Cao **Bittencourt**

Research and Development Analyst · Data Scientist

Brazilian male, 27 years old, single

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"Ora et Labora." (St. Benedict)

Education

Getulio Vargas Foundation (EPGE, FGV-RJ) — *Rio de Janeiro, RJ, BR*

B.S. in Economics — *2017 – 2021*

- Thesis: "Equivalence scales in Brazil: the Brazilian cost of living estimated by Engel's and Rothbarth's methods."

Federal University of Santa Catarina (UFSC) — *Florianópolis, SC, BR*

B.S. in Psychology (Interrupted) — *2014 – 2016*

Honors & Awards

First Place **Best Undergraduate Thesis 2021,** Minister Ernane Galvêas Award (R$10,000.00) — *EPGE, FGV-RJ*

Skills

Programming	R, Python, R Markdown, SQL, AWS Lambda (basic), LaTeX (basic), Stata, VBA, GeoGebra, Scilab.
Machine Learning	Supervised and Unsupervised ML algorithms and procedures such as K-Nearest Neighbors (KNN), Principal Component Analysis (PCA), Singular Value Decomposition (SVD), Quadratic Optimization, Random Forest, K-Means, and Hierarchical Clustering; and also various regression models, including OLS, NLS, 2SLS, SUR, BLR, NNLS, BVLS, Beta, Tobit, Probit, and Logistic regressions, Quantile regression, LOESS, Kernel Smoothing, heteroskedasticity identification and treatment, and so on.
Psychometrics	Exploratory Factor Analysis (EFA), automation of factor analyses, factor-analytic comparative statics, evaluation of factors's internal consistency (via Lambda 6, Omega Total, Omega Hierarchical, Lambda 2, Cronbach's Alpha, Beta, inter-item correlation, etc), a wide range of psychometric testing tools (e.g. Big Five, EPI, MBTI, DISC, Holland Code, Career Anchors, etc).
Econometrics	Many statistical models, including AR, MA, ARMA, VAR, Lingering and Current Effects models, as well as assessing Granger Causality in time series data.
Finance	Enterprise valuation, portfolio management, options pricing, cost of living estimation, analysis and construction of household budgets, estimation of household equivalence scales.
Business Intelligence	Power BI (basic), R Shiny (basic).
Web Development	Bubble (basic).
Office	Word, Excel, PowerPoint.
Languages	Portuguese, English, German (elementary).
Organization	Agile methodologies (Scrum and Kanban), intertemporal Eisenhower matrix, Pomodoro technique.

Experience

Atlas Research

Deerfield Beach, FL, USA (remote job)

Research and Development Analyst

Apr. 2022 – Current

- I automated psychometric exploratory factor analysis and construct validation procedures.
- I carried out sample-weighted factor analyses on a huge database provided by the Bureau of Labor Statistics (BLS), mapping professional requirements for 873 occupations.
- I significantly reduced the dimensionality of this database by extracting, from 254 variables, the 15 most important groups of attributes, or factors, to characterize each of the 873 occupations.
- Based on the factor analyses performed, I elaborated psychometric questionnaires of different lengths — specifically, of 200, 100, and 50 questions —, all measured by 7-point Likert scales.
- Using the KNN machine learning algorithm, I designed a method to compare questionnaire results with the entire BLS database.
- I considered 20 different mathematical formulations to convert Euclidean distances between individuals and the BLS occupations into similarity coefficients, and I devised a modified Euclidean distance metric, providing adjustments should they be overqualified in relation to any given occupation.
- After this exercise, I established a single mathematical formula to convert the Euclidean distances obtained by the KNN algorithm into similarity coefficients.
- I programmed routines to apply these methods in an online platform through APIs (via AWS Lambda).
- The result is called the Career Finder: a psychometric questionnaire with high internal consistency that returns an ordered list of professional compatibility, measured from 0 to 100%, between the respondent and each of the 873 BLS occupations.
- The adopted procedures were very effective, accurately predicting the careers already chosen by the company's investors, staff members, and prospective clients.
- I automated the production of dynamic reports in R Markdown in order to present this and other assessments provided by Atlas Research.
- I translated the reports into Portuguese and Spanish, adapting the dynamic text generation mechanisms to support multiple languages.
- I developed algorithms for comparing professional profiles between individuals, enabling group assessments, which also generate dynamic reports.
- I established a metric for evaluating the degree of professional broadness, differentiating on a scale of 0 to 100% the generalist and specialist individuals.
- I elaborated an iterative mechanism for visualizing careers as "chemical molecules" made up of 217 BLS professional attributes, in order to construct a "periodic table of careers", and even "professional types", analogous to Jungian cognitive function diagrams.
- I wrote a 13 page report detailing several additional metrics and procedures to solve a seemingly intractable problem in another module of the application, the Career Roadmap.
- My solution was highly praised for its simplicity, effectiveness, and scope. Among those additional mathematical coefficients I wrote were: the adjusted career recommendation coefficient, the metrics of marginal capital cost, marginal time investment, expected time investment, as well as various other coefficients for the recommendation of specific training in professional attributes, and a generic strategic choice metric for optimizing career development.
- In addition, I used the K-Means machine learning algorithm to organize the occupations mapped by the BLS into 8 cohesive clusters.
- I automated complex data visualization procedures.
- I produced circular heat maps to graphically display the BLS database.
- I established a mathematical formulation to quantify the concept of capital flexibility (i.e. the range of applications of a professional competency, its level of transferability across multiple occupations), consisting of a standard deviation-adjusted mode metric.
- I calculated the amount of "flexible" (i.e. transferable) human capital in each of the 873 occupations in the BLS database.
- I wrote generic functions to automate the estimation of various regression models, and multiple metrics for evaluating model predictions.
- I performed sample-weighted OLS and NNLS regression analyses of marginal cost and marginal time investment of human capital, considering all the competencies and occupations in the BLS database.
- I developed a factor-analytic comparative statics method to calculate exogenous impacts on observed variables through latent variables's expected impacts and the respective SS factor loadings of each observed variable on each factor.
- I quantitatively assessed the impact of the advent of Artificial Intelligence (LLMs) on 15 factors, and 217 professional attributes.
- I estimated weighted impact coefficients of the advent of Artificial Intelligence (LLMs) for each of the 873 occupations in the BLS database.
- I developed a coefficient to measure the employability of different individuals and occupations, as well as that of each professional competency.
- I developed an algorithm and a coefficient to measure the level of competition for job posts in each career.
- I developed a coefficient of professional interchangeability by way of a linear interpolation between different similarity metrics.

Cadarn Consulting *Rio de Janeiro, RJ, BR*

Business Intelligence Intern *Jul. 2019 – Jan. 2020*

- I conducted analyses with big budgetary databases from Mosaic Fertilizers, explaining the cost structure for the fertilizer and mining internal transportation category.
- I researched and graphically presented sectoral indices of economic activity to account for the dynamics of internal transportation costs.
- I transposed the textual documents of Mosaic Fertilizers's contracts from multiple facilities into a tabular, synthetic, standardized format, resulting in a large contract dataset to enable future analyses.
- I proposed alternative economic indices for contract readjustments, yielding cost reductions with multi-million dollar potential in Mosaic Fertilizers's internal transportation operations.
- I elaborated dozens of didactic and impactful slides with minimalist aesthetics for presenting the results.
- I automated graph production and prepared over a hundred charts, in order to easily visualize cost, contracting, and profitability structures of Mosaic Fertilizers's internal transportation operations.
- I catalogued partner and potential suppliers for contracting internal transportation services, detailing the size of the companies, their certifications, their major customers, and contracting modalities.
- I also designed national and regional maps for Mosaic Fertilizers's internal transportation operations, locating current and potential suppliers.

Sacred Heart of Jesus Catholic Church *Itapema, SC, BR*

Volunteer *Oct. 2021 – Dec. 2021*

- I helped assemble and distribute approximately 420 food baskets, amounting to more than R$32,000.00 in donations.
- I also proclaimed the Holy Gospel in catechetical meetings to an audience of about 40 people each week.

Programming Projects

R	Estimation of 4 household equivalence scales based on Brazilian Household Budget Surveys POFs 2002 – 2003 and 2008 – 2009.
R	Estimation of child costs in Brazil based on Brazilian Household Budget Surveys POFs 2002 – 2003 and 2008 – 2009.
R	Estimation of median cost of living for multiple family compositions and per capita income levels in Brazil based on Brazilian Household Budget Surveys POFs 2002 – 2003 and 2008 – 2009.
R	Fundamentalist valuation of companies by sector of activity.
R	Options pricing via Black-Scholes and Binomial models.
Stata	Quantitative analyses in Marketing by computing Tobit, Probit, Lingering and Current Effects models.
Python	Descriptive statistics for Brazilian Household Budget Surveys POFs 2002 – 2003 and 2008 – 2009.
R	Estimation of VAR models for 91 countries over the period of 1960 to 2019 in order to assess Granger causality between Gross Domestic Savings and growth of Gross Domestic Product per capita.
R	Quantitative analyses in Political Science with electoral data from Rio de Janeiro's 2018 municipal elections.
Python	Expediture analyses with my personal financial data.

Extracurricular Activity

Stock Market League (Undergraduate Study Group at EPGE, FGV-RJ) *Rio de Janeiro, RJ, BR*

Member *Feb. 2018 – Jul. 2018*

- I've acquired fundamental knowledge about stocks, investment funds and fixed income securities.
- I gave presentations on various asset classes.
- I participated in weekly league planning meetings.