COMPSS 224B: Quantitative Political Risk Analysis (QUANTPOLRISK)

Course Description: The "political risk" industry is a prominent application of political science, macroeconomics, and political economy in the private sector. While political risk analysis is still mostly qualitative, its growing importance to commercial outcomes has spurred a limited but growing use of quantitative methods. This course provides an overview of (i) country/political risk industry, (ii) current applications of data science and machine learning in the industry; and (iii) the quantitative methods behind most of these applications. The course will both provide MaCSS students an introduction to career opportunities in this domain as well as a practical toolkit for risk analysis.

Instructors

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Credit Hours

- 1.5 units: 7 weeks
- 3 hours/week in-person class session (Fridays 9am-12pm)
- Up to 7 hours/week for out-of-class work

Prerequisites: Passing grade (C+ or better) on boot-camp courses or passing grade on waiver exams for COMPSS 201 (Introduction to Computing) and COMPSS 202 (Introduction to Applied Statistics). This includes familiarity with either R or Python.

Required Text: For the technical parts of the course, we will be using Introduction to Statistical Learning in Python (ISLP). The text is available for free https://www.statlearning.com/.

Assessments

- **Class Participation (10%):** Contributing to discussions in thoughtful and meaningful ways each week is essential. Quantity of participation is not as important as quality. Questions, insights, applied examples, and challenges are all considered quality.
- **Short Response (5% due by 11:59pm PT April 9):** Students will write a 500-1000 word double-spaced response paper early in the course to begin thinking about a specific use case for their final project, limits to current approaches, and which dataset below they want to probe for this case. Faculty will provide feedback.
- **Problem Sets (60%):** Problem sets will ask students to work through a few short applied examples. Students should submit a Jupyter notebook or other output that shows i) their code, ii) their quantitative answers, and iii) qualitative analysis and explanation. Students are encouraged to collaborate on problem sets together or consult LLMs, but must write up their problem sets on their own. Students should cite who/what resources they use per code of conduct.
    - Problem Set 1 (30%, due by 11:59pm PT Wed April 23)
    - Problem Set 2 (30%, due by 11:59pm PT Wed May 7)
- **Final Memo — Research Design (25%):** Students will present a research design (up to 3000 words) and some preliminary data analysis. Analysis will be due during final exam period (no later than 16 May 2025). The memo will identify a political risk use case, describe existing approaches, identify limits, and outline a prototype to address these challenges. The final memo will include preliminary data analysis, demonstrating proof-of-concept, and proposing next steps for given these findings. Use cases should incorporate one unsupervised method and one supervised learning method. The analysis must focus on one of the following datasets (subject to change):
    - World Bank World Governance Indicators
    - V-Dem Varieties of Democracy
    - Uppsala Conflict Data Programs Geo-Referenced Events Data
    - United Nations General Assembly Voting Data
    - Dyadic Cyber Incident and Campaign Data (DCID)
    - Comparative Manifestos Dataset

Attendance Policy: Encouraged

Late Work Policy: Late papers will be penalized at a rate of one-half letter grade (e.g. A to A-) for every 12 hours past the deadline. They are not accepted after 72 hours. Extensions for late work must be arranged well in advance of the due date. An assignment is considered late if the document cannot be opened before the deadline.

Academic Integrity/Code of Conduct

Your participation in this course is governed by the Berkeley Code of Student Conduct (https://conduct.berkeley.edu/code-of-conduct)

Accommodations Policy

UC Berkeley is committed to creating a learning environment that meets the needs of its diverse student body including students with disabilities. If you anticipate or experience any barriers to learning in this course, please feel welcome to discuss your concerns with me.

If you have a disability, or think you may have a disability, you can work with the Disabled Students' Program (DSP) to request an official accommodation. The Disabled Students' Program (DSP) is the campus office responsible for authorizing disability-related academic accommodations, in cooperation with the students themselves and their instructors. You can find more information about DSP, including contact information and the application process here: dsp.berkeley.edu. If you have already been approved for accommodations through DSP, please meet with me so we can develop an implementation plan together."

Students who need academic accommodations or have questions about their accommodations should contact DSP, located at 260 César Chávez Student Center. Students may call 642-0518 (voice), 642-6376 (TTY), or e-mail dsp@berkeley.edu

COURSE OUTLINE + READINGS

1. Introduction to Country and Political Risk Analysis: Part 1 (March 21)

Topics:

- Overview of Country and Political Risk Industry
- Qualitative Methods and Applications
    - Qualitative Frameworks
    - Expert Judgment
    - Good, Bad, Ugly

Required Readings

- Simon, Jeffery. "A Theoretical Perspective on Political Risk." *International Journal of Business Studies*, 1984. (available on bCourses)
- Rice, Condoleezza, & Zegart, Amy. "Managing 21st Century Political Risk." *Harvard Business Review.* June 2018.https://hbr.org/2018/05/managing-21st-century-political-risk

- Epstein, David. “The Peculiar Blindness of Experts.” *Atlantic Magazine*. June 2019. https://www.theatlantic.com/magazine/archive/2019/06/how-to-predict-the-future/588040/

Recommended Readings

- Bremmer, Ian. “Managing Risks in an Uncertain World”, *Harvard Business Review*¸ June 2005, https://hbr.org/2005/06/managing-risk-in-an-unstable-world
- “Inside the Secretive Business of Geopolitical Advice.” *Economist Magazine*. 5 Oct 2023 https://www.economist.com/business/2023/10/05/inside-the-secretive-business-of-geopolitical-advice
- Haider, Ziad. “Eye in the Sky: Launching a Geopolitical Risk Unit” McKinsey Insights. 6 May 2024. https://www.mckinsey.com/capabilities/risk-and-resilience/our-insights/eye-in-the-sky-launching-a-geopolitical-risk-unit

2. Introduction to Country and Political Risk Analysis: Part II (April 4)

Topics:

- Financial Market Applications
- Corporate Applications
- Scenario Analysis and Event Forecasting

Required Readings

- Diamonte, R., J. Liew & R. Stevens. “Political Risk in Emerging and Developed Markets.” Financial Analysts Journal. Vol. 52, No. 3 (1996): 71-76. (available on bCourses)
- Wilkinson, A and Kuper, R. “Living in the Futures.” *Harvard Business Review.* May 2013 https://hbr.org/2013/05/living-in-the-futures
- Ramanna, Karthik, and Vidhya Muthuram. "Wal-Mart Lobbying in India?" Harvard Business School Case 114-023, September 2013. (Revised January 2015.) (available on bCourses)
- State Street Insights. “GeoQuant in Practice: GeoQuant’s FX Political Risk Indicator”. August 2023. (available on bCourses)

Recommended Readings

- Tetlock, P and Shoemaker, P. “Superforecasting: How to Upgrade Your Company’s Judgement”. *Harvard Business Review*, May 2016. https://hbr.org/2016/05/superforecasting-how-to-upgrade-your-companys-judgment

3. Machine Learning for Political Risk Analysis: Overview (April 11)

Topics:

- Prediction versus inference
- Supervised versus unsupervised learning
- Applied machine learning operations and data science pipelines

Required Readings

- ISLP, Chp. 2 (skim)
- Grimmer, Justin, Margaret E. Roberts, and Brandon M. Stewart. "Machine learning for social science: An agnostic approach." *Annual Review of Political Science* 24, no. 1 (2021): 395-419. (available on bCourses)
- Rød, Espen Geelmuyden, Tim Gåsste, and Håvard Hegre. "A review and comparison of conflict early warning systems." *International Journal of Forecasting* 40, no. 1 (2024): 96-112. (available on bCourses)

4. Understanding Political Risk Data (April 18)

Topics:

- Data Wrangling
- Missing Data
- Unsupervised Learning:
    - Principal Component Analysis
    - K-Means clustering

Political Risk Use Cases:

- Defining and measuring “political risk”
- Market or country segmentation
- Index creation
- Anomaly detection

Required Readings:

- ISLP, Chp. 12 (skim/review from COMPSS 211)
- Schrodt, Philip A., and Deborah J. Gerner. "Cluster-based early warning indicators for political change in the contemporary levant." *American Political Science Review* 94, no. 4 (2000): 803-817. (available on bCourses)

- "States of Fragility Dashboard." in *States of Fragility 2022.* OECD (2022). http://www3.compareyourcountry.org/states-of-fragility/about/0/ See Fragility Framework Methodology and Git

Recommended Readings:

- Moyer, Jonathan D., Austin S. Matthews, Mickey Rafa, and Yutang Xiong. "Identifying patterns in the structural drivers of intrastate conflict." *British Journal of Political Science* 53, no. 2 (2023): 749-756.
- Hendrix, Cullen S. "Measuring state capacity: Theoretical and empirical implications for the study of civil conflict." *Journal of peace research* 47, no. 3 (2010): 273-285.

5. Text Analysis of Political Risk (April 25)

Topics:
- Sentiment analysis
- Embeddings
- Topic modeling

Political Risk Use Cases:
- GeoQuant
- Threat assessment
- Early warning monitors

Required Readings:

- GeoQuant: Methodology Document, 2023. (available on bCourses)
- Caldara, C and Iacoviello, M. “Measuring Geopolitical Risk.” Federal Reserve: International Finance Discussion Papers, 2018. (available on bCourses)
- https://www.federalreserve.gov/econres/ifdp/files/ifdp1222.pdf
- Mueller, Hannes, and Christopher Rauh. "Reading between the lines: Prediction of political violence using newspaper text." American Political Science Review 112, no. 2 (2018): 358-375. (available on bCourses)

6. Modeling Political Risk (May 2)

Topics:

- Imbalanced data
- Common modeling challenges
- Advanced decision trees

Political Risk Use Cases:

- Time series forecasting
- Rare event modeling

Required Readings

- ISLP, Chp. 8, 10 (review from COMPSS 211)
- Liu, Ruowei, Xiaobai Yao, Chenxiao Guo, and Xuebin Wei. "Can we forecast presidential election using twitter data? an integrative modelling approach." Annals of GIS 27, no. 1 (2021): 43-56. (available on bCourses)
- A Quick Guide to ACLED and Conflict Alert System Dashboard. https://acleddata.com/resources/quick-guide-to-acled-data/

Suggested Readings

- Malone, Iris. "Recurrent neural networks for conflict forecasting." *International Interactions* 48, no. 4 (2022): 614-632. (available on bCourses)
- King, Gary, Michael Tomz, and Jason Wittenberg. "Making the most of statistical analyses: Improving interpretation and presentation." *American journal of political science* (2000): 347-361 (available on bCourses)

7. Explaining Political Risk Models and Analytics (May 9)

Topics:

- Feature Effects, Interactions, and Importance Measures
- Data visualization
- Story-Telling

Political Risk Use Cases:

- Risk screening
- Data visualization
- Scenario analysis and stress tests

Required Readings

- Molnar, Christopher. Interpretable Machine Learning. Chp 3, 5 (skim) https://christophm.github.io/interpretable-ml-book/
- Hill, Daniel W., and Zachary M. Jones. "An empirical evaluation of explanations for state repression." American Political Science Review 108, no. 3 (2014): 661-687. (available on bCourses)
- Large Bank Stress Test Dashboard. https://www.minneapolisfed.org/banking/financial-studies-and-community-banking/run-your-own-stress-test-on-large-banks

Suggested Readings

- ISLP, Chp. 5, 6 (review from COMPSS 211)