PHILIPPE BURLINA

resvirtualis.github.io
https://malonecenter.jhu.edu/people/philippe-burlina/

Principal Scientist, Johns Hopkins University / Applied Physics Lab (APL) / Intelligent Systems Center
Associate Research Professor, Johns Hopkins / University Dept. of Computer Science
Faculty: Johns Hopkins University / Malone Center for Engineering in Healthcare

SUMMARY

I am a technical lead for R&D teams and I design deep learning algorithms that are impactful for AI problems in **computer vision, healthcare and autonomy**. My work principally addresses machine vision problems regarding robustness, fairness, low-shot learning, anomaly detection, adversarial attacks, generative modeling, distributional shift, and privacy. I have experience with growing software development teams from the ground up to mature levels (25+ developers/testers/documenters) in start-up or large company environments and establishing software development/testing processes for enterprise/production platform development. I also teach, mentor at all levels (from undergraduates to PhD), and publish bit.ly/burl_papers.

WORK STATUS: U.S. Citizen

WORK EXPERIENCE

- 2012-now: **Principal Scientist, JHU/APL Intelligent Systems Center (ISC)**, Laurel, MD. My principal affiliation at JHU is with APL/ISC where I lead engineering teams and projects focused on robustness of computer vision algorithms, with emphasis on challenges related to insufficient training data (zero-shot and low shot learning, anomaly detection); robustness of machine vision algorithms to distributional shift and unbalanced data; issues of unequal performance and fairness in computer vision with respect to protected factors such as age, sex, race or environmental conditions; vulnerability of vision algorithms to adversarial machine learning; auditing/addressing privacy issues in computer vision; all these problems with applications in face analysis, healthcare and autonomy. I also work on the development of novel generative models able to synthesize high fidelity / realistic images to help with training or testing data augmentation; and new generative models that allow for control of semantic attributes (e.g. face age or markers for disease) while also tackling disentanglement.
- 2012-now: **Associate Professor** (research), **JHU Dept. of Computer Science,** Baltimore, MD.
- 2018-now: **Faculty**, **JHU Malone Center for Engineering in Healthcare,** Baltimore, MD.
- 2004-2012: **Section supervisor**, **JHU/APL.** Laurel, MD. Line manager at section and group levels (i.e. leading teams ranging from 10 to 20 ICs including PhDs, MS and BS). Technical lead for projects addressing machine learning / machine vision in various domains.
- 2006-2011: **Assistant Professor (research)**, **JHU Dept. of Computer Science,** Baltimore, MD.
- 2002-2004: **Director**, **Enterprise Software Development. FileNet (purchased by IBM),** Costa Mesa, CA. Line and technical lead for a team of 25+ software developers, testers and documenters, developing enterprise platforms for content management (ECM), e-process/workflow management, authentication, authorization, and deployment engines, powering portals on corporate sites and online news sites used by large US, European and Asian customers including Vodafone (UK, Italy, Netherlands), Vivendi, Sigma Aldrich, etc. Led architecture design and software development. Closely worked with reports (development, documentation and testing managers) to lead people and platform development; work

with customers, product management, and marketing to define product roadmap; establish software development lifecycle processes, testing procedures including unit/longevity/stress testing, etc.

- 2000-2002: **Vice-President of Engineering**. **eGrail**, Bethesda, MD. Technical lead and line manager for a 25+ person team of software engineers developing an enterprise content management platform implemented in Linux/Apache/mySQL/PHP then reimplemented in Java EE. Built team from the ground up (growing from 3 to 25+ developers). Company was sold to FileNet and then IBM.
- 1997-2000: **R&D technical lead**: **ImageCorp**, Inc., College Park, MD. Tech lead and co-founder. Led design and development of machine vision and machine learning solutions for government and industry, including vehicular autonomy applications. Company was sold to SAIC.

EDUCATION

- **Ph.D., Electrical Engineering, University of Maryland at College Park, Computer Vision Lab.** Ph.D. Dissertation on computer vision algorithms focused on autonomous vehicle navigation and autonomy. (Advisor: Prof. Rama Chellappa)
- **M.S.**, **Electrical Engineering, University of Maryland at College Park**, Communications and Control.
- **B.S. (Diplome d'Ingenieur), Computer Science, Université de Technology de Compiegne**, France (including one year as exchange at University of Pennsylvania, Moore School of Engineering).

DOMAIN KNOWLEDGE, CODING, LANGUAGES, OTHER

- **Deep Learning, machine vision frameworks:** PyTorch, Keras, Python, ML/data science packages, OpenCV, etc.
- **Domain knowledge:** Machine learning, machine vision, AI Assurance, AI robustness, generative models, adversarial AI, AI privacy and fairness, deep learning, machine perception, image/video analysis, autonomous vehicle navigation, machine intelligence, biomedical imaging, signal / image processing, enterprise software development, content and record management, e-process/workflow management, authentication, authorization, deployment engines.
- **Software Languages/scripts/frameworks**: Currently Python; previously: C/C++, Matlab, PHP, Java, Mathematica.
- **Software development lifecycle (SDLC):** agile, extreme programming.
- **Web Frameworks:** LAMP: Linux, Apache, MySQL, PHP; Java EE.
- **DBMS**: RDBMSs, MySQL, MS SQL, Oracle, and other

PUBLICATIONS

List: bit.ly/burl_papers

Selected/Representative/Recent publications:

(Generative models with control and disentanglement for computer vision) Unsupervised Discovery, Control, and Disentanglement of Semantic Attributes With Applications to Anomaly Detection, Paul, Wang, Alajaji, and Burlina. Neural Computation, 2021.
(Anomaly detection in machine vision) Where's Wally Now? Deep Generative and Discriminative Embeddings for Novelty Detection, Burlina, Joshi, Wang, CVPR 2019
(AI bias mitigation in computer vision) TARA: Training and Representation Alteration for AI Fairness and Domain Generalization, Paul, Hadzic, Joshi, Alajaji, Burlina, Neural computation, 2022.

(Visual tracking) Efficient particle filtering via sparse kernel density estimation, Banerjee and Burlina, IEEE Trans. IP, 2010.
(DRL) Leveraging Deep Reinforcement Learning for Reaching Robotic Tasks, Katyal, Wang, Burlina, CVPR Workshop, 2017.
(Pose estimation in multi-camera setups) Distributed consensus on camera pose, Jorstad, DeMenthon, Wang, Burlina, IEEE Trans. IP, 2010.
(Defending against privacy leakage in computer vision system) Defending Medical Image Diagnostics against Privacy Attacks using Generative Methods, Paul, Cao, Zhang. Burlina, MICCAI workshop 2021.
(Auditing and attacking privacy information in computer vision systems) Practical Blind Membership Inference Attack via Differential Comparisons, Hi, Yang, Huan, Burlina, Gong, Cao, NDSS 2021.
(Practical adversarial attacks on machine vision classifiers) Jacks of All Trades, Masters of None: Addressing Distributional Shift and Obtrusiveness via Transparent Patch Attacks, N Fendley, M Lennon, IJ Wang, P Burlina, N Drenkow, ECCV 2020 workshop.
(Low shot learning) Low-shot deep learning of diabetic retinopathy Burlina Paul Mathew Pacheco Bressler, JAMA Ophthalmology 2020.

PATENTS

All: https://scholar.google.com/scholar?hl=en&as_sdt=0%2C21&q=philippe+burlina+patent&btnG=

Selected list:
Object recognition and presentation for the visually impaired (US10,646,966); Systems and methods for remote tagging and tracking of objects using hyperspectral video sensors (US8295548); Hyperspectral imaging for detection of skin related conditions (US Patent 8,761,476, 2014); System and method for automated detection of age-related macular degeneration and other retinal abnormalities (US8896682); Automated pneumothorax detection (US Patent 8,914,097, 2014); Patient-Specific Segmentation, Analysis, and Modeling from 3-Dimensional Ultrasound Image Data (Patent App. 13/609,476, 2012). System and method of managing web content (US20040216084); Systems and methods for determining eye glances (US20020176604); Content manager integration (US20040225730);

INVITED TALKS, PROFESSIONAL SOCIETIES, SERVICE, ORGANIZATION

Invited and Keynote presentations: 2021 U Maryland, 2021 U Louisiana, 2020 Stanford CCOI, 2018 DRCR, 2018 APTOS, U. Kyoto (2018) and U. Nagoya (2018).
Workshop organization: Co-Organizer 2022 ECCV workshop on AML; Co-organizer: 2022 MICCAI workshop on trusted AI. Co-Organizer 2021 ICCV workshop on AML; Chair: 2018 AIRIA Workshop on Artificial Intelligence applied to Retinal and Medical Image Analysis, held under the Asian Conference on Computer Vision (ACCV), Perth, Australia.
Technical reviewer: for various machine vision and machine learning technical journals and conferences including IEEE T. PAMI, IEEE T. MIA, IEEE T. IP, IEEE T. GRS, NeurIPS, MICCAI, ISBI, CVPR, ICCV; NIH Biomedical Imaging Technology Study Section member.
Societies: IEEE Senior Member.

TEACHING

- 2017-present: teaching graduate level class on deep learning and computer vision.
- 2013-2016: taught class on computer vision.

FOREIGN LANGUAGES

Fluent in French and Italian, decent Spanish, and rusty German.

OTHER

Vintage Japanese guitars enthusiast.