Nathan McCormick

Biomedical Engineer
CV/AI/DS Developer
Scientific Programmer

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LinkedIn

Python

TensorFlow-CPU/GPU, Scikit-Learn, Statsmodels, Numpy, SciPy, Pandas, Sympy, Numba, Cupy, OpenCV, Pillow, Matplotlib

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Skills

Machine/Deep Learning
  CNN (Keras/TensorFlow), DNN, Random Forest, Hierarchical Clustering, k-NN, k Means, SVM, PCA
Regression
  Multiple Linear, Logistic Lasso, Ridge, Elastic Net
Machine/Computer Vision
Image Analysis
Robotics
Process Automation
Statistics and Probability
Data Analysis/Visualization
Numerical Methods
Vectorized Computations
GPU Acceleration (CUDA)
Python, R, Minitab
SAM (Meta) API, Keras API
GPT-4 API
Git, GitHub, Docker

Cross-site Collaboration
Rapid Prototyping
R&D Innovation

Graduate Education

University of Minnesota, 2020 - 2023

MS in Biomedical Engineering (GPA: 3.95)

Advanced Biomedical Imaging, Advanced Bioelectricity and Instrumentation, Statistics, Applied Regression Analysis (w/ Machine Learning), Quality Engineering, Physiology, Differential Equations, Linear Algebra, Functional Genomics, Systems Biology, and Bioinformatics

Research Engineer - Translational NeuroEngineering Lab May 2022 - Aug 2022

Refactored existing data pipeline in R by converting nested loops to vectorized operations, reducing file processing time from 15 minutes to 12 seconds. Built pipeline to visualize lab rat location and correlate with behavior responses.

Work Experience

Sherwin Williams, 2014 - Present

Automated Image Analysis of Corrosion

Developed a robotic and machine vision system to automate measurement of corrosion panels, achieving 95% time savings and winning the 2022 Percy Neyman award for Science. Implemented image analysis, data processing, and statistical testing in Python. Trained a TensorFlow convolutional neural network to segment images. Used GPU acceleration, image augmentation, and weighted classes to achieve 99.9% accuracy. Programmed control of 108MP camera including autofocus algorithm to maximize the variance of the image Laplacian. Responsible for mechanical and electrical design, controls, and global rollout strategy.

Automated EIS Data Processing

Used Python, HTML, JavaScript, and Docker to build a fully functional and scalable web application that automates electrochemical impedance spectroscopy data processing for the Pittsburgh Packaging Group. Implemented Kramers - Kronig residuals analysis, log least squares curve fitting, circuit model selection, and automated statistical analysis. Collaborated with IT to deploy on Kubernetes.

Surface Roughness Measurement

Developed a method to quantify the surface roughness induced by the absorption of a liquid coating into a porous substrate. Used Python to process data from a 3D structured light scanner, algorithmically orient the surface using vector calculus, compensate for surface curvature, and coerce the data from an irregular point cloud into an image. Used imaged analysis to quantify surface roughness.

Corrosion Rate Characterization Method 2020 - Present

Invented a novel, contactless method to measure the corrosion rate of steel substrates. Designed and built an instrument that generates a change in AC voltage magnitude as a function of corrosion. Screened for optimal settings using DOE methodology in Minitab. Used Python to fully automate sample placement, Keithley DMM6500 data collection, Fourier filtering, and baseline correction.

Career Progression

Sr. Chemist
PCG Innovation
March 2022 - Present

Chemist II
PCG Innovation
May 2019 – March 2022

Chemist I
Advanced Liquid Platforms
Jan 2017 – May 2019

Associate Chemist
Commercial Vehicle Group
Sept 2014 – Jan 2017

Contractor
Truck/Trailer Group
March 2014 – Sept 2014

Machine Vision Adhesion Measurement
Supported General Industrial (GI) business unit response to customer adhesion failure complaint. Rapidly developed prototype system using Python OpenCV to quantify adhesion loss in real time, enabling the GI R&D team to rapidly measure samples, quantify adhesion improvement, and respond to the complaint.

Simulation of Tumor Growth (*MS Class Project*)
Modeled tumor response to a combination of chemotherapy, radiation, and immunotherapy. Numerically solved a system of six coupled differential equations using Python. Explored effect of initial conditions on tumor survival.

Mathematical Model of Solar Heat Gain in Insulative Coatings
Developed and programmed a heat transfer model of coating surface temperature that includes coating reflectance, emissivity, thickness, and thermal conductivity. Conducted a Monte Carlo simulation to determine which coating parameters offer the best opportunity for optimization. Project was presented at the 2023 Association for Materials Protection and Performance Annual Conference.

Automated Statistical Inference
Developed a tool to quantify correlations between formula contents and performance metrics that dynamically adjusts p-value thresholds for data set size and multiple testing. Deployed the tool with an intuitive user interface that visualizes significance thresholds and results, aiding interpretation by end users.

Machine Vision for Air Inclusion Defect Analysis
Invented a microscopic image analysis method to quantify air release of curing coatings. Used Python and machine vision to provide a real time quantification of bubble rise and pop time constants, enabling a mechanistic understanding of air entrapment. Developed GUI for distribution to R&D lab groups.

Latent Base Catalyst
Invented patent pending latent base crosslinking catalyst for a premium General Industrial product line, winning the 2019 Percy Neyman award for Innovation. Worked cross-functionally with Regulatory Group to define global regulatory strategy. Collaborated with Analytical Group in Cleveland, OH to generate C-NMR data and validate synthesis process.

Manufacturing and Commercialization Support
Commercialized $3M of new business in the light industrial market at various customers. Invented a method for improving wet film catalyst latency.

Undergraduate Education

***University of Dallas*, 2009 - 2013**

Bachelor's in Biology (Cum Laude)
Anatomy, Molecular Biology, Microbiology, Vector Calculus, General Physics, General Chemistry, Organic Chemistry, Analytical Chemistry

Patents and Publications

Heat Buildup for Thermally Insulative Coatings due to Solar Exposure: Efforts in Modeling and Prediction - 2023 AMPP Annual Conference

US20220332884A1 - Coating Compositions and Methods with Polyfunctional Carbamate Salt (2020)

US20200079965A1 - Polyurethane Coating Composition (2019)

Awards

2022 Sherwin Williams Percy Neyman Award - Science
2019 Sherwin Williams Percy Neyman Award - Innovation
2009 Vex Robotics World Championship Innovation Award