Nahil Sobh

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MOST RECENT EXPERIENCE

Beckman Institute for Advanced Science and Technology
Urbana, IL - *Deep Learning Academic Hourly Support*

December 2019 – present

- I worked closely with Professor Gabi Popescu's lab consisting of post docs, graduate and undergraduate students to plan, develop, implement, and deploy deep leaning and analytics software tools and assist in writing of papers and proposals. Together with Professor Popescu and two of his graduate students we filed a patent on a deep learning algorithm and published over five papers at conferences and journals.

Recent Publications

- Zhang J., He Y., Sobh N., Popescu G. Label-free colorectal cancer screening using deep learning and spatial light interference microscopy (SLIM). APL Photonics 5, 040805 (2020).
- Lee CH, Khan A, Luo D, Santos TP, Shi C, Janicek BE, Kang S, Zhu W, Sobh N, Schleife A, Clark BK, Huang PY. Deep Learning Enabled Strain Mapping of Single-Atom Defects in 2D Transition Metal Dichalcogenides with Sub-picometer Precision. Nano Lett., American Chemical Society, 1530-6984, (2020).
- Fanous M, Majeed H, He Y, Sobh N, Popescu G. Deep learning-based computational histology staining using spatial light interference microscopy (SLIM) Data, SPIE Proceedings Volume 11249, Quantitative Phase Imaging VI; 1124913 (2020).
- Blatti C 3rd, Emad A, Berry MJ, Gatzke L, Epstein M, Lanier D, Rizal P, Ge J, Liao X, Sobh O, Lambert M, Post CS, Xiao J, Groves P, Epstein AT, Chen X, Srinivasan S, Lehnert E, Kalari KR, Wang L, Weinshilboum RM, Song JS, Jongeneel CV, Han J, Ravaioli U, Sobh N, Bushell CB, Sinha S. Knowledge-guided analysis of "omics" data using the KnowEnG cloud platform. PLoS Biol. (2020).
- Abueidda D, Almasri M, Ammourah R, Ravaioli U, Jasiuk IM, Sobh N. Prediction and optimization of mechanical properties of composites using convolutional neural networks. Composite Structures (2019).
- Kandel M, He Y, Lee Y, Chen T, Sullivan K, Aydin O, Saif M, Kong H, Sobh N, Popescu G. Phase Imaging with Computational Specificity (PICS) for measuring dry mass changes in sub-cellular compartments. arXiv:2002.08361, (2020).

Beckman Institute for Advanced Science and Technology
Urbana, IL - *Deep Learning and Analytics Architect*

September 2018 – September 2019

https://dearplearning.ai
https://landing.ai
https://aifund.ai

- Breaking into AI and analytics at various research laboratories, research centers, industries and educational institutions is deemed top priority for competing in future research and product development. Today, its national priority and challenge in

SKILLS

Deep Learning, Machine Learning, Analytics, Computer Vision, Scikit-learn, Keras, Tensorflow, Python, R, Matlab, Mathematica, AWS, GitHub, Jira, Docker.

PROJECTS

DSP
A Data science educational platform for all levels.
Bitsiv
Mid to small startups data products turnkey solutions.
Deep Lab
An immerse environment for Machine learning and Analytics training.

Recent Advisee Thesis

Implementing Deep Learning Techniques for A Network based Traffic Forecasting. Submitted to the Graduate College of the University of Illinois at Urbana-Champaign, 2018

many countries . During the past year, I worked closely with numerous Illinois faculty, post docs, graduate and undergraduate students to plan, develop, implement and deploy deep leaning and analytics software tools.

- The QLI Lab (http://light.ece.illinois.edu) has developed several novel imaging instruments (2 patents issued, 9 patents pending). I demonstrated the superiority of a Encoder-Decoder fully convolutional neural network over their current practice. Since then they used the recommended architecture on their instruments.
- Another QLI lab collaboration. I demonstrated the superiority of using U-net to map microscopic images to corresponding fluorescence images. This architecture is under testing for future on device implementation.
- At Pinshane Huang Research (https://huanglab.matse.illinois.edu) they use nanoscience and electron microscopy group that works at the intersections of physics, chemistry, and materials research. They seek to understand the structure and properties of materials, one atom at a time. I mentor the Deep Learning design team to design network to predict defects type, location and denoising of images. Abstract: *Deep Learning Enabled Measurements of Single-Atom Defects in 2D Transition Metal Dichalcogenides with Sub-Picometer Precision,* Fall 2019 MRS Meeting in Boston.
- Al Valocchi's Lab civil engineering (http://publish.illinois.edu/valocchi/research-home/), I worked closely with Al and his graduate student to build a deep learning model and downstream analytics to predict rocks porosity and permeability. Also on the use of generative adversial networks to generate realistic digital rocks.
- At the Research Park of the University of Illinois, I worked closely with TAI startup to architect analytical tools to estimated complex system response and Long-Short Term Memory (LSTM) deep neural networks to predict maintenance scheduling.
- The research group at Prof. Prashant Janes Lab (https://www.nanogold.org) is advancing the understanding and control of the light-matter interface, their experimental work is carried at the Materials Research Lab and their theoretical work uses facilities of the National Center for Supercomputing Applications (NCSA). With Prashant research students we are designing analytics tools to predict the species present in a solution that is imaged over nanoparticles using blue laser.
- Recently the Genomics team at NCSA invited me to collaborate on a Mayo Clinic project related to *machine learning on cellular microscopy images, removing the tissue-free background*.
- Collaboration with Prof. Sebnem Duzgun (Fred Banfield Distinguished Endowed Chair of Mining Engineering at Colorado School of Mines). Use machine learning techniques to analyze remote-sensing images, with the goal of developing a process to identify the presence of blind geothermal resources based on surface characteristics. Automatically label data from hyperspectral images of Brady's Hot Springs, Desert Rock, and the Salton Sea.
- Most Recent Publication: https://arxiv.org/abs/1906.00094

EXPERIENCE

NIH Bigdata to Knowledge Center of Excellence.
Department of Computer Science at the University of Illinois
Champaign, IL - *Data Science R&D Manger and Technical Lead*

Oct 2015 - PRESENT

http://knoweng.org

- The Big Data to Knowledge (BD2K) center of excellence at Illinois supports the

research and development of innovative and transformative approaches and tools to maximize and accelerate the utility of big data and data science in biomedical research. I Lead a team of faculty, post docs, graduate and undergraduate students, to deliver reliable cutting edge analytical services and actionable insights to community of practitioners and internal university teams by leveraging AWS cloud, analytics, proper tracking technologies, data mining techniques and visualization tools. Key clients included National Institutes of Health, Mayo Clinic, UC-Santa Cruz, Cancer Bioinformatics at Purdue.

- Provided key insights to clients leading them to adjust current practices in cloud products delivery, analyzing disease association providing a fresh look at network based gene-disease association.
- Maximized the use of causation modeling techniques to validate the use of different network based analytics.
- Ensured that tracking was correctly implemented across all developed tools to maintain consistency among the various products of the center.
- Led team building starting from recruiting to hiring and ending in development and management.
- Conceptualized, designed, and developed solutions to solve build, curate, and manage analytics software throughout the center.

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Illinois Natural History Survey
Urbana, IL - Co-*Principal Investigator*

Sep 2011 - Sep 2015

https://invertnet.org

- Led the development of a turnkey Cloud-based data curation platform at scale. This includes managing the assembling and shipping of robots, design algorithms for building software products to ingest images and text data, data mining, online annotation of images and visualization to support biodiversity preservations.
- Collaborated, interacted, and brainstormed with contributing institutions to integrate our custom designed and built robotic imaging solution in captureing and contributing high resolution images of drawers. (https://i.ytimg.com/vi/OtJyi4Kf1UE/maxresdefault.jpg)
- Mentored undergraduate students during the design, building, and deliver phases of our custom solution of image capturing tools.
- Presented and demoed the our platform at collaborating institutions.
- Reported and presented project progress at the annual NSF iDigBio conference showcasing updates, future plans, and outreach.

Beckman Institute for Advanced Science and Technology
Champaign, IL – *Network for Computational Nanotechnology, Site Manager and Technical Lead.*

Jan 2007 - Sept 2017

https://nanohub.org/groups/nanobio

- Founded in 2002, the Network for Computational Nanotechnology (NCN) is a multi-institution NSF project with the mission to advance nanoscience and nanotechnology through scientific end-to-end cloud computing environment, hosting thousands of resources for research, collaboration, teaching, learning, and publishing. I led and managed the technical development team of the NCN-node at Illinois.

- Provided scientific computing technical expertise in building computational nano-Biology analytics products hosted on nanoHUB.org cloud platform.
- Assisted in publicizing the node services at Illinois and at professional meetings.
- Organized more than four summer workshops to train future generation of engineers in computational nanotechnology.
- Mentored a large number of node participants ranging from high school seniors to postdocs to develop and host computational tools at nanoHUB.org
- Collaborate, as appropriate, with other faculty/researchers at Illinois campus to port their code to nanohub.org.
- Contribute to grant proposals to grow the enterprise beyond the core grant.
- Assisted in developing NCN brand recognition externally by presenting at conferences, networking with industry experts, and partnering with universities and minority institutions.

National Center for Supercomputing Applications

Champaign,IL - *Performance Engineering and Computational Methods Lead*

May 2004 - Jan 2007

https://nanohub.org
- The National Center for Supercomputing Applications provides powerful computers and expert support that help scientists and engineers improve our world. I Led the performance engineering and computational methods team, comprised of full time computational scientists, software engineers, graduate and undergraduate students, in supporting national users with parallel processing, scientific computing, high performance algorithms, and in tracking, designing benchmarks and automatic performance tools.
- Provided hands-on technical support to private sector partners in porting and optimizing scientific codes to NCSA supercomputers and matched applications needs to appropriate NCSA resources.
- Supported Strategic Partners in the most effective use of NCSA compute and storage resources.
- Led the technical support to the National Faculty Fellowship Program at NCSA though access to NCSA high performance resources and optimization of legacy codes.
- Led the development of NCSA Benchmark suite of real applications to assess current and future NCSA systems.

Champaign Simulation Center

Champaign, IL - *Senior Computational Scientist and Engineer*

June 2002 - May 2004

- The mission of CSC is to use computer-aided engineering to develop products. I led the developed finite element simulation software for machining and manufacturing.
- Performed finite element analysis to support the company's continuous product improvement.
- Trained seasoned engineers on nonlinear finite element simulations.
- Certified as Six-sigma green belt.

Computational Science and Engineering

University of Illinois - *Computational Methods Lead Developer*

May 1998 - May 2002

- The principal goal of this CSE project is the detailed, integrated, high fidelity whole-system simulation under normal and abnormal operating condition. I Led software

development of Advanced Simulation and Computing program of Department of Energy at Illinois to model mechanical behavior of continuously changing media.

- Led software development of multiscale process of manufacturing of Aluminum extrusion using multi-million degrees of freedom.
- Mentored graduate students in the theoretical foundations of discontinuous Galerkin methods and their software implementation.

Aramco Research and Development

Dhahran - *Lead Scientist*

Jan 1992 - May 1998

- Developed and implemented first parallel oil-water reservoir simulator.
- Carried numerous parallel performance benchmarks to assess the speedup of linear algebra related functions.

Old Dominion University

Norfolk - *Assistant Professor*

Sept 1987 - Jan 1992

- Taught courses in High Performance Computing and Numerical Analysis.
- Ported control volume CFD code from FORTRAN to C* (Naval Research Lab).
- Research portfolio included parallel conjugate gradient solver (NASA Langley Research Center).
- Mentored and served on several graduate students thesis committees.

University of Colorado Boulder

- Applied Mathematics: Ph.D. 1990, M.Sc. 1984, B.Sc. 1982.
- Structural Engineering: Ph.D. 1987, M.Sc. 1983, B.Sc. 1981.