 2011.9   Ecole des Mine de Paris, Paris, France

- Master of Science and Engineering Diploma in Applied Mathematics, Robotics, Vision and Automatism

2006.9-2011.9   Ecole Polytechnique, Palaiseau, France,

- French Leading Engineering School
- Engineering Diploma in Applied Mathematics

EXPERIENCE

2015.6 – now   IBM T.J. Watson Research Center, Yorktown Heights, NY, USA
IBM Research
MIT-IBM Watson AI Lab
Research Staff Member

- Multimodal Group Technical Team leader and Principal Inverstigator in the MIT-IBM Watson AI lab
- Conducting research in deep multimodal learning for image and text based search, retrieval and captioning : Top ranking Captioning System on the

Microsoft COCO Server at time of submision

- Conducting research on Generative Adversarial Networks for learning structured data
- Conducting research in Optimal Transport for Unsupervised and Self-supervised Learning
- Conducting research on Mutual Information estimation and its use in dependency estimation and in unsupervised learning
- Conducting research on Large scale optimization for training of Generative adversarial Networks

2015.2 – now   Poggio Laboratory, Brain and Cognitive Sciences Department, MIT, Cambridge MA, USA

Research Affiliate

- Conducting research in collaboration with the Center for Brain Minds and Machines on Invariant Representations and Visual Attention Modeling

2014.5 – 2014.9   IBM T.J Watson Research Center
Multimodal Algorithms and Engines Group

Research Intern

- Mentors: Dr. Etienne Marcheret and Dr. Vaibhava Goel
- Proposed and implemented a new deep tensor neural network for Audio-Visual Speech Recognition

2013.7 – 2013.12   Non-Linear Systems Laboratory, MIT, Cambridge USA

Visiting Master Student

- Supervisor: Prof. Jean-Jacques Slotine
- Proposed and analyzed a new algorithm for multi-category classification

2013.1 – 2013.4   Centre de Mathématiques Appliquées, Ecole Polytechnique, Palaiseau, France

Research Intern

- Supervisor: Prof. Stephane Mallat
- Conducted research on Invariant Representations for Image Recognition Using Wavelets Transforms

AWARDS
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2006 – 2010   Eiffel Excellence Scholarship

2010 – 2015   Istituto Italiano di Tecnologia Fellowship

[1] Wei Zhang, Xiaodong Cui, Abdullah Kayi, Mingrui Liu, Ulrich Finkler, Brian Kingsbury, George Saon, Youssef Mroueh, Alper Buyuktosunoglu, Payel Das, David Kung, Michael Picheny. Improving Efficiency in Large-Scale Decentralized Distributed Training. **ICASSP 2020 (Oral)**

[2] David Alvarez-Melis, Youssef Mroueh and Tommi Jaakkola. Unsupervised Hierarchy Matching with Otimal Transport Over Hyperbolic Spaces. **AISTATS 2020.**

[3] Youssef Mroueh. Wasserstein Style Transfer. . **AISTATS 2020.**

[4] Mingrui Liu, Youssef Mroueh, Jerret Ross, Wei Zhang, Xiaodong Cui, Payel Das, Tianbao Yang. Towards Better Understanding of Adaptive Gradients Algorithms in Generative Adversarial Networks. **ICLR 2020**.

[5] Adam Block, Youssef Mroueh, Alexander Rakhlin. Generative Modeling with Denoising Auto-encoders and Langevin Sampling . **Submitted COLT 2020.**

[6] Thanh V Nguyen Youssef Mroueh Samuel Hoffman Payel Das Pierre Dognin Guieseppe Romano Chimnay Hegde. Multi-objective Black-Box Optimization with Surrogate Langevin Sampling. **Submitted ICML 2020.**

[7] Youssef Mroueh Igor Melnyk Pierre Dognin Jerret Ross and Tom Sercu. Improved Mutual Information Estimation. **Submitted ICML 2020.**

[8] Youssef Mroueh Mattia Rigotti. Unbalanced Sobolev Descent. **Submitted ICML 2020.**

[9] Mingrui Liu, Youssef Mroueh, Wei Zhang, Xiaodong Cui, Jerret Ross, Tianbao Yang , Payel Das. Decentralized Parallel Algorithm for Training Generative Adversarial Nets. **NeurIPS Smooth Games Optimization and machine Learning Worshop, Vancouver, BC, December 2019. Submitted ICML 2020.**

[10] Youssef Mroueh, Tom Sercu, Mattia Rigotti, Inkit Padhi, Cicero Dos Santos. Sobolev Independence Criterion**. NeurIPS 2019.**

[11] Youssef Mroueh, Tom Sercu and Anant Raj. Sobolev Descent. **AISTATS 2019 (Oral).**

[12] Pierre Dognin*, Igor Melnyk*, Youssef Mroueh*, Jerret Ross*, Tom Sercu*. Adversarial Semantic Alignement for Improved Image Captions. (* alphabetical order, Equal Contributions) **CVPR (2019).**

[13] Pierre Dognin*, Igor Melnyk*, Youssef Mroueh*, Jerret Ross*, Cicero Dos Santos*, Tom Sercu*. Wasserstein Barycenter Model Ensembling. **ICLR (2019).**

[14] Chun-Liang Li, Wei- Chen Chang, Youssef Mroueh, Yiming Yang, Baranabas Poczos. Implicit Kernel Learning. **AISTATS (2019).**

[15]Cicero Dos Santos*,Youssef Mroueh*, Inkit Padhi*, Pierre Dognin*. Learning Implicit Generative Models by Matching Perceptual Features. **Submitted (2019)**

[16]Cicero Dos Santos, Inkit Padhi, Pierre Dognin, Vijil Chenthamarakshan, Youssef Mroueh . Training Implicit Text Generators From Scrath with Feature Matching Networks. **Submitted (2019)**

[17] Youssef Mroueh Chun-Liang Li Tom Sercu Anant Raj and Yu Cheng. Sobolev GAN. **ICLR (2018).**

[18] Tom Sercu, Youssef Mroueh. Semi-Supervised Learning with IPM Based GANs : An Empirical Study. **NeurIPS workshop (2017)**

[19] Youssef Mroueh and Tom Sercu. Fisher GAN. **NeurIPS (2017)**

[20] Youssef Mroueh, Tom Sercu and Vaibhava Goel. McGan: Mean and Covariance Feature Matching GAN**. ICML (2017)**

[21] Youssef Mroueh, Etienne Marcheret and Vaibhava Goel. Co-Occurring Directions Sketching for Approximate Matrix Multiply. **AISTATS (2017) Oral**

[22] Steven J Rennie, Etienne Marcheret, Youssef Mroueh, Jarret Ross and Vaibhava Goel. Self-critical Sequence Training for Image Captioning. **CVPR (2017) Oral**

[23] Anant Raj, Abhikesh Kumar, Youssef Mroueh, Tom Fletcher and Bernhard Schoelkopf. Local Group Invariant Representations Via Orbits Embeddings **AISTATS (2017)**

[24]Gerasimos Potamianos, Etienne Marcheret, Youssef Mroueh, VaibhavaGoel, Alexander Koumbaroulis, Argyrios Vartholomaios, and Spyridon Thermos. Audio and Visual Modality Combination in Speech Processing Applications. **Book Chapter,** Handbook of Multi-Modal Multi-Sensor Interfaces, Morgan & Claypool Publishers **(2016)**

[25] Youssef Mroueh, Etienne Marcheret, and Vaibhava Goel. Asymmetric Regularized CCA and Hierarchical Kernel Sentence Embedding for Image and Text Retrieval. **Arxiv (2016)**

[26] Youssef Mroueh, Etienne Marcheret and Vaibhava Goel. Deep Multimodal Learning For Audio-Visual Speech Recognition. IEEE International Conference On Acoustics Speech and Signal Processing **ICASSP(2015)**

[27] Youssef Mroueh, Stephen Voinea, and Tomaso Poggio. Learning with Group Invariant Features a Kernel Perspective. Neural Information Processing Systems **NeurIPS (2015)**

[28] Carlo Cilliberto, Youssef Mroueh, Tomaso Poggio and Lorenzo Rosasco. Convex Learning of Multiple Tasks and their Structure. International Conference of Machine Learning **ICML (2015) Oral**

[29] Youssef Mroueh. Robust Phase Retrieval and Super-Resolution from One Bit Coded Diffraction Patterns. **Arxiv (2014)**

[30] Youssef Mroueh and Lorenzo Rosasco. On Efficiency and Low Sample Complexity in Phase Retrieval. IEEE International Symposium on Information Theory **ISIT (2014) Oral**

[31] Qian Liao, Joel Z Leibo, Youssef Mroueh and Tomaso Poggio. Can a Biologically Plausible Hierarchy Effectively Replace Face Detection, Alignment, and Recognition pipelines? CBMM **Memo, MIT, (2013)**

[32] Youssef Mroueh and Lorenzo Rosasco. Q-ary Compressive Sensing. Sampling Theory and Applications Sampta **(2013) Oral**

[33] Youssef Mroueh and Lorenzo Rosasco. Quantization and Greed are Good: Oe Bit Phase Retrieval, Robustness and Greedy Refinements. **Arxiv (2013)**

[34] Youssef Mroueh, Tomaso Poggio, Lorenzo Rosasco, and Jean Jacques Slotine. Multiclass Learning with Simplex Coding. Advances in Neural Information Processing **NeurIPS (2012)**

[35] Youssef Mroueh, Lorenzo Rosasco, and Tomaso Poggio. Multi-category and Taxonomy learning: A Regularization Approach. **NIPS Workshop** on Challenges in Learning Hierarchical Models: Transfer Learning and Optimization **(2011)**

[36] Youssef Mroueh, Tomaso Poggio and Lorenzo Rosasco. Regularization predicts while Discovering Taxonomy. MIT CSAIL **Technical Report** (2011)

SERVICES

2012 –	Reviewer, Neural Information Processing Systems (NeurIPS)
2014 –	Reviewer, International Conference of Machine Learning (ICML)
2015 –	Reviewer, International Conference on Learning Representations (ICLR)
2015 –	Reviewer, International Conference On Acoustics Speech and Signal Processing (ICASSP)
2018	Reviewer AAAI Conference on Artificial Intelligence Co-organized ICML 2018 workshop on learning from limited labels

INVITED TALKS

2012.07	Multi-class Learning: Theory and Algorithms, Italian Institute of Technology Italy
2013.06	Q-ary Compressive Sensing, Laboratory for Information and Decisions Systems, MIT, USA

2013.07	One Bit Phase Retrieval, University of Genova, Italy
2016.06	Bridging the Semantic Gap: Image Captioning with Visual Attention. Deep Learning Workshop, MIT, USA, 2016
2018.06	Sobolev Descent. UCL London, Gatsby unit.
2019.04	Sobolev Descent. Okinawa Japan

TEACHING EXPERIENCE

2014	Teaching Assistant 6.003, MIT with Professors Russ Tedrake and Pablo Parillo: Signals and Systems, undergraduate class on signal processing and control theory

SKILLS

Languages	French, Arabic, Native. English, Fluent. Spanish, Intermediate
Applications	Torch, MATLAB, PyTorch