Singelyn Center for Innovative Analytics Five-Year Report (Nov 2018-June 2024)

Authors: Rita Kumar, Mehrdad Koohikamali, Anthony W. Orlando, Mohammad Salehan, Sonya Zhang

Background

In 2018, a generous donation from alumni **David and Ruth Singelyn** to the College of Business Administration made it possible to launch the Singelyn Center for Innovative Analytics (SCIA) as a collaborative hub for innovative education, industry partnerships, and applied research. The Center officially launched in November of 2018.

A. Mission

The *Singelyn Center for Innovative Analytics* aims to empower the next-generation workforce with the advanced visualization and innovative analytics skills needed to enhance organizational effectiveness by transforming data into actionable insights.

B. Goals and Objectives

Goal 1. Innovation in Education

The Center enables the College of Business Administration to help solve organizational and societal challenges through cross-disciplinary applied research and integrate these activities into its teaching & research programs. The Center supports new and existing academic programs and is a collaborative hub for delivering experiential learning across the College of Business Administration and campus.

Goal 2. Industry Engagement and Partnerships

The Center brings together academics, students through cross-disciplinary teams, and practitioners to collaborate on data analytics projects. The Center offers unique opportunities to our students for hands-on experiences with cutting-edge tools applied to relevant industry, societal, or university projects, preparing the workforce of tomorrow. The Center's activities are aimed at impacting organizations where analytics, visualization, and technology can provide decision-makers with new forms of intelligent support.

Goal 3: Research for Impact

The Center provides a basis for creating and sharing knowledge across industry and academia, and aims to establish an academic center of excellence that engages academics widely.

Faculty Affiliations

Rita Kumar, PhD – Director

Dr. Kumar is a Professor of Technology and Operations Management in the College of Business Administration at Cal Poly Pomona. Her research interests include prescriptive analytics, with a focus on heuristic solutions to optimization problems; and assurance of learning. Her research has been published in journals including Management Science, The Service Industries Journal, International Journal of Hospitality Management, and Journal of Supply Chain and Operations Management. She has presented her research at conferences including Decision Sciences Institute, Western Decision Sciences Institute, Production and Operations Management Society, and The Institute for Operations Research and the Management Sciences.

Dr. Kumar has co-led several industry and community partnership projects at the Center, which provide real-world experiential learning opportunities for students. These include collaborations with Boeing, the City of Pomona, PCV Murcor, Intertrend, Meta Reality Labs, Southern California Real Estate Research Council, and Cal Poly Pomona University Advancement.

Dr. Kumar has mentored student teams who have presented their research at conferences including Decision Sciences Institute Annual Conference, Meeting of the Minds Annual Conference, and CPP RSCA Annual Conference. Dr. Kumar has also mentored Kellogg Honors College students working on their capstone projects in analytics. She serves as an advisor to two student clubs: MISSA (Management Information Systems Student Association) and OMS (Operations Management Society). From the inception of the Center, Dr. Kumar has offered regular workshops for students on Data Visualization Using Tableau, and has collaborated on offering workshops introducing students to Geographic Information systems (GIS). She has collaborated on developing and has taught analytics courses at both the undergraduate and graduate levels.

Mehrdad Koohikamali, PhD – Co-Director

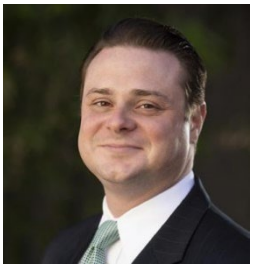
Dr. Koohikamali has been involved in the center's activities since 2019, when he joined the university. Since then, he has initiated several main projects focusing on the value of location data and geographic information systems (GIS). His 15 years of experience within the GIS industry helped build a portfolio of projects that can take advantage of spatial components in various business contexts, including Intertrend and the City of Pomona in 2019. During previous academic years, he led the GIS workshop training and certification offered for free to students, faculty, and staff. Invited GIS speakers were a milestone in providing GIS knowledge to the college.

Dr. Koohikamali also focuses on text mining and helps clients draw insights from unstructured text data. Through the center, he worked with two other colleagues to help a client process massive amounts of maintenance data in text and build machine learning models to predict common issues and defects important to the client. Due to the increasing popularity of large language models (LLMs), he pioneered

equipping the center with a graphical processing unit (GPU) server capable of building complex models. The complexity of designing a GPU server and security considerations were challenges Dr. Koohikamali helped overcome over a year. The center's access to a secure GPU allows it to use client-sensitive data and build complex models without needing cloud services that could have potential threats.

Finally, Dr. Koohikamali's active scholarly work within the center has enabled students to take advantage of some project outcomes and build scholarly work. Over the past year, two groups of students attended prestigious national conferences to present their work, and their travel was supported partially through the center. Dr. Koohikamali's research has focused on location analytics, misinformation, social media, and data analytics. His new efforts are focused on building advanced digital twin infrastructures for smart cities. He led a grant submission to NSF focused on an Interoperable and Open Digital Twin Water Infrastructure Framework for Smart and Connected Communities in Spring 2024. He also received SPICE grant funding to work on "Digital Twin Transformation: Bridging Geomatics and Business Intelligence for Enhanced Decision Making" in Spring 2025. Dr. Koohikamali's GIS, drone, and data analytics expertise makes him an appropriate asset for the center's future.

Anthony Orlando, PhD, CFA



Anthony W. Orlando is an Associate Professor in the Finance, Real Estate, & Law Department at California State Polytechnic University, Pomona. He holds the titles of Scholar of Analytics for the Singelyn Center for Innovative Analytics, and Visiting Scholar at the Federal Reserve Bank of Atlanta. He serves as the Co-Advisor of the Cal Poly Pomona Finance Society, and he serves on the Public Finance Authority Board for the La Verne Enhanced Infrastructure Financing District

Dr. Orlando is the author of the book, "Keeping Races in Their Places: The Dividing Lines That Shaped the American City". His research has appeared in top academic journals, including Real Estate Economics, Housing Studies, The Annals of the American Academy of Political and Social Science, the Journal of Real Estate Finance and Economics, Inquiry: The Journal of Health Care Organization, Provision, and Financing, Energy Economics, the Indiana Health Law Review, Trends in Genetics, Ageing Research Reviews, the American Journal of Medicine, the American Journal of Law & Medicine, the Annals of Health Law, and the Wharton Real Estate Review.

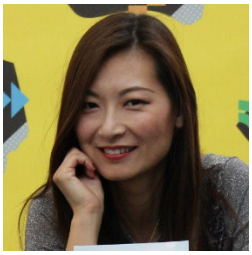
Dr. Orlando received his bachelor's degree in economics from The Wharton School of the University of Pennsylvania, as well as a master's in economic history from the London School of Economics and Political Science and a master's in professional writing from the University of Southern California. He holds a Ph.D. in public policy and management from the USC Price School of Public Policy. He is a CFA charterholder and a member of the CFA Society of Los Angeles.

Mohammad Salehan, PhD

Dr. Salehan is an Associate Professor of Computer Information Systems and a key contributor to the Center for Innovative Analytics. With a strong background in software engineering, including five years of industry experience, Dr. Salehan has evolved his expertise to encompass Machine Learning, Big Data, and Cloud Computing. He focuses on implementing advanced analytics solutions in cloud environments, a proficiency validated by his AWS Certified Machine Learning Specialty. This unique blend of software engineering experience and cutting-edge data science skills positions Dr. Salehan at the forefront of data-driven business solutions. Dr. Salehan's contributions to the field have been recognized in premier journals, and he was awarded the College of Business Administration's Sheth Award for Scholarly Excellence in 2021.

Since the center's establishment in 2018, Dr. Salehan has been an integral part of the Cal Poly Pomona Center for Innovative Analytics. His involvement has been marked by significant industry collaborations, bridging the gap between academic research and real-world applications. He co-supervises student projects in partnership with Boeing each year, providing students with hands-on experience in applying advanced analytics, such as Large Language Models (LLM), to complex business problems. Dr. Salehan has expanded his industry engagement by supervising student projects with American Homes for Rent (AMH) in recent years. These projects offer students additional opportunities to work on real-world data challenges and gain valuable industry exposure.

Sonya Zhang, PhD



Dr. Zhang's research interests include Data Analytics (Web and mobile analytics, data visualization, data mining, machine learning, and Python), Web and Software Development, Digital Product Management, Internet Entrepreneurship, and Online Learning. She co-authored The Smarter Startup: A Better Approach to Online Business for Entrepreneurs. She has also published in numerous journals and conference proceedings, including the Journal of Computer Information Systems, ACM Interactions, International Journal of Business Analytics, Journal of Management Analytics, International Journal of Social Media and Online Communities, International Journal of Mobile Human-Computer Interaction, International Journal of Healthcare Information Systems and Informatics, Journal of Information Systems Education, Journal of Information Technology Education, HICSS, AMCIS, and IEEE conferences.

Dr. Zhang has been a Professor of Analytics at the Singelyn Center for Innovative Analytics since 2019. Dr. Zhang contributed to the MSBA program by developing and teaching GBA 6410 Social Media Analytics and Text Mining. She drafted and gained approval for the new Advanced Artificial Intelligence for Business program proposal, including the ECO for its core course GBA 6601 Machine Learning and AI Fundamentals through the Graduate Studies Committee (GSC). She mentored several undergrad and graduate students to publish and present research projects at student conferences such as RSCA, CARS, CBA Business Research Showcase, and the Annual Meeting of Western Decision Science Institute (WDSI). Advised and supported student participation in competitions, including ITC, Bronco Startup Challenge, AI Hackathon, and AI Fair. Recently, she worked with Inland Empire Health Plan (IEHP) to explore a data analytics/machine learning project.

Center Advisory Board

The Center's Industry Advisory Board collaborates with Center faculty to establish the strategic direction of the center, align the college with industry trends and new ideas, and build opportunities for students. Sean Bennett serves as the Chair of the Advisory Board, along with Board Members Erik Franks, Hardik Goel, Scot Muller, and Stephen Smirl.

Sean Bennett
Meta – (former)Head of Channel Operations, Reality Labs (RL)

Erik Franks
John Burns Real Estate Consulting - Senior Vice President, Information Management

Hardik Goel
American Homes for Rent - Senior Vice President, Data Science & Research

Scott Muller
Manager – Esri, Business Intelligence

Stephen Smirl
Envista - Director, Data and Analytics, Business Intelligence

Initiatives and Activities

Industry and Community Partnership Projects

The Singelyn Center for Innovative Analytics has purposefully focused on industry and community-led projects, allowing students to gain real-life experiences through continuous collaboration with industry and community partners. More importantly, SCIA's mission is to serve undergraduate and graduate students in their pursuit of a well-rounded education that blends curricular content with real-world experiences to increase their career readiness. Students work in teams with guidance from faculty advisors and mentorship from the industry and community partners, and the projects culminate with final presentations to the partner organizations. Benefits to students include experiential learning using real-world data, learning analytics tools and techniques, and developing leadership, teamwork, and communication skills. Singelyn Center projects have spanned multiple departments in the College of Business and students from other colleges.

Boeing:

The Singelyn Center has partnered with the Boeing Company throughout the Center's five-year history. **Dr. Kumar's** prior leadership of student analytics projects with Boeing facilitated the continuation of the partnership with the establishment of the Singelyn Center. These projects have spanned a variety of analytics challenges, ranging from using augmented reality for real time object classification to focusing on various aspects related to aircraft corrosion, including analysis of aircraft corrosion risk, and text classification of aircraft maintenance data.

2021-2022 through 2023-2024 Projects: Using Machine Learning to Derive Insights from Aircraft Maintenance Records

Focus: The focus of these projects was on deriving valuable insights from freeform aircraft maintenance records related to corrosion by developing a machine learning model for natural language processing (named entity recognition model), capable of identifying most frequently occurring patterns. In the first year, the team worked on extracting key information from maintenance records obtained from a database maintained by the Rochester Institute of Technology, as a pilot for developing a model. In the second and third years, students worked with data specific to Boeing's maintenance records with results and insights specific to the Boeing aircraft corrosion context.

Faculty Advisors: Dr. Mohammad Salehan, Dr. Rita Kumar, Dr. Mehrdad Koohikamali

Student Team (2023-2024): Dylan Ton (CIS), Adam Adrian Chua (CIS), Hua Yang (MSBA), Nathan Leung (CIS), Rishabh Aji (MSBA)

Student Team (2022-2023): Giang Nguyen, Nhi Nguyen, Katie Truong, Nicholas Schlesinger

Student Team (2021-2022): Stefan Chu, Sherleen Lee, Sean Ta, William Vong

2020-2021 Project: Augmented Reality Real Time Object Classification

Focus: The goal of this project was to develop a smartphone application that can take photos of objects and classify them in real time into predetermined categories. Students developed a machine learning model based on convolutional neural networks that was trained on photos of a mock-up provided by Boeing and images of objects from a publicly available database. The application classifies photographs of objects in real time and augments the user's view with an identifying label and confidence level.

Faculty Advisors: Dr. Mohammad Salehan, Dr. Rita Kumar

Student Team (Machine Learning Model Development): Bryan Marquez, Lei Wang, Sinmei Chan, David Wen
Student Team (Android Application Development): Luke Knight, Raymond Kim, Joshua Chun, Marco Rabottini, Jesse Hernandez, Matthew Harris

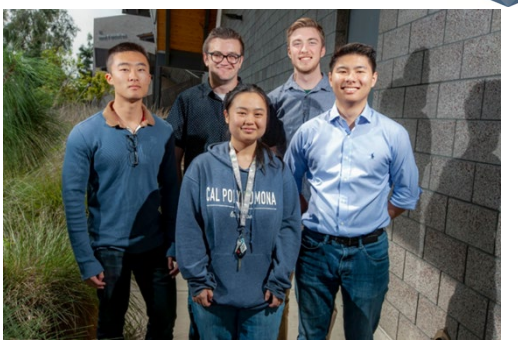
2018-2019 and 2019-2020 Projects: Developing Predictive Corrosion Analysis Capability

Focus: The goal of these projects was to develop predictive corrosion analysis capability for Boeing based on known environmental fleet exposures and corrosion inspection conditions. Data provided by Boeing included aircraft flight and location history, and corrosion conditions from inspection at maintenance depots, for a fleet of aircraft. Boeing also provided a series of MAUS (Mobile Automated Ultrasonic Scanner) images for a subset of the aircraft in the fleet. The teams supplemented this data with data on corrosivity indexes based on location, and weather data from the National Oceanic Atmospheric Administration. The Center collaborated with the College of Engineering during the first year of this project, for their expertise on corrosion specifics. The team used a publicly available tool (ISO Corrosivity Category Estimation Tool: ICCET) during the first year. During the project's second year, the team worked with a tool specifically developed for the Boeing context. Key insights included identifying relationships between time spent at specific locations and the extent of corrosion (which did not always confirm to publicly available location corrosivity indexes), and the role of maintenance discipline in inspected corrosion conditions.

Faculty Advisors: Dr. Rita Kumar, Dr. Mohammad Salehan

Student Team (2019-2020): Erica Buenrostro, Alivia Castillo, Mark Gordon, Samuel Lee, Blake Ogeris, Jennifer Ware, Andrew Welch

Student Team (2018-2019): Brandon Krebs, Erik Larsen, Kevin Lee, Ryan Tung, Kathleen Wong



City of Pomona:

Shortly after the establishment of the Singelyn Center, **Dr. Kumar** and **Dr. Orlando** (along with Dr. Ruth Guthrie) started meeting with officials from the City of Pomona to explore a partnership on issues related to homelessness in the city. The partnership was formalized in March 2020, and students started working on projects with the City in Fall 2020.

2022-2023 Project: City of Pomona Rental Affordability and Tenant Protection Strategies

Focus: This project was completed in three stages. In Stage 1, students delved into the history of housing injustice in the US and researched housing policies designed to bend the arc towards justice, including more recent initiatives to prevent homelessness and evictions during the COVID-19 pandemic. In Stage 2, students researched the short-term and long-term effects of rent stabilization policies, and performed a comparative analysis of rental market variables in Los Angeles County and the City of Pomona. In Stage 3, students analyzed the role of tenant protection strategies in lowering evictions. Students used ArcGIS for mapping and visualizations throughout the project, helping identify neighborhoods in the City of Pomona and neighboring areas where rental affordability may be most threatened. They used Social Equity Analysis to generate a comprehensive index to help understand the areas in Pomona that may be most vulnerable to evictions.

Faculty Advisors: Dr. Anthony Orlando, Dr. Rita Kumar

Student Team: Marvin Alvarado, Andrew Cornejo, Victor Miller, Dat Nguyen, Gialeny Serrano, Paul Williams

2011-2022 Project: City of Pomona Community Solutions for Pomona's Homelessness

Focus: This project was completed in two phases. In Phase 1, students created a resource guide, mapping resources in various categories of service and including COVID-19 vaccine location sites. In Phase 2, they developed strategic planning dashboards, based on analysis of data from the city and publicly available data, to highlight key indicators including individuals served by the range of programs offered in Pomona. Students used ArcGIS and Tableau throughout the project for geocoding, mapping, visualizations, and analysis.

Faculty Advisors: Dr. Anthony Orlando, Dr. Rita Kumar

Student Team: Allegra Roza, Andres Meave, Sanika Gavankar, Ryan Thompson

2020-2021 Project: City of Pomona Homeless Community Resources and Services Guide

Focus: This project was completed in three stages. In Stage 1, students compiled resources and service information to create a directory. In Stage 2, they mapped the resources, mapped and analyzed homeless counts data for the city by census tracts, and mapped and analyzed demographic and socioeconomic data (e.g., income, population) for the city by census tracts. In addition to data from the City of Pomona, students utilized publicly available data sets from sources including LAHSA Homeless Census Tracts, ESRI ArcGIS online datasets, and the Bureau of Labor Statistics. This helped identify areas in the city that would most benefit from additional services. In Stage 3, they developed a mobile and web app to help connect community members with resources and services, including identifying quickest routes. Students used ArcGIS for geocoding, mapping, and app development, and Tableau for additional visualizations and analysis.

Faculty Advisors: Dr. Rita Kumar, Dr. Anthony Orlando, Dr. Mehrdad Koohikamali

Student Team: Vianney Echeverria, Jesus Duran, Alondra Valadez, Feiyu Han, Johans Acosta, Leo Ngo

Southern California Real Estate Research Council:

The Singelyn Center partnered with the Southern California Real Estate Research Council on a project to identify opportunities for affordable housing development in Pomona.

2023-2024 Project: Affordable Housing Development in Pomona

Focus: The focus of this project was on identifying eligible parcels of land for potential affordable housing development in Pomona and prioritizing based on sustainability criteria. These included consideration of environmentally sensitive areas, and proximity to facilities such as transit, healthcare, and grocery stores. Students also incorporated criteria related to 'health places', such as education, job opportunities, and clean air and water. Data sources included the Los Angeles County Assessor's portal, the Southern California Association of Governments, the Healthy Places Index, and CoStar, with mapping and analysis via ArcGIS and Tableau.

Faculty Advisors: Dr. Anthony Orlando, Dr. Rita Kumar

Student Team: Margaret Anderson (ACC), Nicole Cromwell (IB), Enrique Jimenez (CIS), Ilke Suzer (URP), Adam Wakoli (GEO), Cristopher Zavala (FRL)

American Homes 4 Rent (AMH):

Dr. Kumar, **Dr. Koohikamali**, and **Dr. Salehan** started conversations with American Homes 4 Rent in 2021 on possible partnership projects. The partnership was formalized in Spring 2022, and students started working on analytics projects in Fall 2022. This partnership has focused on students in the MSBA (Master of Science in Business Analytics) program. Selected students from the program work on these projects as part of their culminating experience.

2023-2024 Project: Analyzing Rental Property Churn, Vacancies, and Property Quality

Focus: The focus of this project is on helping AMH optimize the property management strategy through enhancing overall customer satisfaction, reducing churn, and minimizing vacancy durations. Specific objectives include measuring the quality of a property based on maintenance data and customer surveys, analyzing the relationship between property quality and customer satisfaction, identifying the factors affecting customer churn, predicting the customers most likely to churn, and explaining why certain properties remain vacant more than others in the AMH portfolio and on the market.

Faculty Advisor: Dr. Mohammad Salehan

Student Team: Anh Nguyen (MSBA), Dan Nguyen (MSBA), Daniel Nguyen (MSBA), Noemi Ferman (MSBA), Ronald Carillo (MSBA)

2023-2024 Project: AI-Enhanced Analysis of Tenant Attributes and Sentiment Dynamics for Improved Property Management

Focus: The focus of this project is on investigating factors that influence residential property tenants' stay-or-go strategies, utilizing AI-driven sentiment analysis techniques to evaluate tenant sentiment over time; investigate relationships between move-in/move-out surveys and tenant sentiment, propensity for lease renewals and overall satisfaction; and to employ AI predictive models to forecast the likelihood of a tenant renewing their lease.

Faculty Advisor: Dr. Mehrdad Koohikamali

Student Team: Eric Young (MSBA), Jose Ortiz (MSBA), Nicholas Fiumetto (MSBA), Spoorthi Kumaraswamy (MSBA), Vy Nguyen (MSBA)

2022-2023 Project: Rental Home Maintenance Analytics

Focus: This project focused on understanding the factors (for example, age and location) that contribute most to historical maintenance costs in the categories of HVAC, Plumbing and Roofing, with the objective to predict upcoming maintenance work orders for any given home.

Faculty Advisor: Dr. Mohammad Salehan

Student Team: Chris Carvalho (MSBA), Karen Chu (MSBA), Hunter Donnan (MSBA), Giang Nguyen (MSBA), Tyler Rich (MSBA)

Meta Reality Labs:

In 2021, **Dr. Kumar** and **Dr. Koohikamali** started working with **Sean Bennett**, Chair of the Singelyn Center Advisory Board, to scope out a partnership project with Meta. The agreement was formalized in 2022, and students completed the project in Spring 2023.

2022-2023 Project: Retail Store Segmentation and Inventory Policies

Focus: In this supply chain analytics project, students segmented US retail stores by sales and inventory levels, and identified high and low performing stores. They also forecast store level sales, and used the results of the segmentation and forecasting analyses to develop store level inventory stocking policies designed to maintain desired service levels.

Faculty Advisors: Dr. Rita Kumar, Dr. Mehrdad Koohikamali

Student Team: Raquel Espiritu (MSBA), Anh Nguyen (MSBA), Monika Raghuvanshi (MSBA), Jesus Sanchez (TOM), Minh Vong (MSBA), Hua Yang (MSBA)

Cal Poly Pomona University Advancement:

The Center partnered with CPP University Advancement during 2021-2022 and 2022-2023 on projects related to alumni engagement and philanthropic giving. With alumni donations playing a crucial role in

supporting the academic excellence and social impact of universities, CPP University Advancement was interested in analyzing factors influencing alumni donation decisions with a view to informing and prioritizing engagement activities.

2021-2022 and 2022-2023 Projects: Engaging Relationships – Engagement and Philanthropic Giving

Focus: The focus of these projects was on analyzing alumni engagement and giving data to develop statistical models that can help predict who the donors will be amongst alumni. The team further developed targeted models to predict donation amounts based on graduation timeframes. After an initial analysis of the entire alumni database, the team focused on the College of Business Administration for the detailed analyses.

Faculty Advisors (2022-2023): Dr. Alireza Yazdani, Dr. Rita Kumar

Student Team (2022-2023): Paolo Baluyot (MSBA), Diana Diaz (MSBA), Sanjay Bharati Kajool (MSBA), Giang Nguyen (MSBA)

Faculty Advisors (2021-2022): Dr. Rita Kumar, Dr. Mehrdad Koohikamali

Student Team (2021-2022): Ashley Chen (MSBA), Monika Raghuvanshi (MSBA), Sean Ta (CIS), William Vong (CIS and EBZ)

Intertrend Communications:

The Center partnered with Intertrend Communications on a project to analyze a membership database and glean insights on emerging trends.

2019-2020 Project: Analyzing Consumer Database for Membership and Donor Insights

Focus: The focus of this project was on an analysis of a membership database which included members, active sustainers, and lapsed members, with a view to gaining insights on donor propensity and trends. This included a broad comparison of California vs other states, and a drill-down into regions in California to identify clusters of most generous donors and long lasting donors, along with lapsed and deep lapsed donors. In addition to the membership database, the team used publicly available data pertaining to socio-economic and demographic characteristics of different regions.

Faculty Advisors: Dr. Rita Kumar, Dr. Mehrdad Koohikamali

Student Team: Feiyu Han, Mark Gordon

PCV Murcor:

The Center partnered with PCV Murcor on a project to analyze real estate appraisals data, supplemented with publicly available data to understand and visualize patterns and trends in appraisals from different appraisers.

2019-2020 Project: Real Estate Appraiser Analytics

Focus: The goal of this project was to perform descriptive analytics of detailed appraisals data. The team analyzed appraisals data including appraiser fees, appraisal volume, appraised values, order processing times, quality levels, and touch points. In addition to the database from PCV Murcor, the team used publicly available data from Zillow, and population data, to contextualize the analysis. An area of focus was analyzing patterns and trends in different states, particularly as they related to appraised values, processing times, and quality levels. Detailed analysis at the individual appraiser level helped identify drivers of appraisal fees and scores. Tableau was used for analysis and visualizations.

Faculty Advisors: Dr. Rita Kumar, Dr. Anthony Orlando

Student Team: Annette Bedard, Aaron Cooper, Mark Gordon, Feiyu Han, Sho Ishimaru, Patrick Ogaz

Visual Analytics Lab

In November 2019, the Singelyn Center opened its Visual Analytics Lab, providing a dedicated space for students to collaborate and work with faculty and professionals. The lab is equipped with computers, interactive displays, and collaborative workspaces.

Tableau Workshops

Dr. Kumar has offered annual workshops on Data Exploration and Visualization Using Tableau throughout the Center's history. These hands-on workshops are typically offered as a two-session series, where students learn to create visualizations and animations, analyze data sets, and build interactive dashboards, with the overall goals of deriving insights from data and storytelling with data. The number of students attending each workshop is around 40-50.

GIS and Location Analytics

Dr. Koohikamali invested much time in GIS certification workshops and speaker series. He coordinated and managed the implementation of two 2-hour GIS workshops with more than 40 attendees, invited two industry leader speakers, created lab tutorials, and trained students for the workshop. Dr. Koohikamali trained one student to lead the hands-on part of the workshop. He has also attended the National Geospatial-Intelligence meeting to highlight the GIS activities in the CBA. During 2020-2021, he served as the GIS advisor for the city of Pomona homeless project. He trained five students to use Web App Builder and Story Map tools and analyze the data for the project. For the MSBA program, Dr. Koohikamali presented a workshop about ArcGIS dashboards in September 2020. In addition, over the Spring 2021 and Summer of 2021, he advised five students on a project called "Deep Learning of Customer Transactional and Mobility Data: Investigating Effects of COVID-19 on Low-Income Demographics".

Dr. Koohikamali volunteered to present about using GIS for COVID-19 relief programs. In the online presentation, he demonstrated to local small businesses how to use GIS during the pandemic to survive and make better decisions related to specific relief programs.

GIS Day Celebrations

Dr. Koohikamali and **Dr. Kumar** organized a virtual GIS Day event in November 2020, which was the first time in many years that the campus had celebrated GIS Day. The event included guest speakers and a StoryMaps showcase with the theme, "2020: Stories from a year like no other". They followed it with a GIS Day celebration in November 2021. For 2023, GIS Day was celebrated on a larger scale at the University level. Dr. Koohikamali and Dr. Kumar represented the College of Business on the planning committee, helping organize a panel on "Careers in GIS" (moderated by **Dr. Orlando**), securing a keynote speaker for the event, and organizing a StoryMaps showcase.

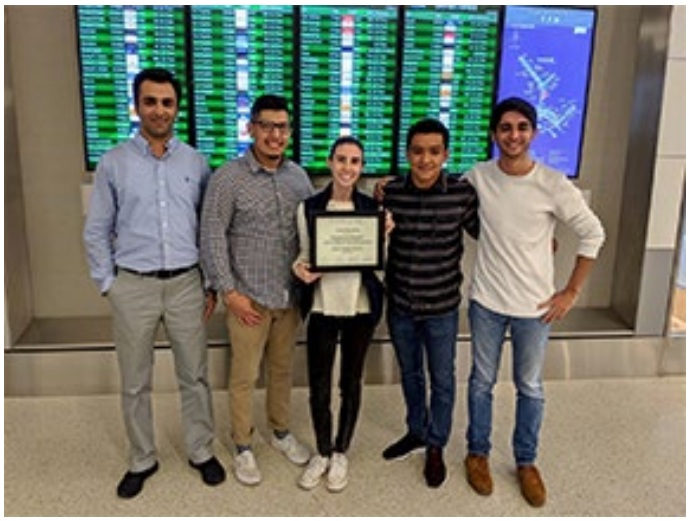
Student Competitions

Dr. Zhang helped lead students among the Top 10 finalist groups in "Ode to Code" at the AI for a Better Future Hackathon 2024. Students: Judi Alvarado (College of Business), Joshua Estrada (College of Science), Rohan Gusain (College of Business), and Sarkis Gaffigan (College of Science).

Dr. Koohikamali mentored the 2020 City of Los Angeles COVID-19 computational challenge in the Spring of 2021. He also volunteered to collaborate with a team of scientists on COVID-19 tactical response and relief programs.

Dr. Kumar mentored students participating in a hackathon at the FUEL Innovation, Leadership and Technology Conference hosted by Avanade and Cal Poly Pomona in 2019. The hackathon was centered around developing solutions for reducing student homelessness, reducing hunger and food insecurity among students, and increasing wellness and reducing obesity.

Dr. Salehan supervised a team of students competing in the University of San Francisco's Business Analytics Hackathon in 2019, showcasing their skills in a competitive environment. He has also worked closely with students and co-authored several papers with them, further contributing to the academic community. Additionally, he advises the student club MISSA, supporting students in their academic and professional development within information systems.



Singelyn Center Sponsors Data Analytics Competition

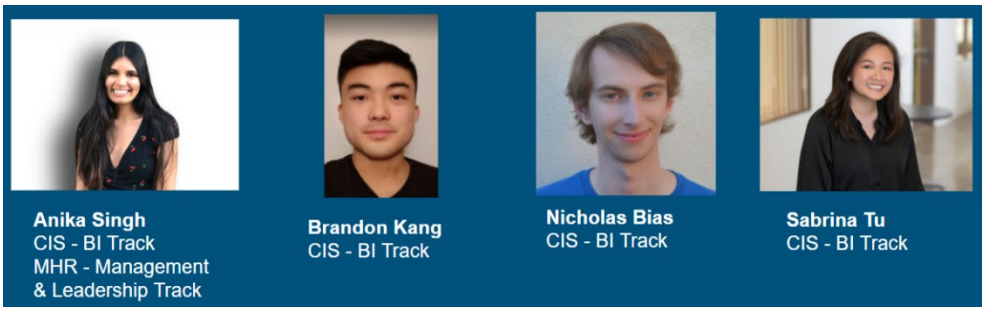
The Singelyn Center sponsored a Data Analytics Competition hosted by MISSA (Management Information Systems Student Association) at Cal Poly Pomona on April 15, 2023. Student teams (acting as consultants) worked on a case study for three weeks, with deliverables including a written report and a presentation. The competition culminated with teams presenting their analysis and recommendations to a panel of judges.

Student Research at Conferences and Showcases

Dr. Koohikamali led a team of five MSBA students on a Western Decision Science Institute conference presentation in April 2023. The project topic was "Detecting fake news: how do governments fool us?". In this project, the team investigated the spread of misinformation and disinformation during the 2022 Iran national protests. The events following the death of a 22-year-old Iranian girl while in police custody embarked on national and international outrage in Iran after September 2022. The role of emotions and sentiment has been investigated. The Twitter data was downloaded using Twitter API v2, and sentiment and emotion analyses were conducted. Results will be expanded and shared in the future.

In research presented at the WDSI conference in April 2023, **Dr. Salehan** and MSBA student Giang Nguyen looked at how the use of sentiment by mainstream media (MSM) channels on Twitter has evolved. The results show that the MSM has learned from the recent research on information diffusion on social media, which has led to increased use of sentiment in general and negative and high-arousal negative sentiment in particular over time. The results confirm that the MSM is actively using sentiment to improve the diffusion of their messages.

Dr. Koohikamali also led another team focused on "Analysis of Customer Satisfaction with Amazon Products." Students focused on analyzing a dataset on Amazon products. Amazon has more than 12 million products on its website, and most of these products have hundreds or even thousands of reviews. It is difficult for a company to analyze this many reviews. They conducted a text-mining analysis on these customer reviews to see how the customers rated the products. Based on their analysis, they provided recommendations on whether the product should be improved. It is important to investigate this problem with text analytics and time series analytics to explore customer satisfaction with products and to see how their satisfaction changes over time with their ratings.



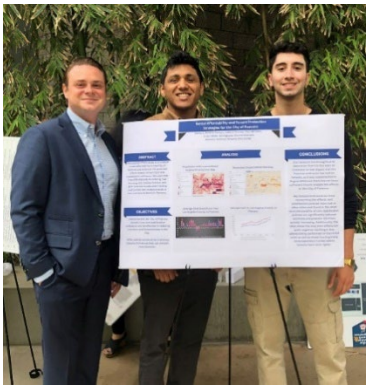
Dr. Salehan led a team focused on "Short-Term Stock Price Prediction Using Deep Learning". Deep learning refers to the use of deep Neural Networks to solve complex Machine Learning problems such as computer vision, speech recognition, and text analytics. The project intends to predict the short-term price of major Exchange Traded Funds (ETF). The team used deep learning models, including Recurrent Neural Networks (RNN) and Long Short-Term Memory (LSTM), to predict the price of S&P 500 (SPY) and

NASDAQ 100 (QQQ) ETFs. The project requires analysis of intraday ETF prices in 1-minute intervals. The model will generate short-term price predictions (next 1-hour), which would facilitate decision-making about the trading stock options. The methods used in this project can be used to analyze any data with a sequence, such as timer-series and text data.

Students working with **Dr. Yazdani** and **Dr. Kumar** on a Singelyn Center project with University Advancement presented their research at the Annual Meeting of the Minds Conference 2023 (MOTM 2023) on February 8, 2023. Elissa San Juan, Executive Director of Advancement Services, along with students Paolo Baluyot, Diana Diaz, Sanjay Bharati Kajool, and Giang Nguyen, presented "Engaging Relationships: Engagement and Philanthropic Giving". The focus of the presentation was on insights gained from an analysis of alumni engagement and donor data.

Students working on a project with the Real Estate Research Council of Southern California showcased their research, "Where to Build to Solve the Crisis: Identifying Sites for Affordable Housing Development in Pomona", at the Cal Poly Pomona RSCA conference in March 2024, at the PolyX Showcase in November 2023, and at the College of Business Administration Showcase in May 2024. **Dr. Orlando** and **Dr. Kumar** served as faculty advisors, and Margaret Anderson, Nicole Cromwell, Enrique Jimenez, Ilke Suzer, Adam Wakoli, Cristopher Zavala were on the student team.

Singelyn Center students presented a poster on their research, "Rental Affordability and Tenant Protection Strategies for the City of Pomona," at the 4th Annual College of Business Administration Showcase of Excellence held on May 9, 2023. Students researched the short-term and long-term effects of rent stabilization policies. They analyzed historical patterns of growth in rental rates in Los Angeles County and the City of Pomona. ArcGIS was used to map variables impacting rental affordability in Pomona. **Dr. Orlando** and **Dr. Kumar** served as faculty advisors, and Marvin Alvarado, Andrew Cornejo, Victor Miller, Dat Nguyen, Gialeny Serrano, and Paul Williams were on the student team.



Students working with **Dr. Kumar** and **Dr. Orlando** on a Singelyn Center project with the City of Pomona Homeless Programs showcased their project at the College of Business RSCA Showcase 2021. They analyzed point-in-time homeless counts data, along with key demographics using ArcGIS mapping and geocoding, to identify areas in Pomona most in need of resources and services. Students Jesus Duran, Leo Ngo, Vianney Echeverria, Feiyu Han, Johans Acosta, and Alondra Valadez Perez were on the team.

Students working with **Dr. Kumar** and **Dr. Orlando** on a Singelyn Center project with the appraisal management company PCV Murcor showcased their project at the College of Business RSCA Showcase 2020. Using data from PCV and from Zillow's Assessor and Real Estate Database, they analyzed the company's position in different geographic areas. In addition, they gained insights on key factors impacting appraisals. Students Patrick Ogaz, Feiyu Han, Mark Gordon, Sho Ishimaru, Annette Bedard, and Aaron Cooper were on the team.

Annual Center Symposium and Reception

In May 2023, the Singelyn Center started a tradition of organizing and hosting an annual center symposium and reception. This was followed by the second annual symposium in May 2024. These events are designed to showcase Singelyn Center partnership projects, and to hear from and engage with industry experts. Attendees include current and former students involved with Singelyn Center projects, industry guest speakers, industry and community partner mentors and representatives, Singelyn Center Advisory Board members, and faculty. Students present their research, and industry guest speakers share their expertise and insights. The symposium is followed by an informal reception which provides networking opportunities for our students. More than fifty participants attended each event.

Faculty and Student Scholarship

Journal Publications

- An, B.Y., Jakabovics, A., Liu, J., **Orlando, A.W.**, Rodnyansky, S., Voith, R., Zielenbach, S., and Bostic, R.W. (2023). "Factors Affecting Spillover Impacts of Low-Income Housing Tax Credit Developments: An Analysis of Los Angeles," Cityscape, 25(2).
- Field, R.I., **Orlando, A.W.**, and Rosoff, A.J. (2023). "Demographic Diversity of Genetic Databases Used in Alzheimer's Disease Research," Human Genetics, 142: 1215-1220.
- **Sonya Zhang**, Daniela Lopez, Lyndon Lam, Abhishek Yenumula, and Tony Vu (2023). "A Comparative Analysis of Text Mining Methodologies for Online Consumer Review", Journal of Applied Business and Economics, Volume 25, Issue 7.
- An, B.Y., Bostic, R.W., Jakabovics, A., **Orlando, A.W.**, and Rodnyansky, S. (2022). "Small and Medium Multifamily Housing: Affordability and Availability," Housing Studies, 37(7): 1274-1297.
- Eriksen, M.D., and **Orlando, A.W.** (2022). "Returns to Scale in Residential Construction: The Marginal Impact of Building Height," Real Estate Economics, 50(2): 534-564.
- Pick, J. B., **Koohikamali, M.**, & Dunaway-Perez, J. (2022). "Management and mitigation of location privacy violations: Case study analysis of US local governments", The Information Society, 38(2), 147-164.
- Voith, R., Liu, J., Zielenbach, S., Jakabovics, A., An, B.Y., Rodnyansky, S., Bostic, R.W., and **Orlando, A.W.** (2022) "Effects of Concentrated LIHTC Development on Surrounding Home Prices," Journal of Housing Economics, 56: 101838.
- **Sonya Zhang**, Linda Ly, Norman Mach, Christian Amaya (2022). "Topic Modeling and Sentiment Analysis of Yelp Restaurant Reviews", International Journal of Information Systems in the Service Sector (IJISSS), Volume 14, Issue 1.
- An, B.Y., Bostic, R.W., Jakabovics, A., **Orlando, A.W.**, and Rodnyansky, S. (2021). "Why Are Small and Medium Multifamily Properties So Inexpensive?" Journal of Real Estate Finance & Economics, 62(3): 402-422.
- Daniel Firpo, **Sonya Zhang**, Lorne Olfman, Kittisak Sirisaengtaksin, and Joe Tawan Roberts (2021). "Building Social Capital in Higher Education with Online Opportunistic Social Matching", International Journal of Social Media and Online Communities (IJSMOC), Volume 13, Issue 1.

- **Orlando, A.W.**, and Field, R.I. (2021). "Measuring the COVID-19 Financial Threat to Hospital Markets," Inquiry: The Journal of Health Care Organization, Provision, and Financing, 58.
- Zayd Al-Beitawi, **Mohammad Salehan**, **Sonya Zhan**g (2020). "What Makes Songs Trending? – Cluster Analysis of Musical Attributes for Spotify Top Trending Songs", Journal of Marketing Development and Competitiveness, Volume 14, Issue 3.
- **Koohikamali, M.**, Mousavi, R., Peak, D. A., & Prybutok, V. R. (2020). "Benefit Expectations and Continued Usage of Location-Based Applications for Location Intelligence", Journal of Applied Business & Economics, 22(9).
- Mousavizadeh, M., **Koohikamali**, **M., Salehan, M.**, & Kim, D. J. (2020). "An Investigation of Peripheral and Central Cues of Online Customer Review Voting and Helpfulness through the Lens of Elaboration Likelihood Model", Information Systems Frontiers, 1-21.
- Gerhart N., **Koohikamali M.**, (2020). "Engagement on Online Social Networks During a Social Crisis: Effect of Anonymity Level", International Journal of Social and Humanistic Computing.
- Ruth Guthrie, Zeynep Aytug, and **Rita Kumar** (2020). "A Cause-Related Marketing Approach to Improving Assessment Culture", Business Education Innovation Journal, Volume 12, No. 1, 68-78.
- Merrill, R.K., and **Orlando, A.W.** (2020). "Oil at Risk: Political Violence and Accelerated Carbon Extraction in the Middle East and North Africa," Energy Economics, 92: 104935.
- Sarkar A., **Koohikamali M**., Pick J. (2019). "Spatial and socioeconomic analysis of host participation in the sharing economy", Information Technology and People.
- **Koohikamali M.**, Kim D.J., French A.M. (2019). "Privacy Trade-Off Dynamics on Social Network Applications", Decision Support Systems (119), pp.46-59.

Conference Proceedings and Presentations

- Bryan Dorr and **Sonya Zhang** (2024), "Exploring Baseball Analytics Through Data Visualization," Annual Meeting of Western Decision Science Institute (WDSI), Santa Rosa, Sonoma County, CA, April 2 – 5, 2024.
- **Rita Kumar** and Larisa Preiser-Houy (2024), "Co-curricular Experiences to Enhance Business Education," Annual Meeting of Western Decision Science Institute (WDSI), April 2024.
- Kostas Alexandridis, **Sonya Zhang, Mehrdad Koohikamali**, Soheil Sabri, and H. Erkan Ozkaya (2024), "Designing and Implementing a Robust, Modular and Interoperable Digital Twin Smart City Framework for Critical Water Spatial Infrastructure," 57th Hawaii International Conference on System Sciences (HICSS), Honolulu, HI, Jan 3-6, 2024.
- **Koohikamali**, "The Aftermath of Mahsa Amini's Death: Spread of Misinformation Iranian Protests," AMCIS2024 (Accepted).
- Soheil Sabri, Kostas Alexandridis, **Mehrdad Koohikamali, Sonya Zhang**, and H. Erkan Ozkaya (2023), "Designing a Spatially-Explicit Urban Digital Twin Framework for Smart Water Infrastructure and Flood Management," IEEE Digital Twins and Parallel Intelligence (DTPI) 2023, Orlando, FL, November 7-9, 2023. https://doi.org/10.1109/DTPI59677.2023.10365478
- **Koohikamali M.**, (2023). Restaurant Industry Revival or Death: How Do Reviews Change During COVID-19?", AMCIS, (Accepted). Panama City, Panama.
- **Koohikamali M.**, French A.M., Kim D.J., (2023). "How Do Users Engage on a Privacy-based Social Networking App?", WDSI, Portland, Oregon.
- **Sonya Zhang** (2023), "A survey of literature on Airbnb price prediction using machine learning," Annual Meeting of Western Decision Science Institute (WDSI), Portland, OR, April 7-9, 2023.
- Victoria Bhavsar, Carlos Gonzalez, **Rita Kumar**, Larisa Preiser-Houy, and Nickolas Hardy (2022). "Using Data for Equity-Minded Teaching of Management Courses", MOBTS Conference, June

2022.

- **Rita Kumar** and Larisa Preiser-Houy (2022). "The Role of Digital Badging in Business Analytics Education", Proceedings of the 50th Annual Meeting of the Western Decision Sciences Institute, April 2022.
- **Sonya Zhang** and Rohith Rajasekaran (2022), "Examining the Relationship Between User Engagement and E-commerce Revenue Using Explorative Data Analysis on Web Analytics Data," Annual Meeting of Western Decision Science Institute (WDSI), Big Island, HI, April 5-10, 2022.
- Zayd Al-Beitawi, **Mohammad Salehan, Sonya Zhang** (2020), "Cluster Analysis of Musical Attributes for Top Trending Songs," 53rd Hawaii International Conference on System Sciences (HICSS), Maui, HI, Jan 7-10, 2020.
- **Rita Kumar** and Aimee Jacobs (2019). "Applications of Geographic Information Systems (GIS) in Business Analytics Curriculum", 50th Annual DSI Meeting, November 2019.
- Erinn Dockins, Ilya Eremin, Erik Larsen, **Rita Kumar**, Connor Martin, and Leo Jimenez (2018). Data Visualization and Predictive Analytics: The Relationship between Standardized Test Scores and Socio-Economic Indicators. 49th Annual DSI Meeting, November 2018.

Internal and External Grants

National Science Foundation (NSF)

In the past year, a team submitted an NSF grant proposal titled "Interoperable and Open Digital Twin Water Infrastructure Framework for Smart and Connected Communities (DTWIF)." Led by Dr. Mehrdad Koohikamali and Dr. Sonya Zhang from California State Polytechnic University, Pomona, along with Dr. Soheil Sabri from the University of Central Florida, Dr. Kostas Alexandridis and Michael LaFontaine from Orange County Public Works, and Dr. Thomas Piechota from Chapman University, the team is pioneering innovative solutions to enhance climate resilience and adaptiveness in smart communities. The project leverages digital twin technology to create robust, modular, and interoperable frameworks tailored for critical climate conditions and challenges facing public water infrastructure systems. With advice and support from industry leaders like Dan Isaacs of the Digital Twin Consortium, Jasmine Pachnanda, Senior Vice President of CEO Alliance Leadership of Orange County (CLA-OC), and Kristina Horn, Coordinator of Artificial Intelligence at CLA-OC, we are addressing key issues such as data integration, security, and system interoperability. This collaborative effort aims to mitigate the impacts of climate change, optimize resource allocation, and ensure the sustainability and safety of public water systems for the future.

SPICE (Special Projects for Improving the Classroom Experience)

Dr. Koohikamali was awarded an internal SPICE grant titled "Digital Twin Transformation: Bridging Geomatics and Business Intelligence for Enhanced Decision Making." He plans to work on two main objectives in Spring 2025:

1. Train computer information systems (CIS)/business intelligence students to leverage digital twins for data analytics by extracting meaningful insights from the geospatial data generated within the digital twin environment.
2. Develop projects and case studies that emulate real-world scenarios, allowing students to apply geospatial data analytics to solve business challenges and optimize decision-making processes.

Dr. Orlando and **Dr. Kumar** were awarded an internal SPICE grant titled "City of Pomona Housing Affordability and Homelessness" in 2023. They led a team of students working with mentors from the Southern California Real Estate Research Council and the Southern California Association of Governments on an analysis of affordable housing development in Pomona. This research was showcased at the Cal Poly Pomona RSCA conference in March 2024, the PolyX Showcase in November 2023, and the College of Business Administration Showcase in May 2024. Further, a StoryMap based on the research was featured during Cal Poly Pomona's GIS Day celebrations in November 2023.

Planned Initiatives

Industry and Community Partnerships

The Center plans to continue to build relationships with industry and community partners that provide experiential learning opportunities for students while addressing the analytics needs of the partner organizations. We expect to continue our partnerships with AMH and Boeing, and hope to launch a partnership with IEHP (Inland Empire Health Plan). We are also exploring new partnership opportunities.

Competition themed around UN Sustainable Development Goals

The Center plans to partner with the College and the University to organize a competition themed around UN Sustainable Development Goals, to be held during GIS Day in November.

Educational Offerings

The Center plans to continue to offer workshops on analytics tools, specifically Visual Analytics Using Tableau, and Location Intelligence Using GIS.

Expand GIS and AI Initiatives

The Center plans to expand on GIS and AI initiatives through partnership projects and other collaborations.

Extended Reality (XR) Initiative

The Center plans to develop an immersive Virtual Reality (VR) training simulation to replicate real-world scenarios.

Conclusion

The Singelyn Center for Innovative Analytics has had an exciting, productive, and transformative first five years. According to the future of jobs report from the World Economic Forum, the highest priority for skills training through 2027 is analytical thinking. Through experiential learning partnership projects with industry and community, students have opportunities to develop their analytical, problem solving, communication, project management, and collaborative learning skills while delivering insights that

contribute to addressing partner organization's challenges. Students also benefit from the mentorship provided by the close relationship with the partner organizations. Specific projects related to homelessness, housing insecurity, and affordable housing speak to the UN Sustainable Development Goal of reducing inequalities. The Center continues to provide opportunities to showcase student work and enhance the career-readiness of students, and workshops offered by the Center help students add to their tools skill set. Students who have worked on projects through the Center have often pursued careers in analytics, or advanced degrees, including undergraduate students returning to CPP for graduate work. Further development of AI and related competencies will help the Center be at the forefront of innovative technologies to solve real-world problems.

We are grateful for the support from Center benefactors David and Ruth Singelyn, our industry and community partners, our Advisory Board, and the College of Business Administration Dean's Office.