# Susan Vanderplas

## Curriculum Vitae

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## Education

2015 **PhD**, *Statistics*, Iowa State University.
Dissertation: The Perception of Statistical Graphics

2011 **MS**, *Statistics*, Iowa State University.

2009 **BS**, *Psychology & Applied Mathematical Sciences*, Texas A&M University.

## Professional Experience

2018 **Research Assistant Professor**, *Center for Statistics and Applications in Forensic Evidence*, Iowa State University.

2018 **Statistical Consultant**, *Nebraska Public Power District*.
Provided individual mentoring and project leadership to continue the Business Intelligence Embedded Agent program and provide support for R-related projects.

2015–2018 **Statistical Analyst**, *Nebraska Public Power District*.

2015–2015 **Postdoc**, *Iowa State University Office of the Vice President for Research*.

2014 **Consultant**.
Develop web applications, interactive data displays, and statistical analyses for clients including the Iowa Soybean Association, ISU Agronomy Labs, and the USDA.

## Scholarship

Contribution percentages estimated from git contributions using `git fame` where possible. Not all projects have github repositories for which this is meaningful.

In Progress

**A Convolutional Neural Network for Outsole Recognition** Use CNNs to automate identification of class characteristics in images of footwear outsoles. Submitted to Forensic Science International, July 2019.

**Testing Statistical Charts: What makes a good graph?** A review of research relating to the testing of statistical graphics across different domains and disciplines. Submitted to Annual Reviews, June 2019.

**Firearms Examination** (Book Chapter) An overview of statistical methods for firearms examination. Submitted July 2019; Under Review.

**Bullet Test Set Validation** Validate an algorithm for bullet matching on several test sets used to test forensic examiner proficiency. To be submitted to Forensic Science International, August 2019.

**Visual Inference for Bayesians** Visual Inference analyses for Bayesians, including estimation of the selection probability of null plots.

**Longitudinal Shoe Database** Design a database for sharing longitudinal shoe wear data, including powder prints, 2D scans, 3D scans, pictures, and crime-scene style casts and prints.

**Bullet Signature Resampling** Method for resampling bullet signatures used to calculate match and non-match score distributions.

## Grants

2019 — **NSF, USDA National Institute of Food and Agriculture**, *A Cyber-Physical System for Data-Intensive Farm Management*, PI, Under review (Submitted September 2019), $3,000,000.

2019 — **NSF**, *Overcoming the Rural Data Deficit to Improve Quality of Life and Community Services in Smart & Connected Small Communities*, PI, Under review (Submitted September 2019), $1,500,000.

2019–2021 — **USDA National Institute of Food and Agriculture**, *Understanding Opioid Risks in Rural and Micropolitan Communities: Economic Restructuring, Social Disorganization, and Local Responses.*, PI, Award number: 2018-68006-27640. Funded for FY 2018-2021, $498,401.00.

2019 — **NIJ R&D in Forensic Science**, *Automatic Acquisition and Identification of Footwear Class Characteristics*, PI, Under review (Submitted April 2019) $386,984.

2018–2019 — **NIJ R&D in Forensic Science**, *Statistical Infrastructure for the Use of Error Rate Studies in the Interpretation of Forensic Evidence*, Collaborator, Funded for FY 2019, $197,699 total, $57,596 ISU sub-award.

2018 — **NIJ R&D in Forensic Science**, *Passive Acquisition of Footwear Class Characteristics in Local Populations*, PI, Not funded, $383,104.

2018 — **NIJ R&D in Forensic Science**, *Evaluating Photogrammetry for 3D Footwear Impression Recovery*, PI, Not funded, $281,755.

## Invited Talks

2019 — **Statistical Lineups for Bayesians**, *JSM*, Section on Statistical Graphics, Denver, CO.

2018 **Clusters Beat Trend!? Testing Feature Hierarchy in Statistical Graphics**, *SDSS*, Reston, VA.

2015 **Animint: Interactive Web-Based Animations Using Ggplot2's Grammar of Graphics**, *JSM*, Seattle, WA.

2014 **The curse of three dimensions: Why your brain is lying to you**, *JSM*, Section on Statistical Graphics Student Paper Session, Boston, MA.

### Contributed Talks

2018 **Framed! Reproducing 150 year old charts**, *JSM*, Vancouver, BC.

2017 **A Bayesian Approach to Visual Inference**, *JSM*, Baltimore, MD.

2016 **Clusters Beat Trend!? Testing Feature Hierarchy in Statistical Graphics**, *JSM*, Chicago, IL.

2015 **Visual Aptitude and Statistical Graphics**, *InfoVis*, Chicago, IL.

2015 **Animint: Interactive, Web-Ready Graphics with R**, *Great Plains R User Group*, Sioux Center, IA.

2014 **Do You See What I See? Using Shiny for User Testing**, *JSM*, Boston, MA.

2013 **Signs of the Sine Illusion – why we need to care**, *JSM*, Montreal, ON.

### Software

2019 `groovefinder`, *Identification of grooves in scans of bullet land engraved areas.*.

2018 `ShoeScrapeR`, *Acquisition of Shoe Images and Metadata from Online Retailers*.

2018 `bulletxtrctr`, *Automated matching of 3d bullet scans*.

2018 `x3ptools`, *Reading, manipulating, and visualizing x3p files*.

2018 `bulletsamplr`, *Resampling of bullet signatures*.

2018 `ImageAlignR`, *Image registration algorithms for forensics*.

2013–2015 `animint`, *animated, interactive web graphics for R using d3.js*.

## Teaching

2019 **Stat 585 - Data Technologies for Statistical Analysis**, *Iowa State University*.
Co-taught, assisted with curriculum development. Mean evaluation: 4.92, Median: 5.0

2017–2018 **Business Intelligence Embedded Agent Program**, *Nebraska Public Power District*.
Design and implement a program to mentor employees, providing instruction in data science and opportunities to apply new skills within the company. Lead one-on-one and group mentoring sessions to create a sense of community and reinforce skills learned through online courses. Class size: 16

2017 **R Workshop**, *Nebraska Public Power District*.
3-day internal course on using R for data analysis.

2013–2014 **R Workshops**, *Iowa State*.
Introduction to R, ggplot2, data management and cleaning, package development, literate programming, and Shiny.

2011–2013 **Statistical Methods for Research**, *Iowa State*, TA.

2012–2013 **Introduction to Business Statistics II**, *Iowa State*, TA.

2011 **Empirical Methods for Computer Science**, *Iowa State*, TA.

# Mentoring and Advising

## Graduate Students

2018– **Miranda Tilton**, *Statistics*, Ph.D.
Footwear Class Characteristics and Computer Vision. Completed MS (Spring 2019).

2019– **Charlotte Roiger**, *Statistics*, MS.
Detection of Topological Features of Bullet Lands using Computer Vision. Estimated MS completion in Spring 2020. Co-advised with Heike Hofmann.

2019– **Joseph Zemmels**, *Statistics*, MS.
Analysis and Matching of Cartridge Cases. Estimated MS completion in Summer 2020. Co-advised with Heike Hofmann.

2019– **Eryn Blagg**, *Statistics*, MS.
Analysis of Wear Development in Three-Dimensional Shoe Scans. Estimated MS completion in Fall 2020.

## Undergraduate Students

2019– **Jason Seo**, *Computer Science and Statistics*, Undergraduate Research.
R package for visualization of neural networks using the python library keras-vis.

2019– **Jenny Ha**, *Computer Science*, Undergraduate Research.
Database design for storing bullet scans and intermediate analysis products.

2018– **Talen Fisher**, *Computer Engineering*, Undergraduate Research.
Tools for working with x3p files, database design for storing bullet scans and intermediate analysis products.

## Summer Research Programs

2019 **Molly McDermott and Andrew Maloney**, *Research Experience for Undergraduates*, Summer 2019.
Bullet Scan Quality and Machine Learning

2019 **Syema Ailia, Emmanuelle Hernandez Morales, Tiger Ji**, *Research Experience for Undergraduates*, Summer 2019.
Rapid Quality Control Tools for Confocal Microscopy Scans

2018 **Ben Wonderlin and Jenny Kim**, *Young Engineers and Scientists*, Summer 2018.
Footwear Class Characteristics and Computer Vision

# Service

2020– **Graphics Section Program Chair**, *ASA*.

2019

**Uncoast Unconference Organizing Committee**, Des Moines, IA.

Organized the first R Uncoast Unconference to bring R developers in flyover country together for a 3-day event. Over 50% of the participants at the conference were women or minorities, and participants included students, academics, and industry R programmers with a variety of experience levels in R programming.

2019

**Gertrude Cox Scholarship Committee Member**, *ASA*.

Assisted with selection of the Gertrude Cox Scholarship recipients and honorable mentions.

2017
2019

**Graphics Section Representative to the Council of Sections**, *ASA*.