

MICHELE MERLER

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IBM TJ Watson Research Center
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EDUCATION

- 2013 : **Ph.D. degree in Computer Science**
Columbia University, New York
Advisor: Professor John Kender
- 2008 : **M.S. degree in Computer Science**
Columbia University, New York
- 2007 : **M.Eng. degree in Telecommunications Engineering (Summa cum Laude)**
University of Trento, Italy
- 2004 : **B.Eng. degree in Telecommunications Engineering (Summa cum Laude)**
University of Trento, Italy

PROFESSIONAL EXPERIENCE

- May 2012 - present : **IBM T.J. Watson Research Center**
Senior Research Scientist, IBM Research
Worked on: large language models for code, knowledge distillation of language models, entity standardization for application modernization, neural architecture search for vision and language models, automatic extraction of highlights from sporting events based on multimodal excitement features, topic modelling and visualization using transformers, deep learning based facial attributes estimation, fine grained image food recognition, attributes estimation from social media profiles by analysis of multimodal content, medical image modality recognition, events recognition in large scale video collections based on semantic model vectors
- September 2007- May 2012 : **Columbia University, New York**
Graduate research assistant, High Level Vision Lab
Advisor: Professor John Kender
Analysis, indexing and enhancement of unstructured videos of presentations based on textual, graphical and facial cues
- Summers 2008, 2009, 2010 : **IBM T.J. Watson Research Center**
Intern, Multimedia and Vision Research Group
Manager: Apostol Natsev, Mentors: Rong Yan, Gang Hua, Lexing Xie
Developed methods for complex video event detection and recognition, imbalanced boosting for combining ranking features on large scale databases, local feature-based representations for general and face recognition in multimedia collections
- Summer 2006 : **California Institute for Telecommunications and Information Technology**
Intern, University of California San Diego branch
Advisor: Professor Serge Belongie

Developed a multimedia database of groceries in the frame-work of the GroZi project. Performance evaluation of state of the art object detection and recognition algorithms on such dataset

Summer 2004 : **Create-Net International Research Center**

Researcher, Trento, Italy branch

Advisor: Professor Francesco De Natale

Developed human detection, visual tracking and user-computer interaction algorithms for real time applications

RESEARCH INTERESTS

Broad Interests: Multimedia Indexing and Retrieval, Computer Vision, NLP, Machine Learning (deep and shallow), LLM

Specific Interests: CodeLLM, entity standardization, neural architecture search, video highlights extraction, deep learning for image and video classification, edge AI, topic modeling, facial attributes estimation, use of semantic representations for large scale image/video retrieval, bias estimation and mitigation in visual classification

Programming Languages/Libraries: Python, C/C++, OpenCV, PyTorch

HONORS AND SCHOLARSHIPS

Technology & Engineering Emmy Award (AI-ML curation of Sports Highlights) (2023)

IBM Outstanding Technical Achievement (Konveyor Open-Source Community) (2023)

Outstanding Reviewer at CVPR (2021)

IBM Corporate Award (AI Video Enrichment and Editing) (2019)

IBM Research Division Award (Watson Visual Recognition Services Contributions) (2018)

Best Digital Development, Yahoo Sports Tech Awards (Wimbledon Cognitive Highlights) (2018)

Best Reviewer Award at ICMR (2015)

IBM Research Division Award (Multimedia Semantic Modeling) (2013)

First Place in ImageCLEF Medical Image Modality Classification (2012 and 2013)

IBM Outstanding Technical Accomplishment (Multimedia group) (2012)

Yahoo! Key Scientific Challenge Award (2009)

VideOlympics "People's Choice Award" (group) for IMARS Multimedia Retrieval System, ACM CIVR (2008)

California Institute of Information and Telecommunications Technology Summer Undergraduate Research Scholarship (2006)

University of Trento International Cooperation and Mobility Program: University of California Scholarship (2005-2006)

ACADEMIC TEACHING EXPERIENCE

Fall 2010 and : **Columbia University Department of Computer Science**

Spring 2011 COMS 1003 - Introduction to Computer Science and Programming in C Full Course (3 credits)

<http://www1.cs.columbia.edu/~mmerler/coms1003-1.html>

Fall 2009 and : **Columbia University Department of Computer Science**
Spring 2010 COMS 3101 - Programming Languages (Matlab)
Short Course (1 credit)
<http://www1.cs.columbia.edu/~mmerler/comsw3101-2.html>

PUBLICATIONS

1. Rangeet Pan, Ali Reza Ibrahimzada, Rahul Krishna, Divya Sankar, Lambert Pouguem Wassi, **Michele Merler**, Boris Sobolev, Raju Pavuluri, Saurabh Sinha, Reyhaneh Jabbarvand. "Understanding the Effectiveness of Large Language Models in Code Translation", *arXiv preprint arXiv: 2308.03109*, 2023
2. Masayasu Muraoka, Bishwaranjan Bhattacharjee, **Michele Merler**, Graeme Blackwood, Yulong Li, Yang Zhao. "Cross-Lingual Transfer of Large Language Model by Visually-Derived Supervision Toward Low-Resource Languages", in *ACM Multimedia*, 2023
3. Takuma Udagawa, Aashka Trivedi, **Michele Merler**, Bishwaranjan Bhattacharjee. "A Comparative Analysis of Task-Agnostic Distillation Methods for Compressing Transformer Language Models", *EMNLP*, 2023
4. Jiaqing Yuan, **Michele Merler**, Mihir Choudhury, Raju Pavuluri, Munindar P. Singh, Maja Vukovic. "CoSiNES: Contrastive Siamese Network for Entity Standardization". *Matching Workshop at ACL*, 2023
5. Aashka Trivedi, Takuma Udagawa, **Michele Merler**, Rameswar Panda, Yousef El-Kurdi, Bishwaranjan Bhattacharjee. "Neural Architecture Search for Effective Teacher-Student Knowledge Transfer in Language Models", *arXiv preprint arXiv: 2303.09639*, 2023
6. Rameswar Panda, **Michele Merler**, Mayoore Jaiswal, Hui Wu, Kandan Ramakrishnan, Ulrich Finkler, Chun-Fu Chen, Minsik Cho, David Kung, Rogerio Feris, Bishwaranjan Bhattacharjee. "NASTransfer: Analyzing Architecture Transferability in Large Scale Neural Architecture Search", *35th AAAI Conference on Artificial Intelligence (AAAI)*, 2021
7. Ulrich Finkler, **Michele Merler**, Rameswar Panda, Mayoore S Jaiswal, Hui Wu, Kandan Ramakrishnan, Chun-Fu Chen, Minsik Cho, David Kung, Rogerio Feris, Bishwaranjan Bhattacharjee. "Large Scale Neural Architecture Search with Polyharmonic Splines", *AAAI Workshop on Meta-Learning for Computer Vision (MeL4CV)*, 2021
8. **Michele Merler**, Cicero N Santos, Mauro Martino, Alfio M Gliozzo, John R Smith. "Covering the news with (AI) Style", *arXiv preprint arXiv:2002.02369*, 2020
9. **Michele Merler**, Nalini Ratha, Rogerio S Feris, John R Smith. "Diversity in Faces", *arXiv preprint arXiv:1901.10436*, 2019
10. **Michele Merler**, Dhiraj Joshi, Quoc-Bao Nguyen, Stephen Hammer, John Kent, Jinjun Xiong, Minh N. Do, John R Smith, Rogerio S Feris. "Automatic Curation of Sport Highlights using Multimodal Excitement Features", *IEEE Transactions on Multimedia*, 2018
11. **Michele Merler**, Dhiraj Joshi, Quoc-Bao Nguyen, Stephen Hammer, John Kent, John R Smith, Rogerio S Feris. "Automatic Curation of Golf Highlights using Multimodal Excitement Features", *3rd Workshop on Computer Vision in Sports @CVPR*, 2017
12. Dhiraj Joshi, **Michele Merler**, Quoc-Bao Nguyen, Stephen Hammer, John Kent, John R Smith, Rogerio S Feris, "IBM High-Five: Highlights From Intelligent Video Engine". *ACM Multimedia*, 2017

13. Xiaolong Wang, Guodong Guo, **Michele Merler**, Noel CF Codella, MV Rohith, John R Smith, Chandra Kambhamettu, "Leveraging multiple cues for recognizing family photos", *Journal of Image and Vision Computing*, 2017
14. **Michele Merler**, Hui Wu, Rosario Uceda-Sosa, Quoc-Bao Nguyen, John R Smith, "Snap, Eat, RepEat: a food recognition engine for dietary logging", *2nd International Workshop on Multimedia Assisted Dietary Management @ACM Multimedia*, 2016
15. Hui Wu, **Michele Merler**, Rosario Uceda-Sosa, John R Smith, "Learning to make better mistakes: Semantics-aware visual food recognition", *ACM Multimedia*, 2016
16. Quan Zou, Wei Liu, **Michele Merler**, Rongrong Ji, "Advanced learning for large-scale heterogeneous computing", *Neurocomputing Journal*, Issue 217, 2016
17. **Michele Merler**, Liangliang Cao, John R Smith, "You are what you tweet... pic! gender prediction based on semantic analysis of social media images", *IEEE International on Conference on Multimedia and Expo (ICME)*, 2015
18. Junjie Cai, **Michele Merler**, Sharath Pankanti, Qi Tian, "Heterogeneous semantic level features fusion for action recognition", *IEEE International on Conference on Multimedia Retrieval (ICMR)*, 2015
19. Mani Abedini, Noel CF Codella, Jonathan H Connell, Rahil Garnavi, **Michele Merler**, Sharath Pankanti, John R Smith, Tanveer Syeda-Mahmood, "A generalized framework for medical image classification and recognition", *IBM J. of Research and Development*, 2015
20. John R Smith, Liangliang Cao, Noel CF Codella, Matthew L Hill, **Michele Merler**, Q-B Nguyen, E Pring, Rosario A Uceda-Sosa, "Massive-scale learning of image and video semantic concepts", *IBM Journal of Research and Development*, Volume 59, Issue 2/3, 2015
21. Felix X Yu, Liangliang Cao, **Michele Merler**, Noel Codella, Tao Chen, John R Smith, Shih-Fu Chang. "Modeling attributes from category-attribute proportions", *ACM Multimedia*, 2014
22. Noel Codella, Jonathan Connell, Sharath Pankanti, **Michele Merler**, John R Smith, "Automated medical image modality recognition by fusion of visual and text information", *International Conference on Medical Image Computing and Computer-Assisted Intervention(MICCAI)*, 2014
23. Noel Codella, Gang Hua, Liangliang Cao, **Michele Merler**, Leiguang Gong, Matt Hill, John R Smith, "Large-scale video event classification using dynamic temporal pyramid matching of visual semantics", *International Conference on Image Processing (ICIP)*, 2013
24. Mani Abedini, Liangliang Cao, Noel Codella, Jonathan H Connell, Rahil Garnavi, Amir Geva, **Michele Merler**, Quoc-Bao Nguyen, Sharathchandra U Pankanti, John R Smith, Xingzhi Sun, Asaf Tzadok, "IBM research at ImageCLEF 2013 medical tasks", *American Medical Informatics Association (AMIA) ImageCLEF, Medical Image Retrieval Workshop*, 2013. Ranked #1 in Medical Image Modality Classification Task
25. Lisa Brown, Liangliang Cao, Shih-Fu Chang, Yu Cheng, Alok Choudhary, Noel Codella, Courtenay Cotton, Dan Ellis, Quanfu Fan, Rogerio Feris, Leiguang Gong, Matthew Hill, Gang Hua, John Kender, **Michele Merler**, Yadong Mu, Sharath Pankanti, John R Smith, FX Yu, "Ibm research and columbia university trecvid-2013 multimedia event detection (med), multimedia event recounting (mer), surveillance event detection (sed), and semantic indexing (sin) systems", *NIST TRECVID Workshop*, 2013

26. **Michele Merler**, Bert Huang, Lexing Xie, Gang Hua, and Apostol Natsev, “Semantic Model Vectors for Complex Video Event Recognition”, *IEEE Transactions on Multimedia, Special issue on Object and Event Classification in Large-Scale Video Collections*, 2012
27. F. Yu., L Cao, SF Chang, N Codella, C Cotton, D Ellis, L Gong, M Hill, G Hua, J Kender, **M Merler**, Y Mu, J Smith, “IBM Research and Columbia University TRECVID-2012 Multimedia Event Detection (MED), Multimedia Event Recounting (MER), and Semantic Indexing (SIN) Systems”, *NIST TRECVID Workshop*, 2012
28. Liangliang Cao, Yuan-Chi Chang, Noel Codella, **Michele Merler**, Quoc-Bao Nguyen, John R Smith, “Multimedia Analytics: Modality Classification and Case-Based Retrieval tasks of ImageCLEF2012”, *ImageCLEF, Medical Image Retrieval Workshop*, 2012. Ranked #1 in Medical Image Modality Classification Task
29. **Michele Merler** and John Kender, “Selecting the Best Faces to Index Presentation Videos”, *ACM Multimedia*, 2011
30. **Michele Merler**, “Analysis, indexing and visualization of presentation videos”, *ACM Multimedia*, 2011
31. Matthew Hill, Gang Hua, Apostol Natsev, John R. Smith, Lexing Xie, Bert Huang, **Michele Merler**, Hua Ouyang and Mingyuan Zhou, “IBM Research TRECVID-2010 Video Copy Detection and Multimedia Event Detection System”, *NIST TRECVID Workshop*, 2010.
32. Apostol Natsev, Matthew Hill, John R. Smith, Lexing Xie, Rong Yan, Shenghua Bao, Dong Wang, **Michele Merler** and Yi Zhang, “IBM research TRECVID-2009 video retrieval system”, *NIST TRECVID Workshop*, 2009.
33. **Michele Merler** and John Kender, “Semantic Keyword Extraction via Adaptive Text Binarization of Unstructured Unsourced Video”, *IEEE Conf. on Image Processing (ICIP)*, 2009
34. Rong Yan, Marc-Olivier Fleury, **Michele Merler**, Apostol Natsev and John R. Smith, “Large-Scale Multimedia Semantic Concept Modeling using Robust Subspace Bagging and Map-Reduce”, *ACM Multimedia Workshop LS-MMRM*, 2009
35. **Michele Merler**, Rong Yan and John R. Smith, “Imbalanced RankBoost for Efficiently Ranking Large-Scale Image/Video Collections”, *IEEE Conference Computer Vision and Pattern Recognition (CVPR)* 2009.
36. Jane Chang, **Michele Merler**, Paul Natsev, John R Smith, “IBM Content Based Copy Detection System for TRECVID 2009”. *NIST TRECVID Workshop*, 2009. Ranked #1 on Content Based Copy Detection Task
37. Apostol Natsev, Wei Jiang, **Michele Merler**, John Smith, Jelena Tesic, Lexing Xie, Rong Yan, “IBM research TRECVID-2008 video retrieval system”, *NIST TRECVID Workshop*, 2008.
38. **Michele Merler**, Carolina Galleguillos and Serge Belongie, “Recognizing Groceries *in situ* Using *in vitro* Training Data”, *SLAM Workshop @CVPR*, 2007

PATENTS AND APPLICATIONS

1. *US Patent App 17/748,263* Transparent and controllable topic modeling, 2023
2. *US Patent App 17/670,617* Neural architecture search of language models using knowledge distillation, 2022
3. *US Patent App 17/075,963* Configuring a neural network using smoothing splines, 2022
4. *US Patent 11,170,270* Automatic generation of content using multimedia, 2021
5. *US Patent 10,595,101* Auto-curation and personalization of sports highlights, 2020

6. *US Patent 10,282,677* Individual and user group attributes discovery and comparison from social media visual content, 2019
7. *US Patent 9,928,448* Image classification utilizing semantic relationships in a classification hierarchy, 2018
8. *US Patent 9,684,852* Systems and methods for inferring gender by fusion of multimodal content, 2017
9. *US Patent 9,177,229* Kalman filter approach to augment object tracking, 2015

PROFESSIONAL ACTIVITY

Associate Editor

IEEE Transactions on Multimedia 2021-2023

Area Chair

ICIAP 2019, Brave New Ideas

ACM Multimedia 2017, Multimedia Search and Recommendation

ACM Multimedia 2016, Multimedia Search and Recommendation

Program Chair

International Workshop on Computer Vision in Sports (CVsports) @CVPR 2020-23

Workshop on Fair, Data Efficient and Trusted Computer Vision (FA.DE.TR.CV) @CVPR 2020-23

Second International Workshop on Bias Estimation in Face Analytics (BEFA) @CVPR 2019

First International Workshop on Bias Estimation in Face Analytics (BEFA) @ECCV 2018

Demo Chair

International Conference on MultiMedia Modeling (MMM) 2019

Award Committee Member

Best Paper Award Committee, ACM Multimedia 2017

Grant Reviewing Panelist at National Science Foundation (NSF), IIS Division 2015

Registration Chair

VCIP 2017

Local Organization Chair and Web Chair

ICMR 2016

Guest Editor

Neurocomputing Journal, Special Issue on Advanced Learning for Large-Scale Heterogeneous Computing, 2016

Co-organizer

Greater New York Area Multimedia and Vision Meeting, 2012 -2014

Technical Program Committee Member and Reviewer

Served since 2008 for major conferences and journals in computer vision/multimedia

Conferences: CVPR, ECCV, ICCV, ACM Multimedia, NeurIPS, AAAI, ICML, ICMR, FG, ICPR, ICME

Journals: IEEE Transactions on Multimedia, IEEE Transactions on Pattern Analysis and Machine Intelligence, IEEE Transactions on Image Processing, Computer Vision and Image Understanding, ACM Transactions on Multimedia Computing, IEEE Transactions on Circuits and Systems for Video Technology, IPSJ Transactions on Computer Vision and Applications, Journal of Visual Communication and Image Representation, Neurocomputing, Journal of Biomedical and Health Informatics

Professional Societies Membership

Member of the IEEE, the IEEE Circuits and Systems Society, the New York Academy of Sciences

MENTORSHIP (INTERNS)

Jiaqing Yuan (Phd Student, NCSU). Project: contrastive learning on siamese network for entity standardization, 2022

Aashka Trivedi (MS Student, NYU). Project: NAS-guided language model distillation, 2021

Paul Pritz (PhD Student, Imperial College London). Project: zero-shot learning for IoT device classification from network traffic data, 2021

Xialong Wang (PhD Student, University of Delaware). Project: face analysis in consumer photos, 2015

Junjie Cai (PhD Student, University of Texas at San Antonio). Project: heterogeneous features fusion for action recognition in videos, 2014

THESIS COMMITTEE

Adrià Arbués Sangüesa (Universitat Pompeu Fabra, Barcelona) 2021

Chun-Yu (Claire) Tsai (Columbia University), 2017

LANGUAGES

Italian (native), English (fluent), Spanish (intermediate)

OTHER INTERESTS

Soccer, AI Art, Graphic Novels, Philosophy, Light Painting