Robert Hoelzle, PhD

Data and Statistics Specialist

Results-driven data scientist and engineer with 7 years' experience in big data analytics, 12 years' experience in high paced R&D environment, and a life-long passion for finding creative solutions to complex problems. Proficient in **Python**, **R**, and **SQL** for data mining, statistical analysis, visualization, and various machine learning models.

Skills & Techniques

Languages & Libraries	Python • SKLearn, SciPy, Pandas, NumPy, BeautifulSoup, Dash, Matplotlib, Plotly, Seaborn, Folium, DB-APIs, RegEx R • Vegan, NBClust, RCy3, RStatix, mvabund, lsmeans, dplyr, tidyr, spaa, SpiecEasi, ggplot, sciplot, corrplot, igraph, stringr SQLite • T-SQL • Bash • C++
Modeling & Statistics	Linear/Non-Linear Regression • Logistic Regression • K-Means Clustering • Hierarchical Clustering • KNN • Decision Trees • Support Vector Machines • Network Analysis • Dimensional Reduction • Ordination • Multivariate Statistics • ANOVA • PERMANOVA • T-test • Z-test • Chi-square Test
Tools	GitHub • Jupyter Notebook • Spyder • R Studio • Atom • Adobe Suite • MS Office Suite
Cloud & Systems	IBM Watson Studio • IBM DB2 • Galaxy Australia • Linux HPCs
Professional	Project Management • Teamwork • Team Coordination • Leadership • Creative Problem Solving • Technical Writing & Communication • Consulting • Engineering • Budgeting • Strategic Planning • Statistical Analysis • Data Mining • Predictive Modeling • Research • Experimental Design

Professional Experience

Data Scientist (Bioinformatics) – Team Lead   *Sep 2021 – Present*
Data Scientist (Bioinformatics)   *Aug 2016 – Aug 2021*
The University of Queensland (Faculty of Science), Brisbane, Queensland, Australia

- **Python**, **R**, **SQL**, **Bash**, **Dimensional Reduction**, **Regression**, **Clustering**, **Classification**, **Statistical Validation**
- Design and run data analysis and modeling pipelines in **Python, R, SQL, and Bash** on structured and unstructured genomic, environmental, agricultural, immunological, mining, electrochemical, and environmental engineering data
- Coordinate interdisciplinary research programs involving researchers and industry stakeholders to define key project deliverables and design experiments for targeted data collection
- Communicate findings and deliverables through consulting reports, presentations, and peer-reviewed publications
- Mentor and coach professional and student researchers on experimental design, data management, data processing, predictive modeling, and statistical validation. Includes code reviews, workshops, and brainstorming sessions
- Solved groundwater cyanide issue for industry client using **dimensional reduction**, **KNN classification**, and **PERMANOVA** on genomic and environmental datasets
- Identified probiotic bacteria for an industry client using **dimensional reduction**, **multivariate regression**, **k-means clustering**, and **PERMANOVA** on immunological and genomic datasets
- Modeled future greenhouse gas emissions from thawing arctic permafrost using **k-means clustering**, **PERMANOVA**, and **multivariate regression** on environmental, genomic, and protein expression datasets

Bioprocess Engineer   *Jun 2012 – Jul 2016*
The University of Queensland (Advanced Water Management Centre), Brisbane, Queensland, Australia

- **R**, **C++**, **Bash**, **Dimensional Reduction**, **Regression**, **Statistical Validation**
- Coordinated with research team to design experiments and communicate findings in peer-review publications
- Built **C++** programs to automate experiments and collect time-series data into pipeline-formatted data tables
- Processed, modelled, and statistically validated large, multivariate datasets to validate carbon biorecycling to bioplastics process, using **dimensional reduction**, **PERMANOVA**, and **multivariate regression**

Bioprocess Engineer   *Jun 2010 – Mar 2012*
Green Biologics Ltd, Columbus, Ohio, USA

- **C++**, **Excel**, **Regression**, **Statistical Validation**
- Built **C++** programs to automate experiments and collect time-series data on pilot-scale biofuel system
- Designed successful commercial biofuel reactor from time-series data using **regression** modelling and **ANOVA**

Education & Certificates

PhD, Bioprocess and Chemical Engineering, <u>The University of Queensland</u>   *2017*
  Thesis: *Metabolic mechanisms and regulation of mixed culture fermentation*

BSc w/ Hons, Bioprocess Engineering, <u>The Ohio State University</u>   *2010*
  Hons Thesis: *Genetic improvement of* Clostridium tyrobutyricum *for butanol production by insertion of adhE from* Clostridium acetobutylicum

Professional Certificate, Data Science, <u>IBM</u>   *2022*

Community Engagement

Data Science Blog on Medium   *2022 – Present*
  <u>medium.com/@RDHoelzle</u>: Personal blog for publishing data science projects and how-to articles.

Mental Health Working Group: UQ School of Earth & Environmental Sciences   *2020 – Present*
  <u>Mentorship and Activities Committees</u>: Working group to develop and implement positive mental health programs within the School of Earth & Environmental Sciences, including a mentorship program for early career researchers, networking events, and lunch and sporting activities.

Joint Academic Microbiology Seminars (JAMS)   *2018 – Present*
  <u>Brisbane Organizing Committee</u>: Bimonthly networking and seminar series aimed at developing collaboration between academic, industry, and medical microbiologists across Southeast Queensland.

March for Science: Brisbane   *2017*
  <u>Organizing Committee</u>: Coordinated international demonstration calling for increased scientific and data-driven governmental policy making, especially on issues of climate change and public health.

Engineers Without Borders   *2015 – 2016*
  <u>UQ Institute Engagement Committee</u>: International engineering aid organization. The UQ Institute Engagement program aligned PhD candidates with UQ researchers working on infrastructure projects for developing nations, especially low-maintenance wastewater and drinking water facilities.

Navigating the Realities of a Diverse Engineering Workplace: UQ School of Chemical Engineering   *2015*
  <u>Organizing Committee</u>: Panel Q&A session on workplace culture in professional engineering, with a focus on diversity of race and gender identity. The panel consisted of a highly diverse range of early, mid, and late career engineering professionals, and facilitated networking between engineering students and professionals.

Top Peer-Reviewed Publications

Substrate availability drives mixed culture fermentation of glucose to lactate at steady state. <u>RD Hoelzle</u>, D Puyol, B Virdis, D Batstone. **Biotechnology and Bioengineering** (2021)

A facile method to enhance the performance of soil bioelectrochemical systems using in situ reduced graphene oxide. C Camedda, <u>RD Hoelzle</u>, A Carucci, S Milia, and B Virdis. **Electrochimica Acta** (2019)

Genome-centric view of carbon processing in thawing permafrost. BJ Woodcroft, CM Singleton, JA Boyd, PN Evans, JB Emerson, AAF Zayed, <u>RD Hoelzle</u>, TO Lamberton, CK McCalley, SB Hodgkins, RM Wilson, SO Purvine, CD Nicora, C Li, S Frolking, JP Chanton, PM Crill, SR Saleska, VI Rich, GW Tyson. **Nature** (2018)

Influence of pH regulation mode in glucose fermentation on product selection and process stability. Z Mohd-Zaki, JR Bastidas-Oyanedel, Y Lu, <u>R Hoelzle</u>, S Pratt, FR Slater, and DJ Batstone. **Microorganisms** (2016)

Regulation mechanisms in mixed and pure culture microbial fermentation. <u>RD Hoelzle</u>, B Virdis, and DJ Batstone. **Biotechnology and Bioengineering** (2014)

Personal Interests

Rock Climbing • Ultimate Frisbee • Home Brewing • Escape Rooms • Photography • Gardening