

EMERGING APPLICATIONS OF AI & BEHAVIORAL ANALYTICS IN FINANCIAL SERVICES

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Image source: https://www.flickr.com/photos/33479292@N05/3536127129//



Big Data-driven Risk and Creditworthiness Assessment



Assessing Credit Risk/Creditworthiness

Two motivating problems

- 1. Predicting **loan repayment and defaults** using financial & alternative data in emerging markets
 - Many emerging markets lack established credit infrastructure
 - Such markets have credit practices that are human intensive and bias-prone
 - Emergence of big data-driven credit scoring is transforming the market, but has challenges
 - In absence of financial history, fine-grained digital data offers key signals but assessing "strong" predictors is a HPC problem
- 2. Understanding **contagion in good/bad repayment practices** within the network?
 - Is there evidence of peer-influence in loan repayment?
 - Can we infer/estimate cascades in loan default before they happen? **These involve simulation and estimation processes that are very computationally expensive!**
 - Can we intervene early to prevent these cascades?

Error Tolerance of Big Data-based Credit Models

• Testing the robustness of credit risk assessments using simulated noise injections on two large online lending datasets



- Gradually introducing noise to borrower-characteristics in training only (vs.) training+test data
- Testing raw accuracy fluctuations using a Naïve Bayes classifier
- Accuracy drops sharply with just 5% increase in noise

High Sensitivity to Modeling Choices

• We replicated the same experiments with different classifiers, feature sets, and noise injection strategies



- Testing raw accuracy fluctuations using a Logistic Regression classifier
- Accuracy drops sharply with just 5% increase in noise
- But ~10% better tolerance than the previous case

High Sensitivity to Modeling Choices

• Neural network were more robust



Joint work in-progress with Anmol Agarwal & Ishita Mediratta

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Contagion Behaviour in Credit Defaults

Two motivating problems

- 1. Predicting **loan repayment and defaults** using network features particularly in emerging markets
 - Many emerging markets lack established credit infrastructure
 - Such markets have credit practices that are human intensive and bias-prone
 - Emergence of big data-driven credit scoring is transforming the market, but has challenges
 - In absence of financial history, social networks hold key signals but computing "strong" network predictors is a HPC problem
- 2. Understanding **contagion in good/bad repayment practices** within the network?
 - Is there evidence of peer-influence in loan repayment?
 - Can we infer/estimate cascades in loan default before they happen? **These involve simulation and estimation processes that are very computationally expensive!**
 - Can we intervene early to prevent these cascades?



Illustrative Example from an Asian City





High credit risk sample

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Peer-influence Varies across Credit Risk Groups



Peer-influence in LOW credit risk sample

Peer-influence in HIGH credit risk sample



Key Takeaways

- 1. Huge potential for alternative datasets in risk and creditworthiness assessment, especially when financial history is scarce
- 2. Significant computational challenges (e.g. model stability) as well as concerns about data quality, model explainability, and privacy
- 3. Insights can be combined with other types of assessment e.g. qualitative inputs from the loan officer



Risk Profiling using Cognitive Al



InPsyche: Cognitive AI for Deep Psychological Insights

What can we infer or learn psychologically about people, from only limited data or partial observations about them?



Impact: Recommending suitable products and services to people, based on their profiles

InPsyche

- Cognitive AI Engine that integrates relationships across psychological and cognitive constructs.
- Provided with **observable attributes**, InPsyche can generate inferences about other attributes that this person is likely to have.



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Key Takeaways

- 1. Cognitive AI tech and platforms provide an alternative strategy to assess risk as a trait, attitude, perception or behavior
- 2. More explainable, and generalizable to other forms of decision making
- 3. Allows self-reported data to be used together with objective/big data



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THANK YOU!

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