EAS 504 ASSIGNMENT-8

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General Information: -

The following Lecture was held by Mr. Matt Nagowski and Eric Hanson. They both work with M&T bank and the topic of the session is Predictive Modeling: Business Analytics and Model Risk Management at a Commercial Bank.

Base Questions: -

1.) What are principal uses of data sciences in this domain?

Ans) Following are principal uses of data science in this domain:

1. **Business Unit Analytical Support: -** *To understand* how can advance analytical and predictive methods help business sell more products, retain more customers, streamline processes, and/ or better target customers.
2. **Interest Rate & Liquidity Risk: -** *To understand* whether the firm's balance sheet earn the same amount of income when interest rates change? Will the firm be able to fund its balance sheet were it to face a sudden outflow of depositors?
3. **Loss Forecasting & Credit Risk Management: -** *To understand* how much will the bank incur in losses conditional on macroeconomic conditions across its portfolio? What is the propensity of borrowers to default at the time of loan origination?
4. **Capital Planning: -** *To understand* whether firm have enough equity to withstand credit and operational losses associated with a significant macroeconomic downturn?

2.) How are data and computing related methods used in the organizational workflow?

Ans) Data and computing related methods are used in following ways in organizational workflow: -

- **Non- Linear regression models** support new deposit demand elasticity modeling.
- To understand the demand for mortgage loans in different economic environments using **Time series modeling**.
- **Predictive Analytics/ Machine learning (Random Forest Model)** is used to reduce the duplicate alerts (suspicious activities) in operational processes.
- **Clustering Analysis, Time Series Modeling & Dynamic Time Wrap** is used to find patterns in pricing.
- **Machine Learning** models are used to track and predict the intra monthly volatility of deposits to ensure adequate funding.

3.) What data science related skills and technologies are commonly used in this sector?

Ans) The data science related skills and technologies commonly used in this sector are as follows: -

- Excel, Statistics/ Econometrics
- Machine Learning (Multiple Linear Regression, Logistic Regression and Panel Data Methods etc)

- Algorithmic Thinking (Object Oriented Programming)/ Data Structures => Python, Java, Javascript processing
- Statistical Programming and Machine Learning => Python (Pandas, Numpy), R, Stata & SAS.
- Time Series Model, Clustering Analysis & Dynamic Time Wrap.
- SQL, SSRS (for data reporting), LaTex and Discrete Mathematics.
- Tableau and QlikView for Visualization.

4.) What are the primary opportunities for growth?

Ans) Speaker explained us about various areas where there are opportunities for growth. Reinvesting money in communities in form of loans has lot of scope for predictive analytics. It would help us understand the human behavior pattern and economic environments of various topologies based on which important business decisions would be taken. Commercial Banks buy insurances so as to prevent themselves from losing money when interest rate goes down. This area involves time series modeling and provides wonderful opportunity for data scientists who are interested in Financial domain. Speaker also explained how commercial banks provide personalized interest rates to commercial depositors and investors and how banks react to rising short term rates. Predictive Analytics provides a perspective to commercial banks to better synchronize with behavioral typologies of customers to have insights of pricing sensitivities of those customers.

Other Questions with respect to this Lecture: -

Ques.) In addition, please summarize one of the applications described in the talk and the data science techniques used to address the problem?

Ans.) Speaker talks about alerts that arises from suspicious activities. Most of the times, these alerts are duplicate alerts, thus resulting in wastage of precious time of employees, handling such duplicated alerts.

M&T uses Predictive Analytics/ Machine Learning to differentiate between duplicate and original alerts. They use Random Forest Model to identify two respective categories of alerts. This saves them a lot of time and at the same time helps the bank in being more vigilant.

Another challenge is to understand the demand for mortgage loans in different economic environments. M&T uses Time Series Modeling to understand such demands, this problem comes under Prudent Risk Management.