

Algorithms & “Big Data” (AI/ML) in Lending

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FRAC Financial Innovation Working Group

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Machine Learning in Credit Decision Making

- Long employed in some areas (e.g., fraud detection)
- Now a “hot topic”
 - Touted by start-ups as technological advantage
 - Incumbent firms also playing up forays in AI and ML
 - Strong demand for ML and data science specialists

ML/Credit Startups

- Consumer
- Mortgage
- Small business
- Technology

Some Large Incumbents Highlighting AI/ML Initiatives

- Commercial banks
- Investment banks
- Credit scoring firms

Assessing Current Practice

- Techniques and methods employed
- Pervasiveness in the industry (what sorts of firms are adopting, availability of standardized products and services)
- Domains of application (e.g., consumer credit, mortgage, commercial, etc.)
- Trends and projections

Status: significant adoption claimed

- Many startup companies
- Incumbents forming AI groups and hiring ML specialists
- No hard data

Effects of ML Technology: Bias?

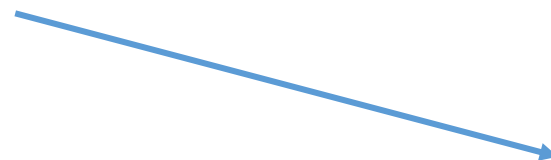
- Biases inherent in data sources

- [Caliskan et al., 2017]

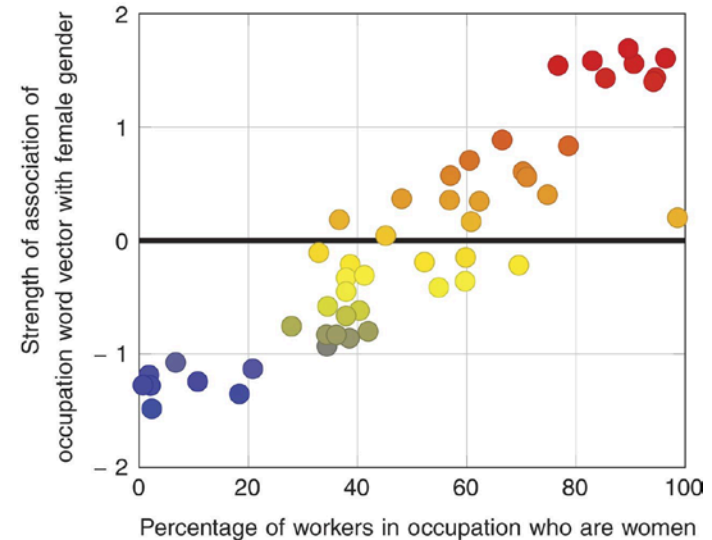


- Discovery of proxies for suspect classification features

- [Netzer et al., 2016]



- Issue: How to define *unwanted* discrimination



Employment and school	1.95***
Interest rate reduction	2.68***
Expenses explanation	-0.54
Business and real estate loan	0.57
Family	-1.28***
Monthly payments	0.65*
Residual from Acceptance	0.40

Effects of the Technology on Lending Practice

- Bias (unintended) of machine-derived lending policies
 - Biases inherent in data sources
 - Discovery of proxies for suspect classification features
 - Issue: How to define *unwanted* discrimination
- Algorithmic implications
 - Changes in standard terms for issuing and revoking credit
 - Actions triggered by new categories of conditions
 - Faster reactions to observed information
 - Privacy considerations

Status: **M**uch press discussion

- Clear demonstrations of potential problems
- Mainly hypothetical and anecdotal
- Academic work **s**tarting at abstract level

Implications for Financial Stability

- Correlated decision making based on common algorithms and data
- Cascading behavior based on rapid reactions to events
- Predictability of future credit allocations

Status: Some attention

- Fairly speculative at this point

Discussion Questions

- How can we measure actual scope and extent of technology adoption?
- Will pervasive AI/ML make lending policies and practices harder to understand?
- How can we identify manifestations of hypothetical concerns (e.g., bias in lending) in practice?
- What legal or technological measures may be available to regulate these implications?
 - Do algorithms present special regulatory difficulties, or opportunities?