Hassan Masoomi, Ph.D.

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Risk and Resilience Scientist with Solid Skills in Natural Hazards Modeling

QUALIFICATIONS

- Risk and resilience scientist with 10+ years of experience in developing data-driven models for extreme natural hazards and probabilistic loss assessment.
- Proficient in data manipulation, statistical analysis, data visualization, and machine learning, specializing in spatial and temporal analysis techniques using programming languages R and Python.
- Experienced leader promoting collaboration and diversity, skilled in cross-departmental communication to achieve successful outcomes by bridging knowledge gaps effectively.

EXPERIENCES

Senior Vice President (December 2021 – Present)
Gallagher Re, Los Angeles, CA

Pan-European Wildfire Hazard Score

- Developed wildfire hazard scores at continent and country levels using a histogram-based XGBoost algorithm, leveraging a vast dataset comprising historical burnt area, weather parameters, terrain features, forest fire danger rating indices, and fuel data.

Flood Risk and Hazard Score Underwriting Solutions (APAC & EMEA)

- Crafted flood risk and hazard score maps for pricing and underwriting in the region, employing k-means clustering algorithm, industry exposures, and location-specific average annual loss data.

U.S. Winter Storm Risk Score Model

- Built a U.S. winter storm risk score model based on AAL, utilizing the NOAA's Storm Events Database, atmospheric/land variables from ERA5-Land hourly reanalysis dataset, historical claims data, generalized linear model, and unsupervised clustering algorithms.

Canadian Multi-peril Crop Insurance

- Created underwriting zones for the Canadian prairies' region by clustering 41 years of downscaled daily precipitation and evapotranspiration datasets to facilitate zonal pricing.

Vice President (March 2021 – December 2021)
Willis Re, Willis Towers Watson, Los Angeles, CA

Canadian Heat Blast Parametric Insurance

- Formulated and solved an optimization model to determine location-specific attachments and exits, utilizing heat blast units calculated from over 40 years of downscaled daily temperature data, along with target rate-on-line and loss ratio criteria.
- Established a parametric insurance model for heat blast units, offering customizable features such as start seeding date, maximum temperature threshold, and duration of risk coverage.

U.S. Wildfire Hazard Score Model

- Created a wildfire hazard score model incorporating wildland urban interface (WUI), distance to WUI, and small and large wildfire potentials calculated from USFS's fire occurrence database and nationwide wildfire stochastic model.

U.S. Stochastic Tornado Model

- Developed a model for tornado risk assessment and management by leveraging Gaussian Kernel Density Estimation and data from the Storm Prediction Center to generate one million years of tornado tracks. The model simulates tornado touchdown locations, intensity, path width and length, heading direction, date, and time, providing valuable insights for risk analysis and mitigation strategies.

Assistant Vice President (May 2019 – March 2021)

Willis Re, Willis Towers Watson, Los Angeles, CA

North American Hail Risk Score Model

- Created the North American hail risk score model by utilizing location-specific average annual hail loss, computed from site-specific hazard curves, along with severity and frequency damage functions derived from historical claims datasets, hail radar data, and machine learning algorithms.

North American Drought Index Insurance

- Crafted multiple drought indices using 50 years of gridded data for drought index insurance, including the standardized precipitation index (SPI), standardized precipitation evapotranspiration index (SPEI), self-calibrated Palmer drought severity index (scPDSI), Z-Index, and standardized soil-moisture index (SSI).

Canadian Wildfire Hazard Score Model

- Developed a wildfire hazard score model using the Canadian Forest Fire Danger Rating System indices and historical fires database, employing random forest and k-means clustering algorithms.

Postdoctoral Scholar (June 2018 – May 2019)

University of California-Los Angeles, Los Angeles, CA

Developing Simulation Models and Tools to Assess and Enhance the Seismic Resilience of Communities (*A research project funded by the Nuclear Regulatory Commission***)**

- Formulated a methodology to evaluate post-earthquake housing functionality recovery considering the effects of utility disruption and socioeconomic/demographic properties of the region (*presented in two international conferences and published as a peer-reviewed journal paper*).

Risk Scientist (June 2018 – May 2019)

The B. John Garrick Institute for the Risk Sciences, UCLA, Los Angeles, CA

Assured Resilience for Autonomous Systems (*A research project funded by NASA***)**

- Collaborated with multidisciplinary scientists to establish resilience metrics and implement various strategies aimed at enhancing the resilience of autonomous systems for deep-space exploration missions.

Graduate Research Assistant (Aug. 2014 – May 2018)

Department of Civil and Environmental Engineering, Colorado State University, Fort Collins, CO

A Resilience-based Decision Framework to Determine Performance Targets for the Built Environment
(*Resulted in eight peer-reviewed journal papers (Google Scholar) and seven conference presentations*)

- Created tornado and hurricane fragility functions for 19 archetypes to be utilized in a comprehensive community-level assessment of loss, risk, and resilience.
- Formulated a methodology for modeling post-hazard recovery of interconnected networks and quantifying socioeconomic consequences. This approach assists decision-makers in planning recovery efforts or upgrading the built infrastructure of a community.

Fatality and Injury Prediction Model for Tornadoes (*Published in ASCE's Natural Hazards Review*)

- Constructed predictive models to anticipate the number of injuries and fatalities resulting from tornadoes across the contiguous United States. Leveraging data from the United States tornado database and the US census database, this analysis utilized ArcGIS, Python, and R programming languages.

Wind-Wave-Surge Hurricane-Induced Damage Prediction (*Published in Journal of Structural Engineering*)

- Developed a multi-hazard damage fragility methodology for hurricane winds, storm surge, and waves.

- Employed spatiotemporal data from the ADCIRC+SWAN model, including wind speeds, flood depths, and significant wave heights, to compute time-dependent damage probabilities for buildings at specific locations.

Graduate Research Assistant (Sept. 2011 – Sept. 2013)
Department of Civil and Environmental Engineering, Sharif University of Technology, Tehran, Iran

Seismic Hazard and Risk Analyses of the Built Environment (*Resulted in two journal papers*)

- Conducted probabilistic seismic hazard analysis (PSHA) to develop site-specific seismic hazard curves for two regions in Iran (Sabzevar and Kerman).
- Utilized nonlinear static analysis and incremental dynamic analysis (IDA) techniques to establish pushover and fragility curves for diverse building archetypes.

EDUCATION

Ph.D. in Engineering (May 2018)
Colorado State University, Fort Collins, CO, USA

M.Sc. in Engineering (Sep. 2013)
Sharif University of Technology, Tehran, Iran

B.Sc. in Engineering (Sep. 2011)
Iran University of Science and Technology, Tehran, Iran

TECHNICAL SKILLS

- **Theory**: Community Resilience, Risk and Reliability Assessment, Natural Hazards, Infrastructure Systems, Spatial Analysis, Machine Learning, Climate Risk, Catastrophe Modeling, Earthquake/Wind Engineering
- **Programming/Application**: Python, R, SQL, MATLAB, ArcGIS, QGIS, Google Earth Engine

ACTIVITIES AND INTERESTS

- Rock climbing, hiking, skiing, travel, movies.