Expanding Roles of Artificial Intelligence and Machine Learning in Lending and Credit Risk Management

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Bank of America has partnered with Harvard University to form the “Council on the Responsible Use of AI” - focusing on the pace of innovation and how it could be deployed in a responsible manner across various domains.

Machine Learning and AI development spans a wide-range of applications, including:

- **Robotic Process Automation** – Intelligent automation solutions to reduce manual and repetitive tasks, e.g., credit financial spreading, interpreting legal documentation, among others

- **Supervised Learning** – Data mining and inference from training datasets, e.g., Credit Scoring, Algorithmic Trading, Fraud and Financial Crimes detection

- **Unsupervised Learning** – Draw inferences from data without labeled responses, e.g., Clustering analysis for geographic regions

- **Natural Language Processing** – Transform unstructured data (text/voice) into actionable insights, e.g., Bank’s virtual assistant Erica, Sentiment Analysis

- **Resources available at Bank of America** – Training, Community, and learning Hives for DataRobot, Python, R, Tableau and other tools used for Data Science/ML
C&I Lending

Can ML improve risk assessment?
Can AI be used to improve efficiency?

What are the risks and promises?
Retail Lending

Should we even try to emulate human loan decision-makers?

When is transparency necessary and/or desirable?

Are there areas of retail lending where AI/ML use is non-controversial?
Potential Benefits and Drawbacks of AI

Benefits

• Improving Efficiencies With AI:
• Improve risk assessments with AI:
• AI can enable better, faster decisions at scale
• Ability to process non-structured data

Drawbacks

• Generalizability?
• Robustness to data issues?
• Blackbox?
AI-Risk Analytics From Alternate Data

Yinyi Co Ltd, a property developer in the Chinese port city of Ningbo, is the latest property developer to default on its bonds. Yinyi said last week that it could not pay to redeem the $300 million yuan (US$43.62 million) due on bonds issued three years ago because of short term liquidity problems.

In an attempt to avoid early redemption, Yinyi sweetened the bond’s annual coupon rate by 150 basis points to 8.78 per cent from 7.28 per cent, but investors still demanded that Yinyi repay their debts.

“If the company cannot properly resolve its overdue debt problems, it will face further lawsuits, with bank accounts being frozen, assets frozen, and may also need to pay related default damages, late fees and penalties.” Yinyi said in a filing with the Shenzhen Stock Exchange, where it is listed.

“This will affect the company’s operations and business, further increase financial costs and affect the company’s performance for the current year.”

Fuguniao : SUSPENSION OF OFFICE OF INDEPENDENT NON-EXECUTIVE DIRECTOR

05/23/2017 | 08:26pm EDT

FUGUNIAO CO., LTD.

(a joint stock company established in the People's Republic of China with limited liability)

(Stock Code: 1819) SUSPENSION OF OFFICE OF INDEPENDENT NON-EXECUTIVE DIRECTOR

The board (the “Board”) of directors ("Director(s)" of Fuguniao Co., Ltd. (the "Company") announces that the Board, having regard to the manner in which Chan Wah Man, Carman ("Ms. Chan") has been responding to the Company's efforts to resume trading in the shares of the Company on The Stock Exchange of Hong Kong Limited, considers that on balance, it is prudent and in the best interest of the Company, its members and the public to remove Ms. Chan from the Board as a Director of the Company after immediate effect until such time as the Board considers appropriate. In reaching this decision, the Directors took into account that Ms. Chan has not been exercising the reasonable care, skill and diligence expected of her as an independent non-executive director, that Ms. Chan has been unreasonably uncooperative and has been unable to provide any constructive particulars to support and substantiate her views and has failed to demonstrate that she is able to make decisions for the Company in an objective and timely manner in the best interest of the Company.

By order of the Board of
Fuguniao Co., Ltd. Lam Wo Ping
Chairman
Hong Kong, 23 May 2017
How will AI/ML Perform in a Recession?

Will an ML algorithm trained on the last recession be able to cope with the next one?

Could overuse of AI/ML cause a bubble/recession?
Cutting Room Floor
Introduction

What is artificial intelligence?

What is machine learning?
AI-Enabled Analytics

- AI-ML that assist (& collaborate) with humans in decision-making
- AI-ML tools provide new products, capabilities not possible before
  - Extract new, timely, better knowledge, insights from alternate data sources (previously not used)

AI models

Unstructured, Alternate, Multimodal Data with no machine-identifiable structure

Structured, Financial Data

Knowledge that fuels insights for better decision making

Unstructured data will account for 80% of all data created in 2020

Source: IDC, 2016
Risk Analytics: Potential Benefits of AI

Improving Efficiencies With AI:

» Automate paper processes – digitization
» Identify & extract relevant balance sheet info automatically

Improve risk assessments with AI:

» Better data-driven models
» Leverage Alternate data (more regular and timely)

AI can enable better, faster decisions at scale

» Provide lending to underserved populations, SMEs
Risk Analytics: Potential Drawbacks of AI

Generalizable AI models:
» Can AI models generalize across macro and micro-economic conditions
» Can AI models be “tricked” by false data
  » Active learning and adversarial training is key

Potential AI Biases:
» Can AI overcome biases in the data

Explainable AI Models
» Black-box models cannot be used under regulatory environments
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