

# Big Data Analytics in Financial Statement Audits

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# Big Data Analytics

- *Big Data analytics* is the process of inspecting, cleaning, transforming, and modeling big data to discover and communicate useful information and patterns, suggesting conclusions, and supporting decision making
- Big Data analytics has been applied in many areas
  - Marketing
  - Political Campaigning
  - Sports
  - National Security
  - Biology
  - Law Enforcement

# Big Data analytics and audit of financial statements

- Audit *with* Big Data as opposed to audit of Big Data
- Identifying and assessing the risks
  - associated with accepting or continuing an audit engagement
  - of material misstatement through understanding the entity and its environment (ISA 315).
  - of material misstatement of the financial statements due to fraud, and testing for fraud having regard to the assessed risks (ISA 240).
- Performing analytical procedures
  - in response to the auditor's assessment of the risks of material misstatement (ISA 520).
  - near the end of the audit to assist the auditor form an overall conclusion (ISA 520)

# Social and Mass Media Big Data

- Bollen, Mao, and Zeng (2011)
  - use Twitter data to predict daily fluctuations of the Dow Jones Industrial Average (DJIA).
  - use Google's *Profile of Mood States* and *OpinionFinder* (Wilson et al. 2005) measure public mood based on 10 million public tweets.
- Chan (2003) and Mittermayer (2004) use news articles to predict stock price movements.
- Social and Mass Media data can be utilized to help measure financial health of a firm, and better evaluate the audit engagement risk.

# Demographic and Weather Big Data

- OfficeMax personalizes online landing pages based on customer's demographics using *LivePredict* system. LivePredict can predict customer's political views.
- Walmart mined its terabytes of data, and found that during hurricane warnings customers increasingly bought not only flashlights, but also strawberry Pop-Tarts.
- Geographical and demographic data can be used to predict revenues in individual locations, and used to create peer-based metrics to identify irregular patterns.

# Hybrid Big Data

- Ayata's *Prescriptive Analytics* is used to predict optimal oil and gas drilling sites based on:
  - images from well logs,
  - videos of fluid flows from hydraulic fractures,
  - sounds from drilling operations,
  - text from driller's notes, and
  - numbers from production reports.
- Mofitt and Vasarhelyi (2013) propose to use news, audio and video streams, cell phone recordings, social media comments to obtain new forms of audit evidence, confirm existence of events, and validate reporting elements.

# Historical Big Data

- The Los Angeles Police Department analyzes data from crime scenes, including time, location, nature, and actors in order to predict the most likely timing and location of crimes on that day and to deploy forces most effectively
- Similar analytics could be used by auditors to identify fraud risks and direct audit effort aimed at fraud detection.

# Characteristics of Big Data Analytics

- Population vs sample analysis.
- Correlations as opposed to causation.
- Integration with continuous auditing.



# Implementing Big Data Analytics in Audit

- Providers of Big Data analytics.
- Exception prioritization (Issa and Kogan 2013).
- Messy data in audit.
- Computational challenges. Data subsetting.
- Legal challenges and audit standards.

Thank you!