

# Big Data and utility function in bank services

## Selected aspects

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**Sofia, 16. 06. 2015**

# What will be discussed

- 1 **Big Data: characteristics and applications.**
- 2 **Big Data in Finance.**
- 3 **Preferences, utility functions and Big Data**
- 4 **Ethnic characteristics of customers and Big Data**

# What is big data

## Big data

Big data is an evolving term that describes any voluminous amount of structured, semi-structured and unstructured data that has the potential to be mined for information. Although big data doesn't refer to any specific quantity, the term is often used when speaking about petabytes ( $10^{15}$ ) and exabytes ( $10^{18}$ ) of data.

## Small data

Data whose volume and format can be easily used for self-service analytics.

**Big data is for machines; small data is for people.**

## Important characteristics of the Big Data

Big data is **high volume**, **high velocity**, and/or **high variety** information assets that require new forms of processing to enable enhanced decision making, insight discovery and process optimization

# Some applications of the Big Data

We create approximately 2.5 quintillion bytes of data ( $2.5 \times 10^{18}$ ) every day, and 90 % of the data in the world today have been created in the last 2 years alone.

- 1 **Big Data in Finance**
- 2 **Big Data Biometrics (Iris matching)**
- 3 **Storing, Managing, and Analyzing Big Satellite Data**
- 4 **Technology:** Google, Facebook, Amazon, e-Bay,....
- 5 **Science:** Large Hadron Collider, Space telescopes
- 6 **Retail sales:** Walmart, Lidl, Aldi,....
- 7 **Government**
- 8 **Defence and Intelligence**

etc.

# Big Data in Finance

## General remarks

- 1 The financial industry has always been driven by data.
- 2 Big Data is used different areas, ranging from the financial services sector to capital markets.
- 3 Availability of Big Data has opened up large opportunities for innovation, growth and sustainability.

## Problem:

Traditional data management practices in finance can no longer effectively cope with the huge, ever-increasing, and rapid influx of heterogeneous (structured, semi-structured, unstructured) data originating from internal processes and external sources, such as social media, blogs, audio, video, etc.

# Big Data and banks

Banks are using big data analytics and real-time execution to better engage with customers

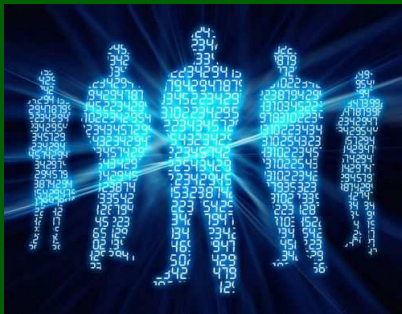
- 1 Customer centricity as top priority: **81 %** of banks
- 2 Executive believe that they do not have mature capabilities to support their customer strategies: **50 %** of executives

What kind of technology plays key role in customer-focused strategy ?

- 1 **Predictive analytics** : **59 %** of banks
- 2 Real time processing of data and analytics: **59 %** of banks
- 3 Data visualization: **54 %** of banks

# Two aspects of Big Data will be discussed

- 1 Applications to utility function and preferences
- 2 Application to ethnic characteristics of customers



# Preferences, utility function and Big Data

- 1 Let us consider some products (financial services). **We add a new product (financial service) and want to study the response of customers**
- 2 Customers can be considered (for an example) as
  - **Leaders:** ((Prominent) customers that use the new product)
  - **Followers:** (use the product for other reasons (e.g. in order to imitate the leaders))

## Goal:

- 1 *Include psychology effects (such snobbism, herd behavior, etc.) in the utility function.*
- 2 *Use Big Data to study the probability of accepting and usage of the new financial service*



# Preferences, utility function and Big Data

Let us have  $L$  "old products" and let us add 1 "new product" (financial service)

## How to proceed

- 1 Separation of customers into groups with similar parameters with respect to their demand (budget, preferences for products, psychology, etc.): **Big Data! + analytics**
- 2 Construction of state (demand configuration) of each group: *units of each kind of product, consumed for certain time interval*: **Big Data! + analytics**
- 3 Assign utility function to the state of demand configurations.

The utility function consists of the following parts

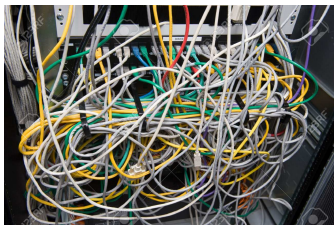
- Utility of the corresponding product (financial service)
- Correlation between any two products within the group (Customers already have the products  $i$ : will they like the product  $j$  (our new financial service??) )
- Correlation between different groups of customers (Customers from group  $\alpha$  already have the product  $k$  (our new financial service): how the customers from group  $\beta$  will react to this??

## What to do next

- 1 Calculate intensities of transitions between states in the demand configuration state (on the basis of the data for consumption of the products) (Big Data + analytics!)
- 2 Calculate probability of realization of (desired) configuration at some moment (i.e., calculate what is the probability that you will meet the sales target at some time in the future)
- 3 Take a decision if you will introduce the corresponding product (financial service) to the market of interest

# Preferences, utility function and Big Data

- 1 Obtained equation is of class **MASTER EQUATION** that calculates the change of probability of the desired state in the demand configurations state as sum of probability to arrive to this state from any other state **minus** sum of probabilities to move away from the desired state to any other state.
- 2 The size of the computer you will need depends on the size of the market of interest (with respect to the number of customers and the volume of sales of the corresponding class of products)



# Another use of utility function: ethnic characteristics of customers

People from different countries have different preferences and different utility functions **Why?**

"Frequency" explanation of a product absorption by customers

- 1 Society in a country consists of people. **What people?**
- 2 **Main frequency:** All people in a country are connected by a "field" that has specific "frequency" (different countries, different "main frequencies")
- 3 **Secondary frequencies:** People in a country belong to different ethnic groups. The "field" of each group has own specific frequency
- 4 **Tertiary frequencies:** People from an ethnic group belong to different sub-ethnic groups. The "field" of each such group has own specific frequency
- 5 **etc.**

# Another use of utility function: ethnic characteristics of customers

## "Frequency" explanation of a product absorption by customers

- 1 **If you want that your product (financial service) reaches some ethnic group this product must have "resonances" at all "frequencies" corresponding to the group**
- 2 **If the resonances are not presented then the group will not accept the product**
- 3 **Because of this the development of the products (financial services) has to be specific for the corresponding country**

# Another use of utility function: ethnic characteristics of customers

How to study the "frequencies"

**Classification of people (rough classification for explanatory purposes)**

- 1 I-E,
- 2 P-E,
- 3 I-T,
- 4 P-E,

# Another use of utility function: ethnic characteristics of customers

How to study the "frequencies"

**Determination of the state of the ethnic sub-groups, ethnic groups, and society**

- 1 **Determine the mix of kinds of people in each ethnic sub-group (Big Data + analytics!),**
- 2 **Determine the state of the ethnic sub-groups,**
- 3 **Determine the state of the ethnic groups,**
- 4 **Determine the state of society,**

# Another use of utility function: ethnic characteristics of customers

## Updating utility function

Now the groups are the sub-ethnic groups and the products (financial services are as above). Utility functions has the following parts

- 1 Utility of the corresponding product (financial service)
- 2 Correlation between any two products within the group (Customers already have the product  $i$ : will they like the product  $j$  (our new financial service??) )
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# Another use of utility function: ethnic characteristics of customers

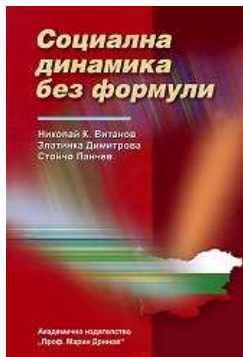
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# Some additional information



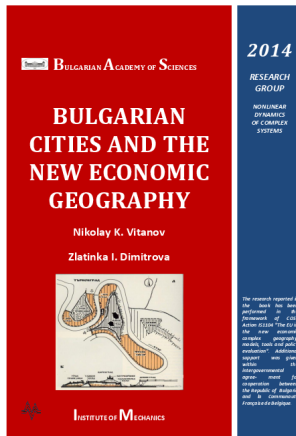
# Some additional information



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# THANK YOU FOR YOUR ATTENTION!

