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MARK JAMES YORK

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SUMMARY

- **Research** includes stochastic price modeling and farmer marketing optimization, effects of global warming on crop production, and the effects of mechanical tillage on food production. Coauthor on three papers (two in preparation) and one patent
- **Academic Interests:** AI, Robotics, Computer Vision, Remote Sensing, and Optimization & Control
- **McKinsey Consultant** leveraging machine learning on satellite imagery, futures prices and other data for agriculture and CPG clients. Four years of industry experience, heavily involving programming
- **President and Co-Founder** of *Tractors for Africa*, a non-profit providing agricultural technology to African farmers. We have now raised over \$65,000 and are active in two countries

EDUCATION

SOUTH DAKOTA STATE UNIVERSITY – Student Body President

Aug 2007-May 2012

B.S. Mathematics, B.S. Agronomy, Minor: Chemistry

Brookings, SD

NSF S-STEM Scholarship Recipient

Overall GPA: 3.87/4.00, Major GPA: 3.95/4.00, Honors College Distinction

PUBLICATIONS

York, M., Wang, Z., Kimn, JH. Optimal Pre-Harvest Grain Futures Marketing Accounting for Stochastic Variations in Price and Yield. In Preparation. Target Journal: *American Journal of Agricultural Economics*

- Fit a three-state model on futures prices to account for stochastic variations in price, volatility and stocks
- Used various levels of volatility risk tolerance to derive an equation which generates the optimal level of futures sales at any point in time given current price, farm-level yield expectations and global stocks

York, M., and Clay, D. Effects of Four Types of Tillage on Soil Structure and Sorghum Yields in Burkina Faso. In Preparation. Target Journal: *International Journal of Agronomy*

- Applied four types of tillage to fields in Burkina Faso (hand labor, animal labor, tractor-driven rotary harrow and tractor-driven moldboard plow)
- Measured the effects on soil bulk density and sorghum yields

York, M., Wang, Z., Kimn, JH. Stock Index Options Pricing Models. South Dakota State University Journal of Undergraduate Research. 2013

- Compared performance of the Black-Scholes stock options pricing model and two other models that account for jumps in the underlying asset price and volatility
- Available at: <http://openprairie.sdstate.edu/jur/vol10/iss1/13/>

PATENT

An Incremental Feature Selection Algorithm for the Forecasting of Crop Production and Other Weather-Driven Phenomena. Inventors: Mark York & Dr. Ellen Cousins. Company: Weather Analytics LLC. Submitted: November 2015. Status: Pending

OTHER ACADEMIC RESEARCH

Precision Agronomy Research – SDSU Department of Plant Science

Dec 2009-May 2012

PI: Dr. Gregg Carlson

Brookings, SD

- Designed and executed experiments to optimize variable plant population and nitrogen rates
- Modeled yield-potential gradients fitting spline models to GIS feature data
- Results incorporated in “Best Management Practices for Corn Production in South Dakota” book

SDSU Prairie Cordgrass Genetics Laboratory

PI: Dr. Jose Gonzalez

Aug 2009-May 2010

Brookings, SD

- Goal was to map and modify the prairie cordgrass genome to create a more optimal biofuel
- Bacterial sub culturing, PCR DNA replication, sequencing of DNA segments and reassembly of genome

PROFESSIONAL EXPERIENCE

MCKINSEY & COMPANY – Consultant, Data Scientist

Sep 2016-Present

Global management consulting firm providing sound business advice and advanced analytics *Waltham, MA*

- Built a global weather-ingestion platform based on public data that is used across the firm
- Apply machine learning and stochastic methods to forecast global crop production and prices
- Use econometric and graphical models to predict global commodity trade flows
- Meet and advise the leadership of public and private organizations on how to manage agricultural risk and maximize risk-adjusted returns

TRACTORS FOR AFRICA – President and Co-Founder – tractorsforafrica.org

Jan 2015-Present

Non-profit organization providing agricultural technology to African farmers *Burkina Faso*

- Raised \$30,000 to send a container of refurbished American farm equipment to West Africa
- Moved to Burkina Faso to train farmers on proper use and maintenance of the equipment
- Developed a cooperative structure and operating charter for the farmers and hired a local project manager to ensure sustainability
- Designed an experiment to measure the effects of tillage equipment on soil structure and yield
- Tilled 43 acres for 20 farm families in the first year (2016)
- We raised an additional \$35,000 and are preparing to send two tractors in our second shipment.

WEATHER ANALYTICS – Director of Agronomic Data Science

Jan 2015-May 2016

Weather startup company providing weather data, crop forecasts and post-event forensics *Washington, DC*

- **Led a team of 3 agronomists** to develop biological and statistical crop models globally
- Built a fund-designation system for crop insurers with PCA, Stochastic techniques and Bayesian updating
- Created and taught a 120-hour agronomic modeling course to 12 actuaries when our client bought a crop insurer. This led in part to their decision to fund our entire Series A round of funding
- Wrote and successfully delivered **business proposals worth over \$250,000**
- Designed an incremental feature selection algorithm to create ensemble crop forecasts (patent pending)
- Automated parallel code execution with shell scripts and Crontab on AWS
- Worked with developers to create crop and weather GUIs for users in insurance, government and finance

CARGILL INC. – Quantitative Agronomist

Jan 2013-Dec 2014

Leading global provider of food ingredients and agricultural services *Wayzata, MN*

- Forecasted US corn, soybean and wheat area, yield and nutrient content
- Employed R and Visual Basic programs, weather, economic and NDVI satellite data
- Consulted with Cargill traders daily to inform trading strategy and risk management
- Built automated web scraping system which saved two months of annual work for three employees
- Designed and ran an experiment to determine final seed size of soybeans in hundreds of fields across the Midwest, contributing to **over \$60 million of soybean trading profits** in one month

INTERNSHIPS ALL FOUR SUMMERS

Pioneer Soybean Genetics Research, Syngenta Seeds, Novos Horizontes Poultry, Burkina Faso Chamber of Ag

VOLUNTEER PROJECTS/ACTIVITIES

Toastmasters - Club President

Mar 2013-Present

- Increased club membership from 22 to 40 in six months *Minneapolis, MN, Washington, DC*
- Achieved President's Distinguished Club (highest club honor) in 2015
- Won the International Speech Contest at the club, area, and division levels, and placed second in the district (one level before world finals)

SDSU Students' Association – Student Body President

Mar 2011-Apr 2012

- Introduced and successfully **lobbied an alcohol safety bill through the South Dakota State Senate** by a vote of 34-1. It finally passed both houses and was signed into law in 2016 *Brookings, SD*
- Successfully lobbied the Brookings City Council to implement bicycle lanes and grant a restaurant license to Buffalo Wild Wings
- Worked to re-design general graduation requirements during our shift from 128 to 120 required credits
- Helped design the expanded Student Union and four new residential halls

The Jimmy V Foundation for Cancer Research

Jul 2010-Aug 2010

- Planned a 48-day, 2,300-mile canoe trip from Brookings, SD to New Orleans, LA *USA*
- Raised over \$6,100 for the Jimmy V Foundation

TEACHING EXPERIENCE

Agricultural Modeling Course (With Weather Analytics)

Jul 2015-Aug 2015

- Taught an agricultural modeling course to 12 actuaries when our client purchased a \$600 million crop insurance company. Three weeks; 120 class hours *Houston, TX*
- Topics included agronomy, genetics, agricultural markets, and statistical and biological crop modeling

Junior Achievement

Mar 2013-Jan 2015

- Taught financial literacy courses to elementary students at the Adams Spanish School *St. Paul, MN*
- Material focused on basic economics, budgeting and the importance of saving for college

La Escuela Guillermo Dr. Mata Amado

May 2015-Jun 2015

- Taught English and Mathematics to 60 sixth-grade students in Spanish and English *Guatemala*
- Designed all curriculum and handled all teaching, grading and discipline

SKILLS

Fluent in four languages: French, Spanish, Portuguese and English

Computer Languages: Python, R, Matlab, Visual Basic, C, JavaScript, HTML

Other Computer Skills: AWS, bash/shell scripting, parallel programming, Linux/Unix, Crontab, Writing API Calls (NASA, NASS, Quandl, etc), LaTeX

Mathematical/Statistical Techniques: Bayesian Inference, Regression Modeling, Decision Trees, Classifiers, Monte Carlo Techniques, Principal Component Analysis (PCA), Canonical Correlation Analysis (CCA), Weiner/Bessel Processes, Kalman Filtering, Stochastic Calculus, Optimization Algorithms

Other Skills: Agile Development Scrum Master, Project Management, User Interface Design, Experimental Design & Analysis, Economic Modeling, Geospatial Modeling, Remote Sensing with Satellite Data