Firas Gerges, Ph.D.

Postdoctoral Research Associate
Department of Civil and Environmental Engineering
Princeton University
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RESEARCH INTERSTS

Machine Learning, Algorithms and Data Structure, Optimization, Bayesian Inference, Computer Vision, Atmospheric Science, Environmental Engineering.

HIGHER EDUCATION

Ph.D. in Computer Science, 2022
New Jersey Institute of Technology, Newark, NJ, USA
Dissertation: "Monitoring Climate Change with Machine Learning and Uncertainty Quantification" (**Best Computer Science PhD Dissertation Award, 2023, NJIT**)

Master of Science in Computer Science, 2018
Lebanese American University, Byblos, Lebanon
Dissertation: "Prediction of Movie Success before production using Machine Learning"

Bachelor of Science in Computer Science, 2015
Lebanese American University, Byblos, Lebanon

EXPERIENCE AND PROFESSIONAL APPOINTMENTS

Postdoctoral Researcher Associate, 2022-Present
Princeton University, Department of Civil and Environmental Engineering, Princeton, NJ, USA

Research Assistant, 2019-2022
New Jersey Institute of Technology, Department of Civil and Environmental Engineering, Newark, NJ, USA

Sr. Full Stack Developer, 2016-2019
Aimee Bio, Beirut, Lebanon

Instructor, 2015-2017
Lebanese American University, Department of Mathematics and Computer Science, Byblos, Lebanon

SELECTED INVITED TALKS

- American Meteorological Society (2024)
- Delaware Estuary Science & Environmental Summit (2023 and 2021)
- 100th Annual Meeting of the Transportation Research Board (TRB) (2021)
- New Jersey Big Data Alliance's 8th Annual Symposium Smart State: Big Data for Community Impact (2021)

ACADEMIC RESEARCH GRANTS AND AWARDS

- (Co-PI) Princeton Innovation Fund (2023-2025)
- (Co-PI) New Jersey State Policy Lab at the Bloustein School of Planning and Public Policy and the School of Public Affairs and Administration at Rutgers University Grant (2023)
- (Key Personnel) National Research Foundation (NSF) RAPID Research Grant (2021)
- (Key Personnel) New Jersey Department of Transportation, Bridge Resource Program (BRP) Grant (2019-2022)
- Best Computer Science PhD Dissertation Award, 2023, NJIT
- ACM ICMLSC 2023 Best Presentation Award
- ACM ICMLSC 2022 Best Presentation Award
- ICIPA 2021 Best Presentation Award (23rd International Conference on Image Processing Algorithms)

SELECTED ACADEMIC PUBLICATIONS (PEER REVIEWED)

1. **Gerges, F.**, Llaguno-Munitxa, M., Zondlo, M., Boufadel, M., Bou-Zeid, E. (2024) Weather and the City: Machine Learning for Predicting and Attributing Fine Scale Air Quality to Meteorological and Urban Determinants. Environmental Science and Technology.
2. **Gerges, F.**, Boufadel, M. C., Bou-Zeid, E., Nassif, H., & Wang, J. T. (2024). Long-term prediction of daily solar irradiance using Bayesian deep learning and climate simulation data. Knowledge and Information Systems, 66(1), 613-633.
3. **Gerges, F.**, Assaad, R. H., Nassif, H., Bou-Zeid, E., & Boufadel, M. C. (2023). A perspective on quantifying resilience: Combining community and infrastructure capitals. Science of the Total Environment, 859, 160187.
4. **Gerges, F.,** Boufadel, M. C., Bou-Zeid, E., Darekar, A., Nassif, H., & Wang, J. T. (2023). Bayesian multi-head convolutional neural networks with Bahdanau attention for forecasting daily precipitation in climate change monitoring. Proceedings of the European Conference on Machine Learning and Knowledge Discovery in Databases, ECML PKDD 2022, Grenoble, France. (pp. 565-580). Cham: Springer Nature Switzerland.
5. **Gerges, F.**, Boufadel, M. C., Bou-Zeid, E., Nassif, H., & Wang, J. T. (2022). Deep Learning-Based Downscaling of Temperatures for Monitoring Local Climate Change Using Global Climate Simulation Data. World Scientific Annual Review of Artificial Intelligence, 2250001.
6. **Gerges, F.**, Nassif, H., Herrington, T., & Boufadel, M. C. (2022). A GIS-based approach for estimating community transportation exposure and capacity in the context of disaster resilience. Sustainable Horizons, 3, 100030.
7. **Gerges, F.**, Boufadel, M. C., Bou-Zeid, E., Nassif, H., & Wang, J. T. (2022). Downscaling Daily Wind Speed with Bayesian Deep Learning for Climate Monitoring.
8. Abduallah, Y., Wang, J. T., Bose, P., Zhang, G., **Gerges, F.**, & Wang, H. (2022, May). Forecasting the Disturbance Storm Time Index with Bayesian Deep Learning. In The International FLAIRS Conference Proceedings (Vol. 35).

9. Frazier, K., **Gerges, F.**, & Boufadel, M. C. (2022). Fractal scaling behavior of a sea ice draft field in the Chukchi Sea. Chaos, Solitons & Fractals, 158, 112031.
10. **Gerges, F.**, Nassif, H., Geng, X., Michael, H. A., & Boufadel, M. C. (2022). GIS-based approach for evaluating a community intrinsic resilience index. Natural Hazards, 111(2), 1271-1299.
11. **Gerges, F.**, Boufadel, M. C., Bou-Zeid, E., Nassif, H., & Wang, J. T. (2022, January). A Novel Deep Learning Approach to the Statistical Downscaling of Temperatures for Monitoring Climate Change. In 2022 The 6th International Conference on Machine Learning and Soft Computing (pp. 1-7).
12. **Gerges, F.**, Boufadel, M. C., Bou-Zeid, E., Nassif, H., & Wang, J. T. (2022). A Novel Bayesian Deep Learning Approach to the Downscaling of Wind Speed with Uncertainty Quantification. In Pacific-Asia Conference on Knowledge Discovery and Data Mining (pp. 55-66). Springer, Cham.
13. **Gerges, F.**, Shih, F., & Azar, D. (2021, September). Automated Diagnosis of Acne and Rosacea using Convolution Neural Networks. In 2021 4th International Conference on Artificial Intelligence and Pattern Recognition (pp. 607-613).
14. Geng, X., **Gerges, F.**, Katul, G. G., Bou-Zeid, E., Nassif, H., & Boufadel, M. C. (2021). Population agglomeration is a harbinger of the spatial complexity of COVID-19. Chemical Engineering Journal, 420, 127702.
15. Geng, X., Katul, G. G., **Gerges, F.**, Bou-Zeid, E., Nassif, H., & Boufadel, M. C. (2021). A kernel-modulated SIR model for Covid-19 contagious spread from county to continent. Proceedings of the National Academy of Sciences, 118(21), e2023321118.
16. **Gerges, F.**, Geng, X., Nassif, H., & Boufadel, M. C. (2021). Anisotropic multifractal scaling of Mount Lebanon topography: approximate conditioning. Fractals, 29(05), 2150112.
17. **Gerges, F.**, & Shih, F. Y. (2021). A Convolutional Deep Neural Network Approach for Skin Cancer Detection Using Skin Lesion Images. International Journal of Electrical and Computer Engineering, 15(8), 475-478.
18. **Gerges, F.**, Zouein, G., & Azar, D. (2018, March). Genetic algorithms with local optima handling to solve sudoku puzzles. In Proceedings of the 2018 international conference on computing and artificial intelligence (pp. 19-22).
19. Moussa, R., **Gerges, F.**, Salem, C., Akiki, R., Falou, O., & Azar, D. (2016, October). Computer-aided detection of Melanoma using geometric features. In 2016 3rd Middle East Conference on Biomedical Engineering (MECBME) (pp. 125-128). IEEE.