

Strategic Complexity

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Section 1

Contributions

Contributions

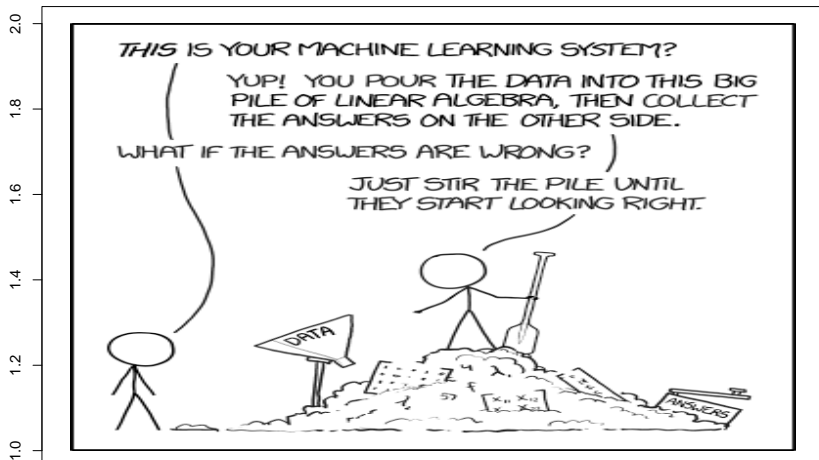
- 1 We expand the notion of strategic complexity from its definition in game theory to a definition similar to the economic complexity definition in scope and depth.
- 2 We expose the role of data science and its multidisciplinary nature to provide deeper, broader and faster data to strategic analyses.
- 3 Epistemological contribution on research methods in Strategy, motivated by the A.I.'s new developments (reinforcement learning and XAI).

Section 2

Research Context

Research Context

Machine Learning



Research Context

Yann Lecun (2020) has recently stressed problems that have not yet been solved by AI:

- contextualization of relationships between elements
- prediction to understand cause and effect
- planning and decision-making based on external and internal factors.

However, A.I. meets or exceeds human performance in perception and categorization of the world around us.

Research Context

To solve a new class of problems encompassing intangibles, complex systems dynamics, and human-machine interaction, Pratt (2019) coined decision intelligence (DI) as new technology and scientific discipline with roots in many fields including cybernetics, systems dynamics, complex systems, behavioural economics, strategic foresight (Eden & Nielsen, 2020).

Complexity in Strategic Research versus Strategic Complexity

Definitions, nuances

- The planning school and the process school led to strategic and scenario planning in order to make strategic decisions in a fast paced competitive environment.
- From a methodological perspective, scenario planning is based on qualitative methods. We propose here to add data science to the scenario planning framework to tap into the new access to data, being structured and unstructured.
- Yet, by integrating scanning one constructs a Strategic Early Warning System (Bisson and Yasar Diner, 2017).

Research Question



Figure 1: Challenges in Strategy

Research Question

What is the issue(s) we want to address:

- limitations: Most of companies today use for strategic purpose OODA (Boyd, 1996) and dig into the Big Data.

However, at best we can analyze 0.5% of Big Data (Bisson and Yasar Diner, 2017).

What is our response?

Research Question

The convergence of powerful technologies, dedicated coding languages, and new machine learning techniques, SEWS can be dramatically improved, entering into a second phase, coined *Augmented Strategic and Competitive Intelligence* (ASCI).

We propose a hybrid approach to augment human expertise by computing power and intelligence, allowing a firm to assess its environment better, create better information or use knowledge in a new way as intelligence.

Section 3

Strategic Complexity

A Brief Assessment of other Fields

- Economic complexity: It bridges economic geography and data science. Inferential approaches allow for a better estimation of the “real” economy" and we can now consider different dimensions.

A Brief Assessment of other Fields

- Complexity in IN
- Complexity in International Business:
 - “The VUCA approach suggests that a rational firm’s response should be to: protect against volatility by engineering-in redundancy and slack, gather information to reduce uncertainty, develop expertise to make complexity computable, and learn heuristically to reduce ambiguity.” VUCA
 - A call for new research methods (Eden & Nielsen, 2020).

Sources of Strategic Complexity

- Combinatorial: It concerns the number and variety of actors (industries, institutions, contexts).
- Organic: About the number and variety of relationships and interdependencies among the actors. Organic complexity happens when there are networks of networks.
- Dynamism: About the multiple ways that time and hysteresis can affect a system. This is at the heart of risk, uncertainty, ambiguity, and volatility (defined as organic change in the previous three dimensions). This is where data science makes probably its greatest contribution to the field.

Strategic Complexity and Decision Science

- In this day and age, like other disciplines, we want to emphasize the need for a reflection on research methods in strategy and the ontological implications.
- We need to benefit from a multidisciplinary perspective, starting with Decision Science and notably the question of *Information* (complete, perfect, risk, ambiguity, uncertainty) from the latest developments in Decision Science
- we also need to consider the new methods to treat information, and this is coming from the new field of Data Science.

Strategic Complexity and Data Science

Data Science:

- Big Data (volume, variety, velocity, value, veracity) characteristics changes faster
- Unprecedented computing power
- Domain knowledge (strategy)

Strategic Complexity

Structured data + Unstructured data =

- New sources of information
- New target variables
- New feature variables

Strategic Complexity

Machine learning-based models (notably unsupervised learning) =

- Causal models
- Predictive modeling

Strategic Complexity

In short:

- the power of machine learning modeling
- massive and new data
- nowcasting

=> Go deeper into the complexity of decision making (the role of information)

Section 4

Conclusion

Conclusion

We call to strengthen the relation of strategy and A.I. by not differentiating these two fields and hybridizing them to lead decision intelligence to the next level with a new paradigm, strategic complexity.

Strategy (domain) + Decision Science (information) + Data Science (algorithms) = Strategic Complexity

Proposals

- learn to live with and embrace complexity in research design
- use triangulation actively to increase rigor and relevance

Section 5

References

References

- “AI in Business: Seeing through the Fog of War” (with de Marcellis N., and Munoz, J. M.), California Management Review Insights, February 19, 2020 [DOI: 10.6084/m9.figshare.11887044.v1]
- “A Network Analysis of Financial Conversations on Twitter” (with de Marcellis, N., Sanger, W.), International Journal of Web Based Communities, Volume 13, Issue 3, pp. 286-310, 2017 [DOI: 10.1504/IJWBC.2017.10004118]

References

- Marty F. & Warin Th. “Concurrence et innovation dans les écosystèmes numériques à l’ère de l’intelligence artificielle”, *Concurrences / Competition Law Review*, Vol. 1, pp. 36-41, February 2020,
<https://www.concurrences.com/en/review/issues/no-1-2020/on-topic/digital-competition-en>
- Marty F. & Warin Th. “The use of AI by online intermediation platforms. Conciliating economic efficiency and ethical issues” (with Marty, F.), *Delphi - Interdisciplinary Review of Emerging Technologies*, Vol 2, Issue 4, pp. 217 - 225, 2019 [DOI: 10.21552/delphi/2019/4/11],
<https://doi.org/10.21552/delphi/2019/4/11>

References

- Marty F. & Warin Th. “Artificial Intelligence and Market Manipulations: Ex-ante Evaluation in the Regulator’s Arsenal”
CIRANO Working Papers 2020s-64
<https://cirano.qc.ca/files/publications/2020s-64.pdf>

Section 6

Appendices

Appendices

Four research lenses on complexity

- Difference
- Distance
- Diversity
- Disparity