Nick Kunz

Data Scientist

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Education

Columbia University — New York, NY 2019
Master of Science, Urban Planning, Urban Analytics
Advisors: Lance Freeman, Kazuki Sakamoto

Harvard University — Cambridge, MA 2012
Non-Degree, Urban Planning
Advisor: Nick Hornig

Arizona State University — Tempe, AZ 2012
Bachelor of Science in Design (Hons.), *summa cum laude*, Housing & Urban Development
Advisors: Kevin Kellog, Michael Underhill, Trevor Barger

Research

Theses

N. Kunz, "Unsupervised Learning for Submarket Modeling: A Proxy for Neighborhood Change," M.S. Thesis, Grad. Sch. of Arch., Plan., and Pres. (GSAPP), Columbia Univ., New York, NY, 2019. [Online]. Availabile: Columbia Academic Commons. [Link]

N. Kunz, "Realizing Interactive Architecture: A Driver of the Knowledge Economy," B.S.D. (Hons.) Thesis, Barrett, The Hons. Col., Arizona State Univ., Tempe, AZ, 2012. [Online]. Availabile: Barrett, The Honors College Thesis/Creative Project Collection. [Link]

Industry

N. Kunz, "n-Dimensional Mapping by Normalized Value Approximation: Squad Immersive Virtual Trainer (SiVT) Safety Performance Metrics," Squad Performance Metrics (SPM), Integrated Visual Augmentation System (IVAS), Microsoft, Redmond, WA, 2021. Protected from public disclosure pursuant to: Trade Secrets Act 18 USC § 1905, 5 USC § 552(b)(4), and C3.2.1.4. of US Dept. of Defense Regulation 5400.7-R. DISTRIBUTION F.

N. Kunz, "Normalized n-Dimensional Inverse Euclidean Distance: Combining Independent Performance Metrics," Squad Performance Metrics (SPM), Integrated Visual Augmentation System (IVAS), Microsoft, Redmond, WA, 2021. Protected from public disclosure pursuant to: Trade Secrets Act 18 USC § 1905, 5 USC § 552(b)(4), and C3.2.1.4. of US Dept. of Defense Regulation 5400.7-R. DISTRIBUTION F.

N. Kunz, "Minimum-Weighted Mean Variability: Within Group Performance Metrics," Squad Performance Metrics (SPM), Integrated Visual Augmentation System (IVAS), Microsoft, Redmond, WA, 2020. Protected from public disclosure pursuant to: Trade Secrets Act 18 USC § 1905, 5 USC § 552(b)(4), and C3.2.1.4. of US Dept. of Defense Regulation 5400.7-R. DISTRIBUTION F.

N. Kunz, "An Exploratory Data Analysis of the Gavin Cup: Brining Readiness & Performance Metrics Into Focus," Squad Performance Metrics (SPM), Integrated Visual Augmentation System (IVAS), Microsoft, Redmond, WA, 2020. Protected from public disclosure pursuant to: Trade Secrets Act 18 USC § 1905, 5 USC § 552(b)(4), and C3.2.1.4. of US Dept. of Defense Regulation 5400.7-R. DISTRIBUTION F.

Industry Experience

Microsoft —Redmond, WA 2020 - 2021
Data Scientist
Integrated Visual Augmentation System (IVAS) [Link]

Pacific Prospecting Group — Seattle, WA 2017 - 2019
Data Scientist
Computational Finance & Engineering [Link]

Brawner & Company — Snoqualmie, WA 2016 - 2017
Development Analyst
Real Estate Development & Finance [Link]

bcWORKSHOP — Dallas, TX 2013 - 2014
Design Fellow
Architecture, Planning & Policy [Link]

n Creative Studios — Phoenix, AZ 2011 - 2012
Design Consultant
Real Estate Development

Software Packages

PUPHL: Proximal Policy Optimization Utilizing Pseudo-Huber Loss 2021
Github [Link]

A modified Proximal Policy Optimization (PPO), Actor-Critic (A2C) algorithm. Applies Pseudo-Huber Loss to the critic loss function in place of traditional Mean Squared Error (MSE). Adds additional critic loss function constraint δ in an effort to further reduce variance to PPO and future A2C policy gradient methods. *Currently in development.*

SMOGN: Synthetic Minority Over-Sampling Technique for Regression with Gaussian Noise 2020
Github [Link] PyPI [Link] Kaggle [Link] Stack Exchange [Link] Stack Overflow [Link]

A novel pre-processing algorithm designed to address imbalanced data for regression problems. Conducts over-sampling with traditional interpolation, as well as with the introduction of Gaussian noise. Selects between the two over-sampling techniques by the KNN distances underlying a given observation.

NestedHyperBoost: Nested Cross-Validation for Bayesian Optimized Gradient Boosting 2020
Github [Link] PyPI [Link]

Unifies Nested K-Fold Cross-Validation, Bayesian Hyperparameter Optimization, and Gradient Boosting. Designed for rapid prototyping on small to mid-sized data sets. Quickly obtains high quality prediction results by abstracting away tedious hyperparameter tuning and implementation details in favor of usability and implementation speed.

NestedHyperLine: Nested Cross-Validation for Bayesian Optimized Linear Regularization 2020
Github [Link] PyPI [Link]

Unifies Nested K-Fold Cross-Validation, Bayesian Hyperparameter Optimization, and Linear Regularization. Designed for rapid prototyping on small to mid-sized data sets. Quickly obtains high quality prediction results by abstracting away tedious hyperparameter tuning and implementation details in favor of usability and implementation speed.

CRASSMAT: Conditional Random Sampling Sparse Matrices 2019
Github [Link] CRAN [Link]

A novel matrix sampling algorithm designed to conditionally random sample sparse matrices. Useful for training and test set splitting prior to model fitting in cross-validation procedures and for estimating the predictive accuracy of data imputation methods, such as Matrix Factorization or Singular Value Decomposition (SVD).

Selected Projects

N. Kunz, S. Huang, and S. Osakata, "Cloudy Night: Activating Park Space by Illuminated Interactivity," Grad. Sch. of Arch., Plan., and Pres. (GSAPP), Columbia Univ., New York, NY, 2019. [Online]. Availabile:

GSAPP [Link] Github [Link] Youtube [Link] Faculty [Link]

N. Kunz and S. Bhele, "Signal or Noise? Qualified Opportunity Zone Affect on Development Activity in Queens," Grad. Sch. of Arch., Plan., and Pres. (GSAPP), Columbia Univ., New York, NY, 2019. [Online]. Availabile:

GSAPP [Link] Github [Link] Issuu [Link] Faculty [Link]

E. Hudgins and **N. Kunz**, "Planning for Extreme Settlements, McMurdo Station, Antarctica," Grad. Sch. of Arch., Plan., and Pres. (GSAPP), Columbia Univ., New York, NY, 2018. [Online]. Availabile:

GSAPP [Link] Issuu [Link]

J. Karasik, S. Lee, **N. Kunz**, et. al. "Negotiating Fragments (Restructuring Quarto Workshop), Genoa, Italy," Grad. Sch. of Arch., Plan., and Pres. (GSAPP), Columbia Univ., New York, NY, 2018. [Online]. Available:

GSAPP [Link] Youtube [Link] Issuu [Link] Issuu [Link] Press [Link]

N. Kunz, "Proportionalities: A Decade of Housing Markets to Subway Stations in Manhattan from 2006 to 2016," Grad. Sch. of Arch., Plan., and Pres. (GSAPP), Columbia Univ., New York, NY, 2017. [Online]. Available:

GSAPP [Link] GSAPP [Link] Issuu [Link] Faculty [Link]

G. S. Coch, S. Nelsen, **N. Kunz**, "Seeking Refuge: The Geography of Migrant Deaths Along the US-MX Border," Grad. Sch. of Arch., Plan., and Pres. (GSAPP), Columbia Univ., New York, NY, 2017. [Online]. Availabile:

GSAPP [Link] Medium [Link]

N. Kunz, "Traditional Theory and the Historic Preservation of Singapore in the Period of the 1980's," Grad. Sch. of Arch., Plan., and Pres. (GSAPP), Columbia Univ., New York, NY, 2017. [Online]. Availabile:

Issuu [Link]

N. Kunz, "Health & Wellness Alliance for Children: Children's Asthma, Healthy Physical Environments, Dallas County, Texas," bcWORKSHOP, Dallas, TX, 2014. [Online]. Availabile:

Issuu [Link]

N. Kunz, "The Bexar Street Corridor: A Century in Development, Dallas, Texas," bcWORKSHOP, Dallas, TX, 2013. [Online]. Availabile:

Issuu [Link] Issuu [Link] bc [Link] Vimeo [Link]

N. Kunz, "Fenway-Kenmore Square: Comprehensive Planning & Finance, Cambridge, Massachusetts," Grad. Sch. of Design (GSD), Harvard Univ., Cambridge, MA, 2012. [Online]. Availabile:

Issuu [Link]

N. Kunz, "Danelle Plaza: Complete Street Mobility Planning, Tempe, Arizona," Herberger Inst. for Des. and the Art., Arizona State Univ., Tempe, AZ, 2012. [Online]. Availabile:

Issuu [Link]

N. Kunz, "Ascension: Multifamily Mixed-Use Real Estate Development Proposal, Tempe, Arizona," n Creative Studios, Phoenix, AZ, 2012. [Online]. Availabile:

Issuu [Link]

N. Kunz, "Sui Residence: Second Story Architecture Development Proposal, Paradise Valley, Arizona," n Creative Studios, Phoenix, AZ, 2011. [Online]. Availabile:

Issuu [Link]

Honors & Awards

Distinguished Alumni Award, Arizona State University — Tempe, AZ 2016
Eli Segal AmeriCorps Education Award, AmeriCorps — Dallas, TX 2014
Dingwall Foundation Scholarship, William Orr Dingwall Foundation — Washington, DC 2011 - 2012
Barrett, The Honors College Scholarship, Arizona State University — Tempe, AZ 2010 - 2012
AIERF Undergraduate Scholarship, Appraisal Institute — Chicago, IL 2010 - 2011
Herberger Institute for Design & the Arts Scholarship, Arizona State University — Tempe, AZ 2010
Study.net Foundation Scholarship, Study.net — Fort Lauderdale, FL 2010
Dean's List *(4.00/4.00 GPA)*, Arizona State University — Tempe, AZ 2009 - 2012

Talks, Exhibits & Presentations

Urban Planners in Technology, Alumni Panel, Columbia University — New York, NY 2021
Urban Planning Showcase, End of Year Show, Columbia University — New York, NY 2019
The Bexar Street Corridor, US Congrasswoman Eddie Bernice Johnson's Office — Dallas, TX 2014
The Bexar Street Corridor, TR Hoover Community Development Corporation — Dallas, TX 2014
The Bexar Street Corridor, bcSHOPFRONT Series, bcWORKSHOP— Dallas, TX 2013
Realizing Interactive Architecture, Honors Symposium, Arizona State University — Tempe, AZ 2012

Mentorship Activities

Chawner Hurd, MBA, Business, Columbia University — New York, NY 2020 - 2021
Military service transition from US Army, 5th Special Forces Group to graduate school.

Michael Bollinger, BA, Computer Science, Columbia University — New York, NY 2019 - 2021
Military service transition from US Army, 75th Ranger Regiment to undergraduate school.

Daniel Hineline, BA, Political Science, Columbia University — New York, NY 2018 - 2021
Military service transition from US Army, 82nd Airborne Division to undergraduate school.

Military Service

Assignments

US Army, 75th Ranger Regiment — Fort Lewis, WA 2015 - 2016
Infantry

US Army, Ranger Training Detachment — Fort Benning, GA 2015
Ranger Assessment & Selection Program

US Army, 1st Special Warfare Training Group — Fort Bragg, NC 2014
Special Forces Assessment & Selection

US Army, 1st Special Warfare Training Group — Fort Bragg, NC 2014
Special Forces Preparation & Conditioning

US Army, 507th Parachute Infantry Regiment — Fort Benning, GA 2014
Airborne School

US Army, 19th Infantry Regiment — Fort Benning, GA 2014
Infantry School

Decorations

Global War on Terrorism Service Medal, US Army, 75th Ranger Regiment — Fort Lewis, WA 2016
Expert Badge, Rifle Component Bar, US Army, 75th Ranger Regiment — Fort Lewis, WA 2016
Driver Badge, Wheeled Vehicle Component Bar, US Army, 75th Ranger Regiment — Fort Lewis, WA 2015
Parachutist Badge, Unit Trimming, US Army, 507th Parachute Infantry Regiment — Fort Benning, GA 2014
Infantry Blue Chord Fourragère, US Army, 19th Infantry Regiment — Fort Benning, GA 2014
National Defense Service Medal, US Army, 19th Infantry Regiment — Fort Benning, GA 2014
Army Service Ribbon, US Army, 19th Infantry Regiment — Fort Benning, GA 2014

Civil Service

Smithsonian Institution — Washington, DC 2020 - 2021
Digital Transcription

AmeriCorps — Dallas, TX 2013 - 2014
Volunteer in Service to America (VISTA)

Open Architecture Collaborative — Dallas, TX 2013 - 2014
Non-Profit Architecture & Planning

Trinity Park Conservancy — Dallas, TX 2013 - 2014
Public Park Conservation

Technical Skills

Languages

Scripting: Python, Bash
Statistical: R, Stata
Compiled: C/C++, Fortran
Database: SQL, NoSQL
Typesetting: LaTeX, Markdown

Frameworks

Data Science: NumPy, SciPy, Pandas, Featuretools, Tidyverse, Dplyr
Visualization: Matplotlib, Seaborn, Plotly, Processing, Shiny, ggplot
Statistical Learning: Scikit-Learn, XGBoost, LightGBM, CatBoost
Reinforcement Learning: OpenAI Baselines, Stable Baselines
Deep Learning: Pytorch, TensorFlow, ONNX

Deployment

DevOps: Git, Docker, Kubernetes, CI/CD Pipelines, Pickle
Databases: SQL Server, PostgreSQL, SQLite, CosmosDB, Blobs
Web Services: Flask, Gunicorn, Nginx
Web Automation: Selenium, Puppeteer
Cloud Platforms: Azure, Azure Gov, AWS
Security: OWASP ZAP, STIGs

Software

Development Environments: VS, VS Code, RStudio, Jupyter, Spyder
Geographic Information Systems: ArcGIS, QGIS, OSM, Leaflet, Mapbox
3D Modeling & Optimization: Rhino, Grasshopper, SketchUp, AutoCAD, Unity
Design & Illustration: Adobe Photoshop, Illustrator, InDesign
Financial Modeling: Excel, Macros, CoStar
Studio & Live Audio: Logic, Protools

Prototyping

Sensors & Hardware: Arduino, Raspberry Pi, GPU, FPGA
Project Management: Agile, Scrum, Critical Path
Electrical: Soldering, Wiring, Safety
Ideation: Drawing & Sketching, Storyboarding
Analogs: Hand Drafting, Physical Modeling, Photography

Personal Activities

Music & Live Audio

Atlas North American Tour — US & Canada 2013
The Word Alive *(Fearless Records)*, Co-Tour Manager
The Word Alive *(Fearless Records)*, Guitar Tech

Fight the Silence Tour — US 2013
The Word Alive *(Fearless Records)*, Guitar Tech
For Today *(Razor & Tie Records)*, Guitar Tech

All Stars Tour — US 2012
The Word Alive *(Fearless Records)*, Guitar Tech
A Skylit Drive *(Fearless Records)*, Guitar Tech

Van's Warped Tour — US & Canada 2011
The Word Alive *(Fearless Records)*, Co-Tour Manager
Of Mice & Men *(Rise Records)*, Guitar Tech

Regional Performances — US 2011
The Rendering *(Authentik Artists)*, Guitar

Outdoors & Endurance

Running *(Half Marathon, 13.1mi, Marathon, 26.2mi)*
Cycling *(Century Ride, 100mi)*
Hiking *(Mt. Denali, Mt. Rainier)*
Overlanding *(Rubicon Trail, Alaskan Arctic Circle, All 50 States)*
Snowboarding *(Cascades, Colorado Plateau, Sierra Nevadas, Mississippi River Valley)*

Updated: Sept. 2021