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Nelson Abdiel Colón Vargas, Ph.D.

(Nel Abdiel)

EDUCATION

The Data Incubator, Washington, D.C.
Certificate in Data Science
Selected among the less than 4% of +1900 applicants.

University of Iowa, Iowa City, Iowa.
Ph.D., Mathematics
Thesis Title: Localized Skein Algebras As Frobenius Extensions.
Advisor: Dr. Charles Frohman
M.Sc., Mathematics

University of Northern Iowa, Cedar Falls, Iowa.
M.A., Mathematics
Research Paper: Discrete Subgroups of $SL_2(\mathbb{R})$.
Advisor: Dr. Min Ho Lee

University of Puerto Rico, Rio Piedras Campus, San Juan, Puerto Rico.
B.Sc., Mathematics

PUBLICATIONS

- **The Localized Skein Algebra is Frobenius**, Nel Abdiel and Charles Frohman, *Algebraic and Geometric Topology* Volume 17, Issue 6, October 2017.

- **Frobenius Algebras Derived From The Kauffman Bracket Skein Algebras**, Nel Abdiel and Charles Frohman, *Journal of Knot Theory and its Ramification*, Volume 25, Issue 04, April 2016.

EXPERIENCE

Microsoft, Redmond, WA / Humacao, P.R.

Data & Applied Scientist II - Anti Piracy Services, June 2016–Present

Loop Marketing Intelligence, Charleston, S.C.

Data & Analytics Development Consultant, Jan 2018–Present

- Design and build predictive model for the platform's recommendation system based language processing and sentiment analysis.
- Help design and build data storage and pipelines to handle ETL.

Soteria - Security Consulting & Data Analytics, Charleston, S.C.

Data Scientist, June 2016–Present

- Developed predictive models to detect Phishing emails and websites based on content and attributes using Python Packages such as Scikit-Learn, NLTK and Pandas.
- Built algorithms to detect large scale Phishing campaigns with the use of Clustering techniques and Natural Language Processing.
- Concocted machine learning classifiers from Scikit-Learn to detect and correctly identify different phishing techniques such as Typosquatting, Spoofing, Whaling and Spear Phishing among others.
- Created ranking system algorithms to prioritize human revision of current threats.
- Developed text classification models to assess risk of brand infringement with the use of Python packages like NLTK and WordNinja.
- Wrote MapReduce jobs to detect patterns in daily and historical domain name registrations.
- Used statistical analysis on usability data to better understand and enhance user engagement and user story.
- Designed auto generated, data-oriented marketing material for social media with the use of Python, LaTeXand the Twitter API.
- Designed and develop auto generated, data-driven monthly report template with detailed analysis of performance and usage of products.
- Engineered and maintain analytics API with the used of Cassandra and Python packages like Pandas, SciKit-Learn, Flask.
- Contributed to the analysis and writing in forensic investigation reports.
- Ameliorated solutions by redesigning ETL and data analytics to function as a Linux service.
- Created software for feature extraction from unstructured data from +30000 websites a day.

- Devised Python pipeline to automate the classification of +30000 websites received per day.
- Involved in the decision making and engineering of technologies and infrastructure for ETL.
- Contributed to the writing of the technical section of an NSF SBIR/STTR grant proposal.
- Contributed to the analysis and writing in forensic investigation reports.
- Developed probabilistic model to predict the outcome of ping pong matches in the office.
- Designed and implemented new OSSEC rules to improve efficiency in data collection.

K2 Data Science, New York City, N.Y.

Data Science Curriculum Consultant, December 2016–July 2017

- Designed and developed assignments with detailed solutions for the the following subjects: Data Cleaning and Preprocessing, Exploratory Data Analysis, Regression, Classification.
- Helped plan and develop comprehensive learning material to aid students with assignments and to prepare them for their future roles as Data Scientists.

The Data Incubator, Washington, D.C.

Data Scientist Fellow, Winter 2016
Capstone Project: http://iokilos.herokuapp.com

- Analyzed the distribution of world records in Olympic Weightlifting using the Naive Bayes Classifier from Scikit-Learn.
- Developed an app for strength athletes' training cycles using Clustering Algorithms. The data was scraped from over a thousand pages from various websites.

Other Projects:

- Conducted open-ended analysis of user behaviors on 9+GB of StackOverFlow XML data using Scala, and Spark.
- Analyzed 10+GB of XML data from Simple English and Thai Wikipedia with MapReduce.
- Web scraping and social graph analysis of more than 100,000 photo captions from NYC Social website using Python (Networkx, BeautifulSoup, and Pandas).
- Developed pipelines with Python (Scikit-Learn) for predicting star reviews for businesses based on Yelp's academic dataset.
- Performed Natural Language Processing analysis on Yelp's academic dataset, 325+MB of json data, with Python (NLTK and Scikit-Learn).
- Developed Time Series model for weather data to predict temperature.
- Analyzed New York food inspection reports for the last 4 years, approximately 530,000 records, using advanced SQL and Python (Pandas).

Topology Research, University of Iowa

Graduate Research Student, August 2012-May 2016
Professor Charles Frohman

- Developed a method for reducing the exponential time of Skein computations in Quantum Topology to linear time.
- Provided the first equation to produce actual examples of the existence of torsion in the Kauffman bracket skein algebra.

University of Iowa

Independent Instructor (responsible for all course duties)

- 22M:009 Elementary Functions, Fall 2015
- 22M:008 College Algebra, Summer 2015 & Spring 2014
- 22M:125 Qualifying Exam in Topology Preparation Seminar, Summer 2014
  (Graduate course)

Teaching Assistant (led discussions, graded homework & quizzes, held office hours)

- 22M:133 Manifolds, Spring 2014
  (Graduate course)
- 22M:132 Point Set Topology, Fall 2013
  (Graduate course)
- 22M:016 Calculus For The Biological Science, Spring 2015, Spring 2012 & Fall 2011

Florida State University

Teaching Assistant (led discussions, graded homework & quizzes, held office hours)

- MGF1107 Math for Liberal Arts, Spring 2011
- MGF1106 Math for Liberal Arts, Fall 2010

University of Northern Iowa

Research Assistant, Summer 2010

- Supervised a group of undergraduate researchers working towards generalizing the Black-Scholes model.

University of Northern Iowa

Researcher in Number Theory, Spring 2010

- Studied the relation between discrete subgroups of $SL_2(\mathbb{R})$ and arithmetic functions in number theory.

University of Puerto Rico, Rio Piedras Campus

Teaching Assistant (led discussions, graded homework & quizzes, held office hours)

- Mate3028 Precalculus I-II Summer 2008, 2009
- Mate3024 Precalculus II, Summer 2004
- Mate3023 Precalculus I Summer 2003, Summer 2005

University of Puerto Rico, Center for Biostatistics And Bioinformatics

Researcher in Biostatistics and Bioinformatics, Fall 2008 - Spring 2009

- Responsible for analyzing data and creating statistical models with R.

University of Puerto Rico, Biochemistry and Biophysics Lab

Researcher in Biochemistry and Data Analyst, Fall 2007 - Spring 2009.

- Responsible for collecting data by ways of experimentation and the mathematical analysis of such data.

Tutoring Experience

- Mathematics Tutorial Lab at University of Iowa, Fall 2011 - Spring 2012, Fall 2014
- Mathematics Tutorial Lab at University of Northern Iowa, Fall 2009 - Spring 2010
- Mathematics Tutorial Lab at the University of Puerto Rico, Rio Piedras Campus, Fall 2003 - Spring 2005, Fall 2007 - Spring 2009

Grading Experience

- Grader for Linear Algebra at University of Iowa, Fall 2015.
- Grader for Ordinary Differential Equations at University of Northern Iowa, Spring 2010.
- Grader for Math and Decision Making at University of Northern Iowa, Fall 2009.
- Grader for Calculus I at University of Northern Iowa, Fall 2009.

INDEPENDENT PROJECTS

Olympic Weightlifting, A Sport Of Numbers.

Click to read on Medium.

- Optimized the Sinclair formula used in Olympic Weightlifting, using Python and Pandas.

Most Consistent Hitters In The Last 30 Years.

Click to see on Kaggle.

- Exploring consistency among Ball players with great batting averages.

The Cost of A Home Run From a 50 Home Run Club Member.

Click to see on Kaggle.

- Analyzed baseball data to uncover the top ten 50 Home Run better paid-per-home-run players.

Starting Pitchers Get Pulled After 2 BB.

Click to see on Kaggle.
Click to read on Medium.

- Analyzed pitching data from 1871-2015 to determined when is the right time to pull a pitcher.

Raspberry Pi/Python Twitterbot

https://twitter.com/nelabdielbot
Click to see one of the scripts on Github.

- Programmed a Raspberry Pi to tweet on its own using Python and the Twitter API.

ConcertiPy!

http://concertipy.herokuapp.com

- Created a web application that uses both the Spotify and BandsInTown API to find events nearby of those artists you follow.

PRESENTATIONS

Talks

- "The Localized Skein Algebra is Frobenius", USTARS, Florida Gulf Coast University, April 2015.
- "The Localized Skein Algebra is Frobenius", Oklahoma State University, Topology Seminar, March 2015.
- "The Localized Skein Algebra is Frobenius", University of Iowa, Topology Seminar, March 2015.
- "Chain Complex and Intersection Homology", University of Iowa, Topology Reading Seminar, January 2015.
- "A Brief Introduction To Geometric Group Theory", University of Iowa, Graduate And Undergraduate Student Seminar, November 2014.

- "2-TQFT and Frobenius Algebras", University of Iowa, Graduate And Undergraduate Student Seminar, September 2014.
- "Examples Of Finitely Generated Skein Algebras", University of Iowa, Topology Seminar, Spring 2014.
- "Groups Acting on Hyperbolic Spaces", University of Iowa, Topology Reading Seminar, Fall 2013.
- "Existence And Uniqueness of Prime Decompositions Of 3-Manifolds", University of Iowa, Topology Reading Seminar, Spring 2013.
- "The Geometry And Topology Of 3-Manifolds", University of Iowa, Topology Reading Seminar, Fall 2012.
- "A Brief Introduction to TQFT, University of Iowa", Underground Topology Seminar, Fall 2012.
- "The L-Function Of An Automorphic Form", University of Iowa, Representation Theory Seminar, Spring 2012.
- "Eisenstein Series And The Sum of Divisors Function", University of Iowa, L-Function Seminar, Fall 2011.
- "A Brief Introduction To Modular Forms", University of Puerto Rico, Rio Piedras Campus, Undergraduate Seminar, Spring 2011.
- "Modular Forms/Functions And Their Relation With Arithmetic Functions In Number Theory", Florida State University, Algebra Seminar, Fall 2010.

Guest Lecturer

- "Rank Vs Genus of 3-Manifolds", University of Iowa, Math Department, Fall 2013.
- "Representations of Knot Groups", University of Iowa, Math Department, Fall 2013.
- "Fundamental Groups of (p,q)-Torus Knots", University of Iowa, Math Department, Fall 2012."

Posters

- "Computations in the Relative Skein of a Local Annulus," USTARS (Underrepresented Students in Topology and Algebra Research Symposium), University of California, Berkeley, CA, April 2014.

CONFERENCES/WORKSHOPS ATTENDED

- USTARS, Florida Gulf Coast University, 18-19 April 2015.
- GSTGC, University of Illinois, Urbana-Champaign, 28-29 March 2015.
- 52nd Texas Geometry And Topology Conference, UT Austin, November 14-16 2014.
- The 10th William Rowan Hamilton Geometry And Topology Workshop, The Hamilton Institute at The University of Dublin, August 26-30 2014.

- Workshop on Contact Geometry in Dimension Three And Higher, University College London, July 28 - August 1 2014.
- Cube Complexes and Groups, Centre For Symmetry And Deformation, July 7-11 2014.
- The 31st Annual Workshop in Geometric Topology, UWM, June 12-14 2014.
- Gear Junior Retreat, University of Michigan, May 23-June 1 2014.
- Georgia Topology Conference, UGA, May 21-25 2014.
- RTG Workshop on Geometric Structures And Discrete Groups, UT Austin, May 2-4 2014.
- USTARS, UC Berkeley, April 11-13 2014.
- GSTGC, University of Texas, Austin April 2-4 2014.
- Physics and Mathematics of Link Homology, CRM, June 24-July 5 2013.
- Cube Complexes and 3-manifolds, University of Illinois at Chicago, May 20-30 2013.
- The Topology of 3-dimensional Manifolds, CRM, May 6-17 2013.
- USTARS, Purdue, April 19-21 2013.
- GSTGC, Notre Dame, April 6-7 2013.

SERVICE

NodeSC

Data Science Mentor, March 2017–Present

The Data Incubator, DC

- Social Chair, Winter 2016

University of Iowa

- University of Iowa Math Department Graduate Program Recruiter
  - SIDIM Conference, University of Puerto Rico, Mayagüez Campus, February 2015
- Faculty Mentoring Workshop Panelist, November 2014
- Iowa Math Modeling Competition Judge, Fall 2014
- Graduate Student Senate
  - International Committee Member, Spring 2012 - Spring 2014
- COGS Steward, Fall 2012 - Spring 2013
- TAPE Orientation for International Students Panelist, February 2012

United Ways of East Central Iowa

- Volunteer Translator, July 2014

SELECTED AWARDS AND HONORS

- Data Science Fellowship at the Data Incubator D.C.
- Ballard Seashore Fellowship at the University of Iowa.
- GAANN Fellowship at the University of Iowa.
- Latin American-Caribbean Scholarship at Florida State University.
- AGEP Scholarship at the University of Northern Iowa.

PROFILES

- https://linkedin.com/in/nelabdiel
- https://github.com/nelabdiel
- https://medium.com/@nelabdiel
- https://medium.com/data-science-nel
- https://www.kaggle.com/nelabdiel
- https://twitter.com/nelabdiel

PROFESSIONAL MEMBERSHIPS

- Geometric Structures And Representation Varieties (GEAR), 2014-Present.
- American Mathematical Society (AMS), 2009-Present.

REFERENCES

Available upon request.

Last updated: February 9, 2018