

# Broadening the data base for deepening the focus? The use of big data analytics in transaction banking

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## What are we going to talk about?

- 1 **Techniques** of big data analytics
- 2 Current applications
- 3 Use in **transaction** banking
- 4 Use in **central** banking

## What is big data?

3, 4 or 5 Vs

1 2 3 4

### Volume

...terabytes, petabytes, exabytes, zettabytes, yottabytes – IoT makes it possbile!

## Velocity

Real-time log files, GPS and sensors almost produce streaming data

## **V**ariety

Numbers, text, voice, pictures, video sequences,...

## **V**eracity

Accuracy, completeness, reliability of mass data?

### Value

Insights, correlations, causality, explanatory power?

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## How to compile a data set?

Different sources, formats and content

2

3

4

#### Internet

Webcontent
Clickstream data
Social media
(Micro-)Blogs
Search engine data

#### **Corporate Systems**

Controlling & accounting
Internal & external reporting
Production or service data
Customer data
Employee data

## **Digitalisation**

## Public & Private Infrastructures

Public infrastructures
(e.g. public transport, energy supply)
Financial infrastructures
(e.g. exchanges, trading platforms, ATMs, card reader)

#### **Devices**

Smartphones
Voice assistants
Cameras
GPS & sensors
Smart home devices

## How about the analytics?

Buzz words wherever you look...

1 2 3 4

## Internet of things

.....Intelligent devices

**Business Intelligence** 

Speech recognition....

.....Management Support Systems

**Automisation** 

**Data Mining** 

OLAP

Digitalisation

Knowledge Discovery in Databases.....

Unsupervised Learning....

**Pattern Discovery** 

## **Artificial Intelligence**

**Text Mining** 

**Machine Learning** 

.....Web Mining

Social Media....

...Clickstream Analysis

Supervised Learning....

**Predictive Analytics** 

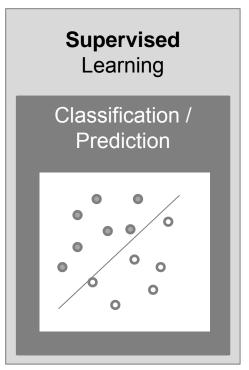
....Reinforcement Learning

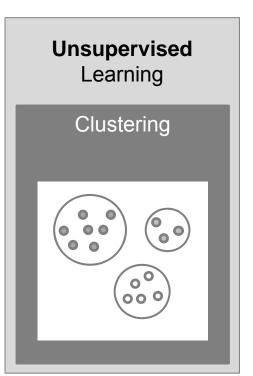
## Can Al help? Machine learning methods

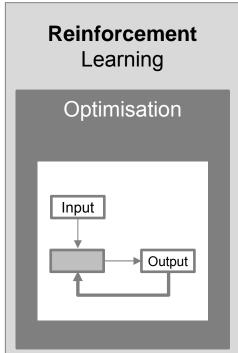
1 2 3 4

## Machine Learning (ML)

= algorithms that autonomously find and improve a decision logic by iterations







Graphics slightly adjusted from Raschka (2016)

## How to use BDA in the financial industry?

Prominent use cases

1 2 3 4

### **Customer Relationship Management & Targeted Marketing**

- Customer profiling
- Strategic decision support
- New product development

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#### **Risk Management & Regulatory Reporting**

- Credit scoring models / Default prediction
- Fraud detection
- Text mining for compliance and auditing

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## **Capital Markets & Asset Management**

- Forecasting prices and recognising trends
- Sentiment analysis
- Risk assessments

## How to use BDA in transaction banking?

Data assessment

1 2 3 4

#### Reference data

e.g. personal data, legal entity information, country,...

## Payment transactions

e.g. value, time, sender, receiver, credit lines, limits,...

#### Portfolio data

e.g. collateral, risk measures,...

#### Market data

e.g. securities prices, benchmark prices, trends,...

## Participant data (public)

e.g. balance sheet information, risk reports, credit ratings...

## How to use BDA in transaction banking?

Focus areas so far...

1 2 3 4

#### Classification

## **Anomaly detection in transaction patterns**

Triepels et al. (2017)

#### **Risk management and fraud detection**

Butaru et al. (2016)

Zareapoor/Shamsolmoali (2015)

#### **Default prediction**

Khadani/Kim/Lo (2010)

## **Forecasting**

#### **Market return forecasting**

Huang et al. (2005)

#### **Risk indicator forecasting**

Plakandaras et al. (2014)

#### **Sentiment analysis**

Azar/Lo (2016)

Sprenger et al. (2014)

Bollen/Mao/Zeng (2011)

## How to use BDA in central banking?

... and the way forward

2 3 4

Can we...

- ... predict a RTGS participant's liquidity needs from individual transaction patterns?
- ... optimise system-wide intraday liqudity management in an RTGS by using a neural network?
- ... **forecast consumption** from analysing aggregate transaction patterns in retail payment systems?
- ...?

#### How to examine the value added of Al as a central bank?

Some questions for central banks

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### Al methods as a "black box"

How efficient and secure can FMI operations with AI be?



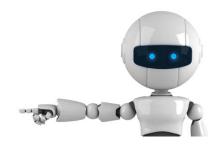
## Comparative analyses – Classic vs. Cool?

Has AI any advantage compared to established FMI operations?



## Reliability and trust

How much responsibility can be transferred to Al in automatic decision making?



#### Sources

- <a href="http://blogs.lse.ac.uk/impactofsocialsciences/2015/05/08/interpretation-in-evidence-based-medicine/">http://blogs.lse.ac.uk/impactofsocialsciences/2015/05/08/interpretation-in-evidence-based-medicine/</a>
- https://www.123rf.com/photo\_13470955\_a-green-two-way-street-sign-pointing-to-old-and-new-letting-you-choose-for-something-older-or-newer-.html
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