A Predictive Ordered Logistic Regression Model for Quality Review of Control Risk Assessments

Hussein Issa
Alexander Kogan

Control Risk Assessments

- Management and external auditors are required to report on the adequacy of internal controls (SOX 404).
- Control Risk Assessments are important for the planning of the annual schedule of audits, as well as the decision whether to limit or expand controls.
- Internal audits quality is important to external auditors & management.
- The quality of internal audit affects external auditors in 3 phases (SAS No. 65) (AU Section 322):
  - Risk assessment
  - Understanding, documenting, and testing internal controls
  - Substantive testing

Exceptional Exceptions

Problem:
- Continuous auditing research is abundant with IT applications to provide continuous assurance
- Prior continuous auditing research focused on detecting exceptions efficiently
- Analysis usually yields large amounts of exceptions, leaving the user flooded with information
- Human users perform complex aggregation and processing tasks poorly

Proposed Solution:

Step 1: Exception detection
  Apply one or more technique to detect exceptions

Step 2: Exceptional exceptions
  Identify patterns within the exceptions based on the distance, $ amount, Frequency, etc

Step 3: Evaluate the ranking techniques

Objective & Research Questions

Objective:
- Formulate a predictive model for preliminary control risk assessment
- Identify exceptions (quality review)
- Propose a methodology to prioritize these exceptions (Exceptional Exceptions)
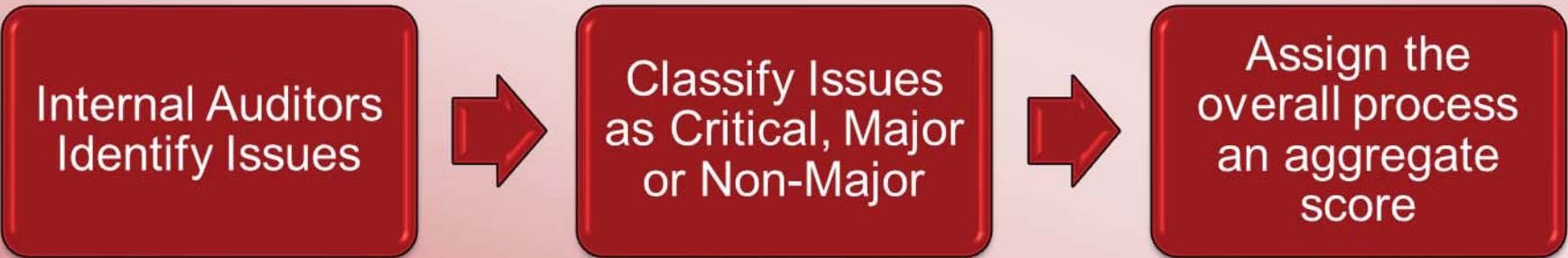
Research Question:
1. How can we verify and review the quality of internal auditors' judgment of CRA?
2. How can we use a probabilistic model to prioritize the exceptions that disagree from the norms?

Methodology

Data:
- Source: Multinational consumer product company
- Issues identified by location and business process (e.g. Distribution, Payroll, A/P)

	FY 08/09	FY 09/10	FY 10/11	All (08-11)
AS	344	305	275	924

Internal Auditors Identify Issues → Classify Issues as Critical, Major or Non-Major → Assign the overall process an aggregate score

Ordered Logistic Regression:

Formula:

$$logit = ln\left(\frac{prob(event)}{1-prob(event)}\right) = \beta^T x_i + \varepsilon_i = \beta_0 + \beta_1 CC + \beta_2 MC + \beta_3 NMC$$

Predicted Probability

$$PredProb = \hat{P}(C_i|x) = \frac{1}{1+e^{-(\beta^T x_i + \varepsilon_i)}}$$

Disagreement Measures:

Ratio:

$$Ratio = \frac{Calc.Class_{Assign}}{Calc.Class_{Pred}}$$

Difference

$$Difference = Calc.Class_{Pred} - Calc.Class_{Assign}$$

Findings & Contribution

Findings:
- Accuracy of the fitted model is 93%, (ie only 7% of the cases deviated from the model
- Accuracy of the predictive model is 76.36%
- Top 20 outliers from both ranking metrics were the same

Contribution:
- Proposed a methodology for Quality review of auditors' judgment of CRAs
- Proposed a methodology to prioritize outliers, thus increasing audit efficiency
- Developed a methodology for consistency check, which can provide non-experts with expert-like knowledge

Audit Analytics: A Field Study of Credit Card After-sale Service Problem Detection at a Major Bank

Jun Dai and Miklos A. Vasarhelyi

Motivation

Audit analytics is an emerging methodology applying *data analysis techniques* on *auditing*. It offers several advantages when compared with traditional auditing methods

It is *desirable* to develop a general and systematic protocol for audit analytics, *because*:

1 It provides *guidance* by offering a synopsis of the processes of audit analytics

2 It establishes a *foundation* for future research on more detailed procedures

3 It helps further develop the audit analytics *discipline*

Ideas & Contributions

Basic Ideas

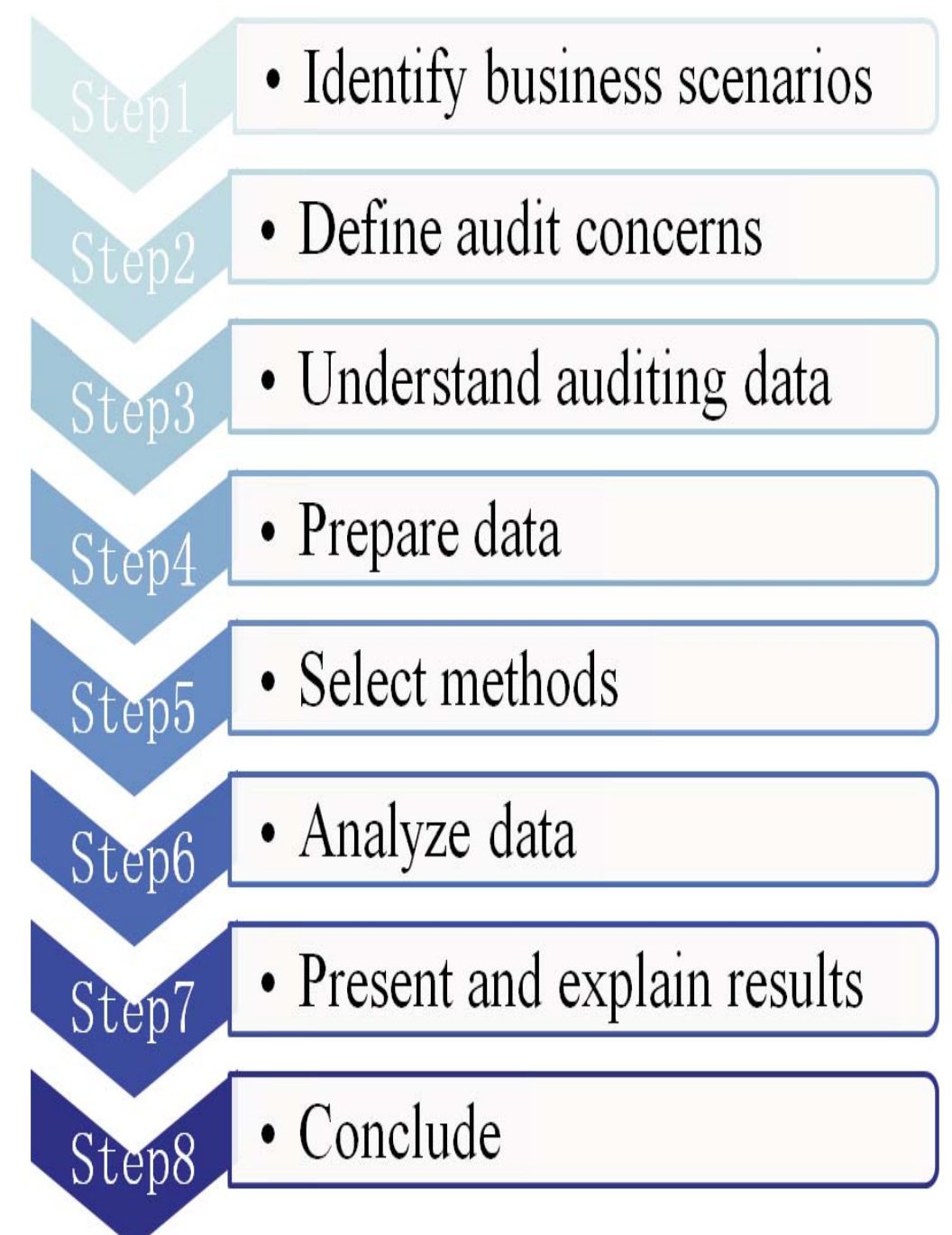This paper first develops *an audit analytics protocol* for auditing issues

In a field study, such protocol is used to detect real world credit card problems

Contributions

This paper is the **first** to discuss the general protocol of audit analytics in addressing auditing issues

The results show that the general protocol is an efficient way to discover audit relevant information that cannot be easily detected by traditional audit protocols
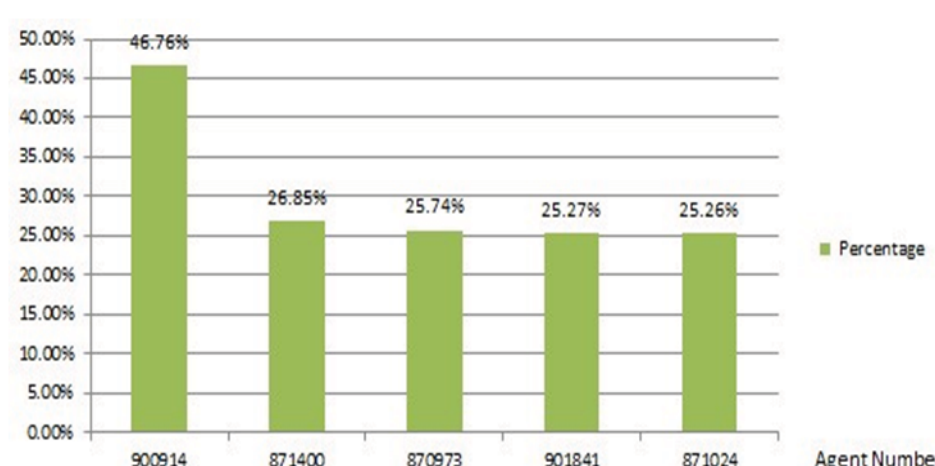
A General Protocol of Audit Analytics

- **Step1** • Identify business scenarios
- **Step2** • Define audit concerns
- **Step3** • Understand auditing data
- **Step4** • Prepare data
- **Step5** • Select methods
- **Step6** • Analyze data
- **Step7** • Present and explain results
- **Step8** • Conclude

Field Study

Objective: To evaluate the efficiency and adaptability of the general audit analytics protocol

Description: The field study is to *investigate* problems existing in credit card after-sale service process at major bank in South America
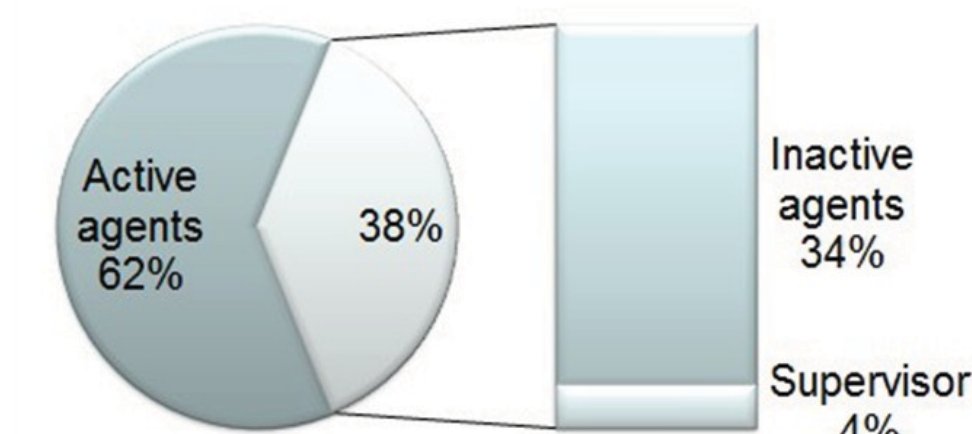
The general protocol: In this field study, the protocol developed in the first step is strictly followed, and further detailed procedures & methods are created
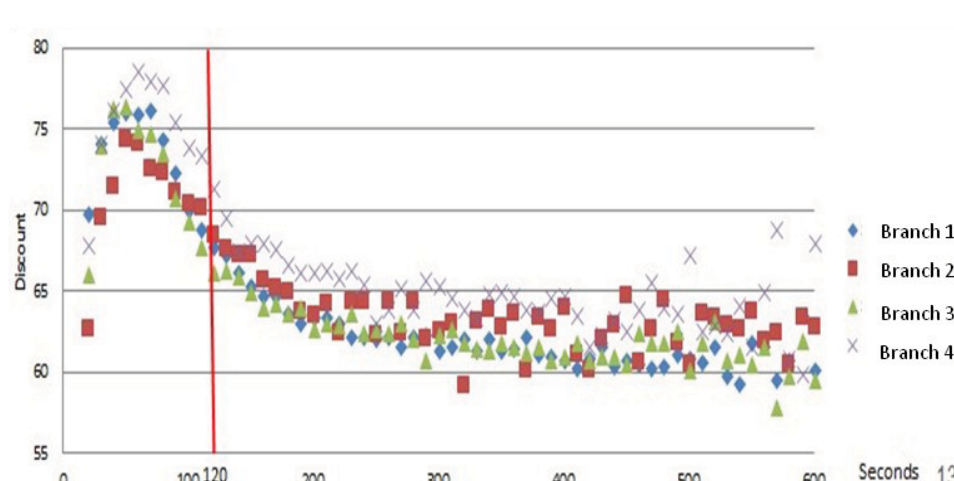
Results

Six Bank Representatives Offering More Than 25% Discounts in Short Calls

Percentages of Active Agents, Inactive Agents, and Supervisors

- Active agents 62%
- 38%
- Inactive agents 34%
- Supervisor 4%

Duration of Call–Discounts Relations by Bank Branches

Summary & Discussion

Summary:
In this paper, a general audit analytics protocol is developed for investigating auditing issues. Following this protocol, a field study is conducted to detect credit card after-sale service problems at a major bank to examine the efficiency and adaptability of the protocol

Discussion
The results of the field study show that, following the protocol, researchers or auditors are able to efficiently investigate audit concerns using simple or complex analytical tools, and further discover the potential problems within the business process

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Exploration and exploitation in deciding what to audit

Roman Chychyla

Alexander Kogan

Introduction

In auditing we are faced with a problem of identifying *irregular* transactions from a set of observed transactions. However, it would be prohibitively expensive to investigate each and every transaction to find the irregular ones. One way to deal with the problem is to investigate transactions that are *suspicious*.

The *traditional* audit approach is to choose a random sample from the population of all transactions. However, this approach tends to ignore the information that is known about transactions.

In the era of technology and computers, it seems natural to *apply analytical models* to identify suspicious transactions. It is cheap, fast, and, possibly, accurate. The question is how good it is. We show that the answer depends not only on *what* analytical models are utilized, but also on *how* they are utilized.

Challenges of applying statistical models

In order for a statistical model to be effective it should be able to should gain "experience" over time by *learning* from its past predictions. Information about the past predictions is called a *feedback*.

In the auditing problem of identifying irregular transactions, a model receives feedback *only* from the past transactions that were *identified as suspicious* and were *investigated*. This is called the problem of *one-sided feedback*, and it may introduce significant bias to the model towards certain types of irregular transactions seen so far. Consequently, the model *may fail* to recognize irregular transactions of other types.

Usually, an audit data is *highly unbalanced*, i.e., the number of irregular transactions is relatively small. This fact make the problem of one-sided feedback even more pronounced.

The exploration and exploitation framework

In this study, we try to mitigate the one-sided feedback problem by building a *framework* on top of the statistical model that changes the way the model learns and predicts. The framework utilizes exploration and exploitation techniques to achieve its goal.

The framework trades off the immediate gain from investigating the most suspicious and important transactions (*exploitation*) for developing a more accurate statistical model by spending audit resources to learn more about the underlying distribution of the transactional data (*exploration*). A more accurate statistical model may yield more benefits in the future.

Visual illustration of the framework
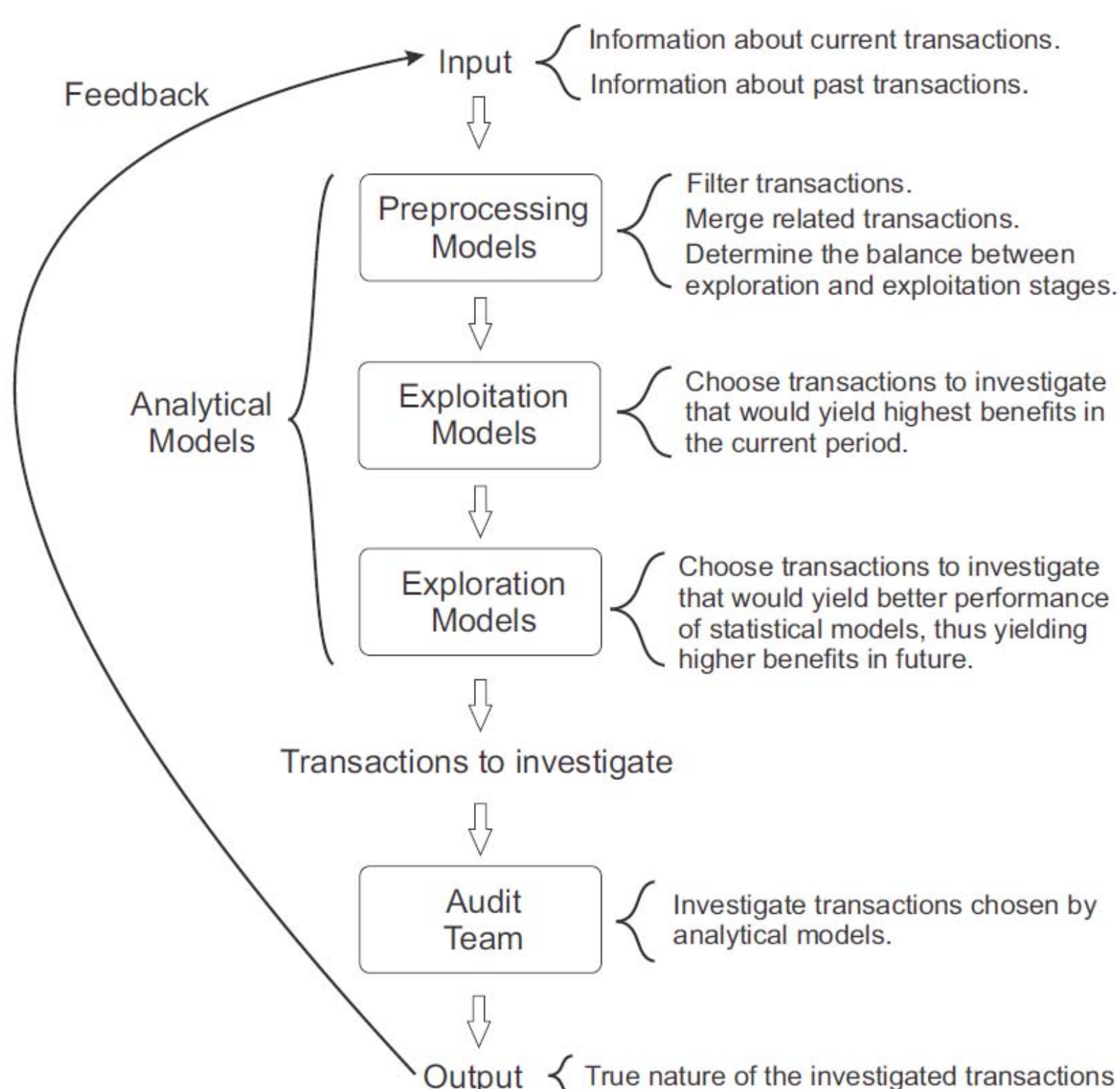
Testing and Results

The proposed framework was tested on the large-scale, real-world census data that simulated the problems associated with the audit data. Several statistical models were used in testing such as logistic regression and support vector machines.

The results show that the proposed framework may boost the accuracy of statistical models by more than 57% and increase the value of prevented loss by more than 18%.
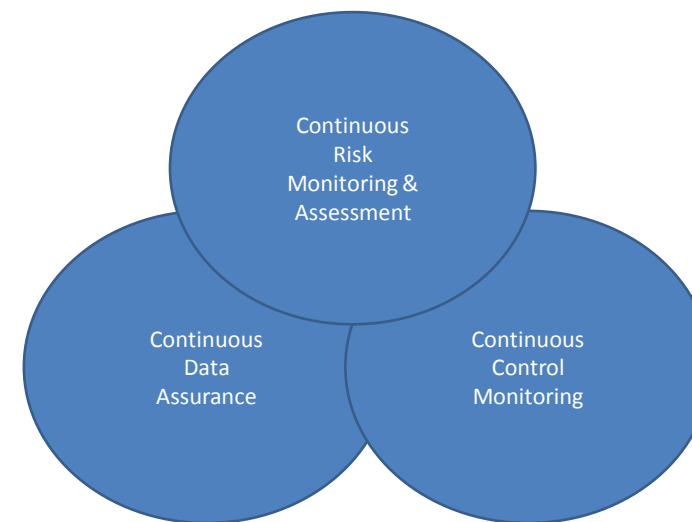
Adopting Continuous Auditing:
A Comparison between the United States and China

Ting (Sophia) Sun
Michael Alles
Miklos A. Vasarhelyi

Abstract

1. While it is increasingly applied in U.S., continuous auditing is in its infancy in China. The term "continuous auditing" has never been formally introduced until the release of the draft of the Internal Control Audit Guide in 2011.

2. Different adopting environment for continuous auditing could explain why there is such a great gap between the U.S. and China.

3. To explore these differences, this study compares three types of environment: business environment, auditing environment, and technology environment.

Continuous Auditing Methodologies

Environment for CA Adoption

Environment	The U.S.	China
Business	• the Global financial crisis • the accelerated increasing of out-sourcing	• the long-term industry monopoly • corruption inside enterprises
Auditing	• the strict regulatory requirement of the SOX Act in the first several years of its passage • the loosening of the requirement of SOX Act in the recent years • research reports, standards, regulations, and guides for continuous auditing provided by professional organizations	• the internationalization of auditing standards • the intervening of the government • the deficiency of internal auditing structure • the lack of management support • no continuous auditing specific standard, regulation, and guide
Technology	• ERP systems • GRC systems • data modeling and data analytics techniques	• ERP systems • network audit systems

Contributions made by organizations the U.S. versus China

	Organization	Year	Contribution
U.S.	Elliott Committee	1997	Elliott Report
	AICPA	1999	Red book
	AICPA	ongoing	Pink book
	IIA	2005	GTAG No.3
	ISACA	2010	IT audit and assurance guidelines No.42
China	State Council of China (SCC)	2001	IT audit regulation
		2006	New version of Audit Law (Article 31 and 32)
	Chinese National Audit Office (CNAO)	2004	National standards of accounting software interface
		Since 2006	IT audit Practice guidelines
	MOF, CSRC, CNAO, CBRC, and CIRC	2010	Draft of "China SOX"
	CICPA	2011	Draft of the Internal Control Audit Guide
	CIIA	2008	Internal Audit Standard (Article No. 28)

Conclusions

1. Competition is an important incentive of adopting continuous auditing

2. Government interference is a key obstacle for adopting continuous auditing

3. Chinese auditors are less independent than their American counterparts

4. Support from management of organizations matters for adopting continuous auditing

5. China needs more legal and professional guidance for adopting continuous auditing

6. There is still an obvious technology gap between China and the U.S.

The Development and Intellectual Structure of Continuous Accounting Research

Victoria Chiu, Qi Liu and Miklos Vasarhelyi

Introduction & Motivation

The continuous development of technology has been identified as a significant influence on the accounting profession. In the last twenty years, auditing tasks have gradually shifted from a traditional paper-and-pencil format to a more electronic format. This study examines the development of continuous auditing research by (a) classifying continuous auditing research on the basis of four attribute dimensions, (b) applying citation and co-citation analyses to identify influential research and scholars within the field, and (c) revealing main reference clusters that contribute to the formation of the continuous auditing field through the use of bibliometrics and graphical data mining techniques.

Methodology

The 118 continuous auditing relevant research examined was collected from online academic research databases- *EbscoHost, Science Direct, Scopus, Wiley Library, ISI Web of knowledge* and *Accounting Research Directory* after querying key terms "*continuous auditing,*" "*continuous assurance,*" "*continuous monitoring*," and "*continuous reporting*." The collected studies are published within the 1983-2011 time frame.

A taxonomy classification approach is applied to identify research characteristics of continuous auditing in four dimensions. Citation & co-citation techniques are used to examine the development of CA citations' intellectual structure over three periods of time.

Results Analysis

<A. Research Characteristics>

Research Method	Articles Count	Percentage
Analytical	59	50.00%
Empirical-Survey	18	15.25%
Empirical-Case	16	13.56%
Empirical-Experiment	13	11.02%
Archival	10	8.47%
Mixed	2	1.69%
Topical Area	**Articles Count**	**Percentage**
General CA	40	33.90%
Continuous Control Monitoring	20	16.95%
Enabling technology	18	15.25%
Continuous Reporting	14	11.86%
Continuous Assurance	13	11.02%
Audit Automation	11	9.32%
Continuous risk monitoring and assessment	2	1.69%
Geographical Area	**Articles Count**	**Percentage**
US	80	67.80%
Asia	10	8.47%
Europe	10	8.47%
Mix	10	8.47%
Australia	3	2.54%
Canada	3	2.54%
Africa	2	1.69%

Results Analysis

Specific Area of Emphasis	Articles Count	Percentage
Systems/models development	22	18.64%
Demand and environment	20	16.95%
Technology/Methods introduction & application	16	13.56%
Concept introduction and development	12	10.17%
Impact	11	9.32%
Research Opportunities/Evaluation	10	8.47%
Perceived value	9	7.63%
Auditing Education	6	5.08%
Cost and benefit	6	5.08%
Implementation in Practice	4	3.39%
Assurance measurement and quality	2	1.69%

<B. CA Co-Citation Clusters (*partial*)>
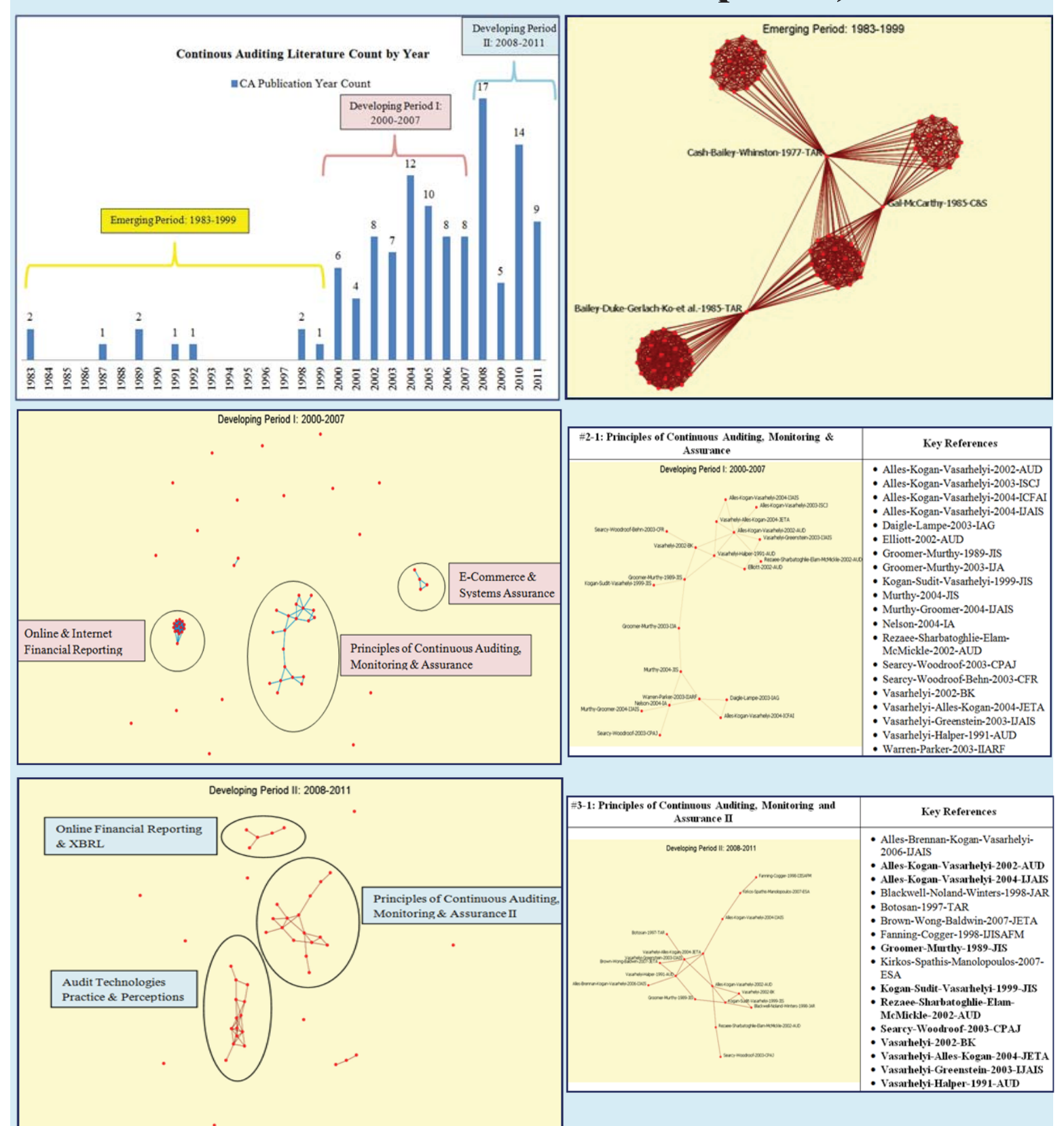
Conclusion Implications

This study examines extant CA literature by bibliometrics to reveal its characteristics and citations' intellectual structure. Longitudinally, CA research mainly falls under normative studies, followed by empirical survey & case studies. Emphasized CA research areas are systems/models development, demand & growth environment, and enabling technologies. Citations shown that *"Principles of Continuous Auditing, Monitoring & Assurance"* cluster I & II share ten exact references (*i.e. Groomer & Murthy, 1989; Vasarhelyi & Halper, 1991; Kogan et al., 1999; Alles et al., 2002; Rezaee et al., 2002; Vasarhelyi, 2002; Searcy & Woodroof, 2003; Vasarhelyi & Greenstein, 2003; Alles et al., 2004; Vasarhelyi et al., 2004*). These key manuscripts are recognized by accounting scholars and have played a crucial role in CA research thought development.

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Semantic Clustering of Accounting Literature

Qi Liu, Miklos Vasarhelyi

Motivation

- Traditionally, literature taxonomization has been performed manually, which is very time consuming and may cause inconsistent results.
- Continuously emerging new concepts and research topics require regular update of taxonomy criteria and classification results.
- Using text clustering techniques to cluster academic literature has been studied in several disciplines such as biomedicine and astronomy, but not in accounting.

Research Questions

- How can we use text clustering technique to automate accounting literature taxonomization?
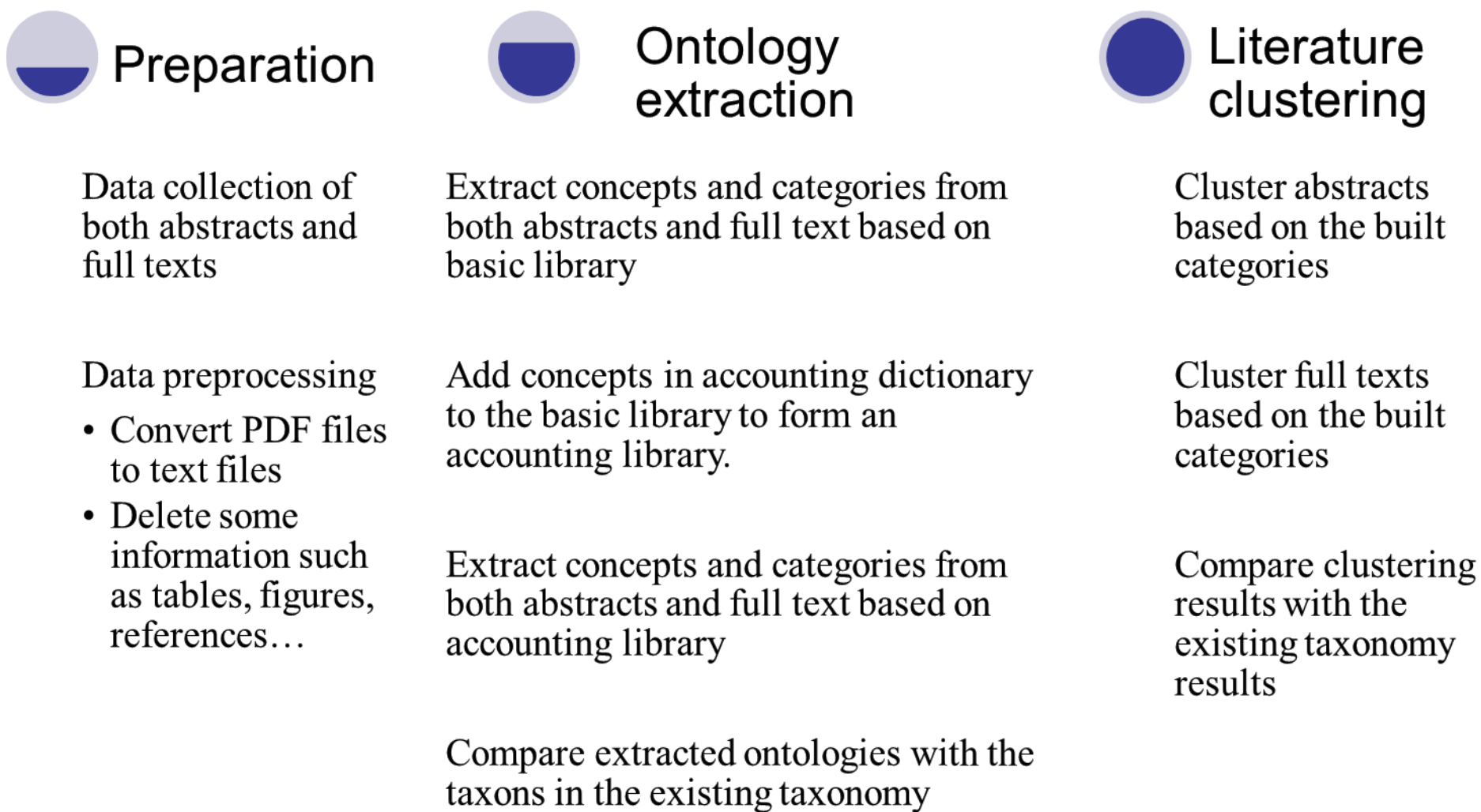- How accurate the automatic results could achieve?

Literature Review

- **Statistical text clustering methods**
  ⇒ Each document is represented by a vector of single words after removing stop words and word stemming. (Salton and Yang, 1975)
  ⇒ Similarities of texts are measured by term frequency. (Hoskinson, 2005; Resnik, 1995)
  ⇒ Semantics in the texts can be misrepresented. (Bloehdorn and Hotho, 2004)
- **Semantic clustering methods**
  ⇒ Phrase based vector presentation (Lewis, 1992)
  ⇒ Structure based clustering method (Hozima, 1993)
  ⇒ Ontology based clustering method (Hotho, 2002)

Methodology

- We use ontology based text clustering method in this study.
- Because there is not a widely accepted existing accounting ontology for literature taxonomization, we can first extract ontology from accounting literature then use it to facilitate clustering task.
- **Sample:** 200 papers published in "The Accounting Review" from 1990 to 1997.
- The existing manually classified taxonomy information in Accounting Research Directory include: research method, mode of reasoning, school of thought, information, treatment, accounting area, objective, foundation discipline.
- **Tool:** IBM SPSS Text Analytics

Experiment Process

Preparation

Data collection of both abstracts and full texts

Data preprocessing
- Convert PDF files to text files
- Delete some information such as tables, figures, references…

Ontology extraction

Extract concepts and categories from both abstracts and full text based on basic library

Add concepts in accounting dictionary to the basic library to form an accounting library.

Extract concepts and categories from both abstracts and full text based on accounting library

Compare extracted ontologies with the taxons in the existing taxonomy

Literature clustering

Cluster abstracts based on the built categories

Cluster full texts based on the built categories

Compare clustering results with the existing taxonomy results

Concept extraction Results

	Abstract with basic library	Abstract with accounting library	Full text with basic library	Full text with accounting library
Accurate rate	48.1%	52.46%	55.19%	61.2%

Literature clustering results

Taxons	Accurate rate of abstracts	Accurate rate of full texts
Research method	5.5%	22%
Mode of reasoning	8%	51.5%
School of thought	2.5%	9%
Information	24.5%	45.5%
Treatment	31%	49%
Accounting area	36.5%	82.5%
Objective	2%	2.5%
Foundation discipline	62.5%	90.5%

Conclusion

- Better ontology can be extracted from full texts than abstracts
- Using full text can generate better clustering results, and clustering results differs according to different taxons.

Continuous Auditing: Exception Prioritization Framework

Pei Li, David Y. Chan, Alexander Kogan

Motivation

I. Fraud Issue: *2010 Report to the Nations on Occupational Fraud and Abuse* estimates fraud costs the world over $2.9 trillion in 2009 (ACFE 2010).

II. High Expense of Internal Audit: Although fraud can be controlled to some degree with internal auditing, the cost of implementing it is rather high. The *GAIN's 2011 Annual Benchmarking Study* from the Institute of Internal Auditors states the total audit costs for audit staff size from six to ten is more than one million per year (IIA 2011).

III. Continuous Auditing (CA) can improve the efficiency of internal audit through automation. However, researchers find that the volume of exceptions generated by a CA system may be very problematic and can be overwhelming to an audit staff (Alles et al. 2008) . The investigation of exceptions is still a manual process and is limited by the availability of audit staff.

Exception Prioritization Framework

In order to make the best use of the limited auditor resources for investigating alarms, we propose a framework to systematically prioritize the exceptions generated by the CA system.
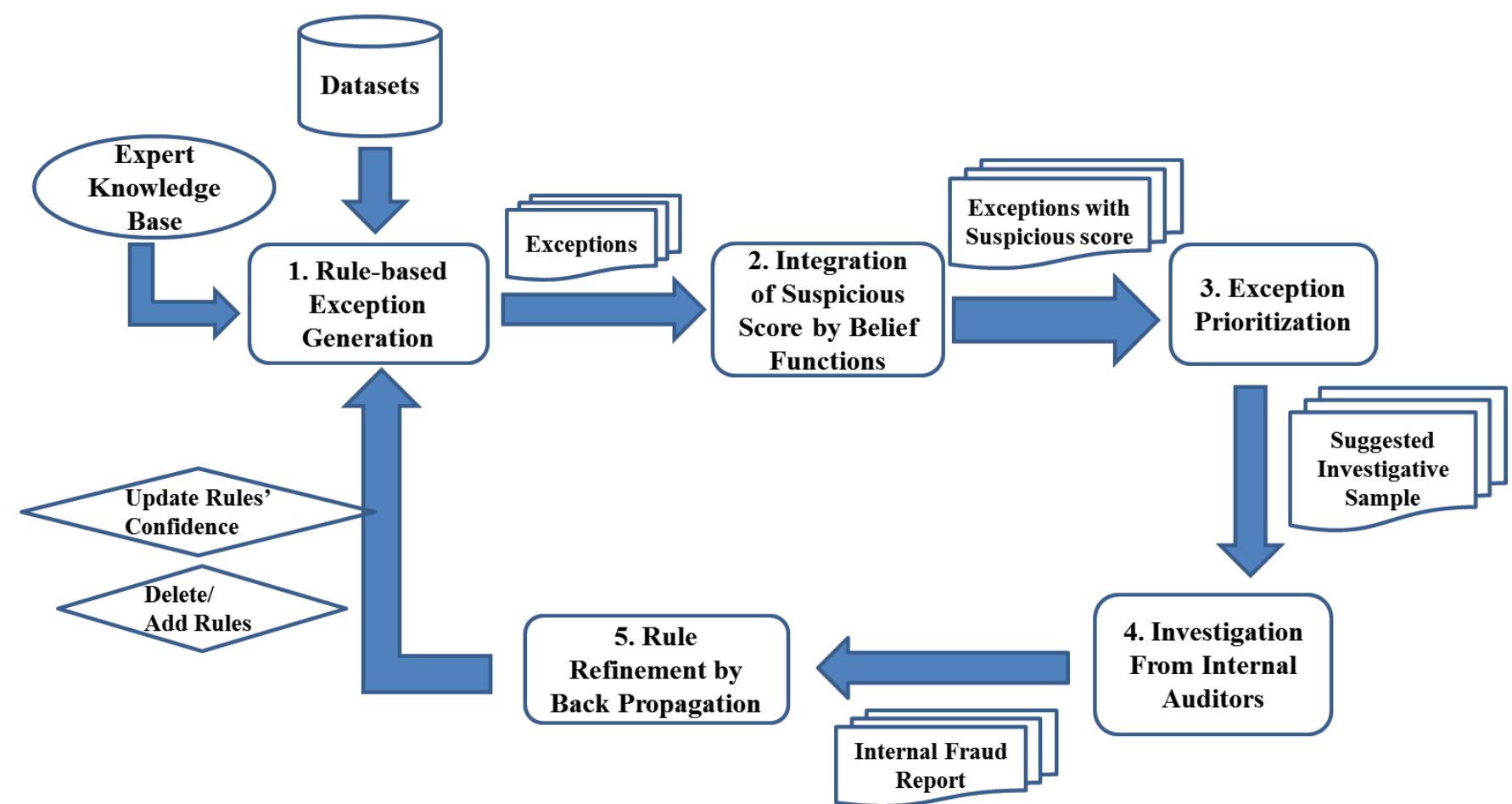

The framework sequentially consists of five major stages: 1. Rule-based Exception Generation, 2. Integration of Suspicion Score by Belief Functions, 3. Exception Prioritization Analysis, 4. Investigation from Internal Auditors, and 5. Rule Refinement by Back Propaga-

Stages of Exception Prioritization Framework

Stage 1. Rule-based Exception Generation: A set of rules is created based on the expert knowledge, and then programmed to identify irregular transactions and control violations. The datasets are imported into the rule-based exception generation system, and are expected to produce large number of exceptions. These exceptions are delivered to the next process.

Stage 2. Integration of Suspicion Score by Belief Functions: The Dempster-Shafer theory of belief functions is employed to combine the confidence of each of these rules that exceptions violate. The combined beliefs are treated as the suspicious score for each transaction.
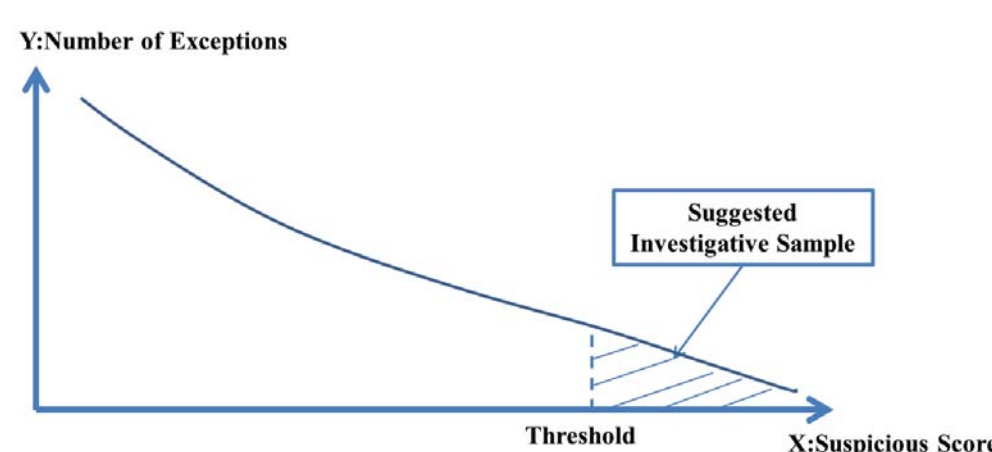
Stage 3. Exception Prioritization Analysis: This process will set a risk threshold to suggest an investigative sample. The threshold is set based on the consideration of the suspicious scores, the materiality, and the available staff.

Stage 4. Investigation from Internal Auditors: The audit staff investigates the sample and reports on the findings.

Stage 5. Rule Refinement by Back Propagation: Based on the findings, the expert rule-based exception generation system can be adjusted or modified accordingly. This revision process will enhance the accuracy of the rules used in the next iterative cycle.

Two Types of Rule Refinement:

1. Investigative Experience: new rules added, its initial confidence is based on the judgment of internal auditors.

2. Investigative Findings:

- The confidence of specific rules will be increased if fraud is detected.
- The confidence of specific rules will be weakened if transactions violate the rule but later determined it to not be fraud.
- When the confidence of the rules decreases to zero, the rules will be deleted from the rule-based detection systems.

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Does Text in MD&A Improve Earnings Forecasts

Khrystyna Bochkay

Carolyn B. Levine

Introduction

• Doubts remain about the underlying value and predictive ability of quantitative measures of firms' fundamentals (Feldman et al., 2009; Shiller, 1981; Roll, 1988; Cutler et al., 1989; Lev and Thiagarajan, 1993).

• Qualitative variables may help to explain stock returns (Tetlock et al., 2008).

• Most of the information that flows out of American corporations is qualitative (Gangolly and Wu, 2000), but regulators frequently caution firms against providing redundant, meaningless disclosures.

• Is qualitative information purely boiler-plate or does it provide information?

• SEC writes : "*Our MD&A requirements call for companies to provide investors and other users with **material information** that is **necessary** to an **understanding** of the **company's financial condition and operating performance**, as well as **its prospects for the future**"

MD&A is particularly important because it enables investors to see the company "through the eyes of management."

Literature Review

• Forward-looking language in public filings (Muslu et al., 2008; Li, 2010)

• Context within which financial information should be analyzed (Sun, 2010)

• Insufficient updating or stickiness of MD&A (Brown and Tucker , 2011)

• Readability of MD&A (Li, 2008; You and Zhang, 2009; Miller, 2010; Loughran and McDonald, 2010)

• Language tone in MD&A (Rogers et al., 2011; Li, 2006; Feldman et al., 2009)

Hypotheses

Hypothesis 1.

(a) Incorporating text from MD&A into quantitative forecasting models increases accuracy.

(b) MD&A disclosures are more informative following the regulatory reforms of 2002-2003.

Hypothesis 2.

(a) MD&A disclosures are more informative for firms with: high earnings uncertainty, a greater proximity to distress, greater complexity, and higher political and/or legal costs.

(b) MD&A disclosures are more informative for firm-years with large changes in performance and high accruals.

(c) MD&A disclosures are more informative for firms with more readable and more financially focused disclosures.

Hypothesis 3.

Between 2008-2009, text is less informative for firms in the consumer discretionary

sector than for firms in other sectors.

Data & Earnings Prediction Models

- *Quantitative Data:* Compustat
- *Qualitative Data:* 10-K annual reports downloaded from EDGAR
- *Existing Quantitative Models:*

$$Model\ 1Q:\ ROE_{t+1} = \beta_0 + \beta_1 ROE_t + e_{t+1},$$
$$Model\ 2Q:\ ROE_{t+1} = \beta_0 + \beta_1 OPINC_t + \beta_2 NOPINC_t + e_{t+1},$$
$$Model\ 3Q:\ ROE_{t+1} = \beta_0 + \beta_1 CFO_t + \beta_2 ACCR_t + e_{t+1},$$
$$Model\ 4Q:\ ROE_{t+1} = \beta_0 + \beta_1 ROE_t + \beta_2 SDD_t + \beta_3 SALES_t + \beta_4 SALES_t * SDD_t + e_{t+1}$$

- *Quantitative Models Complemented with Text*

$$Model\ 1T:\ ROE_{t+1} = \beta_0 + \beta_1 ROE_t + \beta_2 DictPr_t + \alpha(TextMatr_t) + e_{t+1},$$
$$Model\ 2T:\ ROE_{t+1} = \beta_0 + \beta_1 OPINC_t + \beta_2 NOPINC_t + \beta_3 DictPr_t + \alpha(TextMatr_t) + e_{t+1}$$
$$Model\ 3T:\ ROE_{t+1} = \beta_0 + \beta_1 CFO_t + \beta_2 ACCR_t + \beta_3 DictPr_t + \alpha(TextMatr_t) + e_{t+1},$$
$$Model\ 4T:\ ROE_{t+1} = \beta_0 + \beta_1 ROE_t + \beta_2 SDD_t + \beta_3 SALES_t + \beta_4 SALES_t * SDD_t + \beta_5 DictPr_t + \alpha(TextMatr_t) + e_{t+1}.$$

- *Methodology*

  - Representation of text: "Bag-of-words" approach
  - Method: Kernel Ridge Regression

Results

Textual Information Extracted from MD&A helps to predict Future Earnings

Accuracy Differential	Mean	Med	Std. Dev.
1Q-1T	0.0007***	0.0008+++	0.0212
	(4.48)		(6.53)
2Q-2T	0.0005***	0.0007+++	0.0198
	(3.64)		(5.57)
3Q-3T	0.0004***	0.0006+++	0.0200
	(2.49)		(4.42)
4Q-4T	0.0005***	0.0007+++	0.0188
	(3.48)		(5.27)

MD&A disclosures are more informative in the Post Sarbanes-Oxley Era

Period	Mean(D_1)	Med(D_1)	Mean(D_2)	Med(D_2)	Mean(D_3)	Med(D_3)	Mean(D_4)	Med(D_4)
1999-2002	0.0003	0.0001	−0.0002	−0.0000	−0.0000	−0.0001	0.0001	−0.0001
	(1.24)	(1.42)	(-0.73)	(-0.08)	(-0.17)	(-0.50)	(0.41)	(-0.59)
2003-2010	0.0012***	0.0012+++	0.0006***	0.0009+++	0.0009***	0.0010+++	0.0008***	0.0008+++
	(6.36)	(8.06)	(3.24)	(4.91)	(5.18)	(6.90)	(5.49)	(6.95)

MD&A Disclosures are more informative for firms with large changes in performance, high accruals, high earnings uncertainty, a greater proximity to distress, greater complexity, higher political and/or legal costs, and for firms with more financially focused disclosures.

In 2008-2009, MD&A is less informative for firms in the consumer discretionary sector.

Sector	Mean(D_1)	Med(D_1)	Mean(D_2)	Med(D_2)	Mean(D_3)	Med(D_3)	Mean(D_4)	Med(D_4)
Non-CDS	0.0017***	0.0020+++	0.0016***	0.0015+++	0.0010**	0.0011++	0.0018***	0.0017+++
	(3.01)	(3.27)	(2.74)	(2.72)	(1.90)	(2.05)	(4.06)	(4.26)
CDS	−0.0038***	−0.0038+++	−0.0044***	−0.0041+++	−0.0038***	−0.0038+++	−0.0027***	−0.0023+++
	(-8.74)	(-9.27)	(-10.01)	(-10.23)	(-9.33)	(-9.83)	(-7.86)	(-8.41)

Conclusion

This study shows that textual information extracted from the MD&A section significantly improves the accuracy of all the earnings forecast models we use, resulting in lower mean and median absolute prediction errors. While this result appears to confirm the informativeness of MD&A, our results are more surprising when look at improvements in accuracy on a period-by-period basis.

In the period 1999-2002, before enhanced disclosure requirements were implemented, MD&A does not significantly improve the accuracy of forecasts. However, following the increased MD&A regulation, from 2003-2010, narrative disclosure significantly improves forecasting accuracy over models using quantitative variables alone.

An interesting caveat to this result in the period 2008-2009, during which time there was an unanticipated economy-wide shock which disproportionately affected demand in the consumer discretionary sector. In those two years, MD&A disclosure is informative for non-consumer discretionaries but actually adversely affects forecast accuracy for consumer discretionaries.

Our results suggest that MD&A is helpful in periods of economic stability and efforts to reform the MD&A section have led to more relevant narrative disclosures. However, MD&A cannot be expected to eliminate all errors in expectations as managers are no more endowed with a crystal ball than other market participants.

The Predictive Audit:

Looking Forward As Opposed To Backward

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Contemporary Auditing

Audit automation can be performed either by automating traditional audit (progressive audit) or by adopting forward-looking techniques that can be used as either a measurement benchmark for a close-to-the-event audit (predictive audit) or in certain cases as a means to avoid purposely defective transactions to being executed (preventive audit).
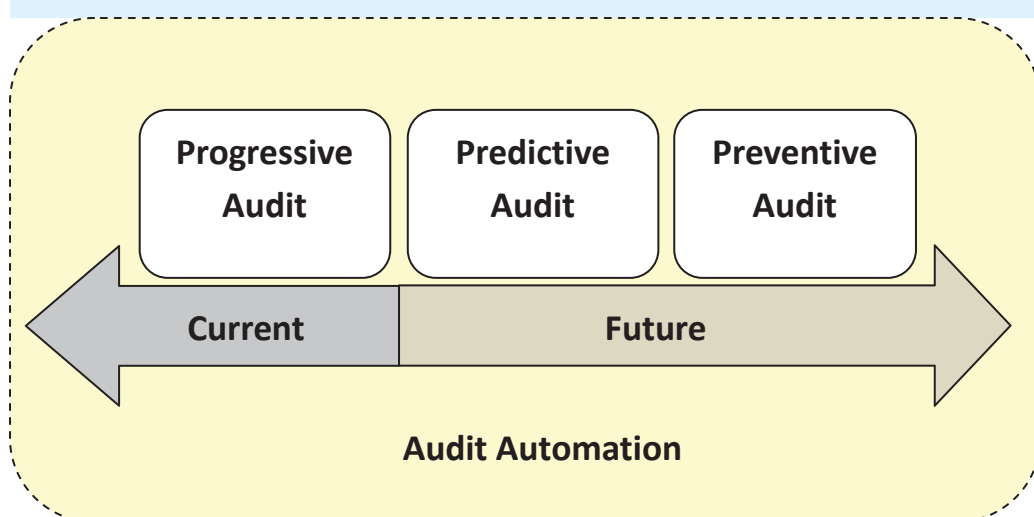
Audit Automation

Progressive Audit

The actual audit processes are formalized and automated where possible. Audit re-engineering is done with CA/CM to get a systematic review and alteration of audit processes to be in line with a flow of data in a company and to improve audit procedures.

Preventive Audit

The preventive audit applies a forensic model that creates a filter to prevent suspicious transactions from being processed. Filtering rules are imbedded in the process and will flag transactions with a significant potential for exception for further review.

Predictive Audit

The idea of the predictive audit is that instead of looking backward to audit the past event and do adjustments according to any changes or errors occurred, auditors could perform the audit in a way that they could do adjustments in a preventive manner.

It is a look forward audit that examines the validity of business transactions before they are executed and compares the results to normative models. Auditors and management will be notified beforehand on the areas that prone to error.

Predictive audit characteristics

	Traditional Audit	Predictive Audit
Control Approach	Detective (Backward)	Preventive (Forward)
Objective	Support audit opinion on financial statements	Support not only for financial purpose, include but not limited to operational audit, compliance, and control monitoring
Audit area	Financial statements at account balance level	High risk areas in financial statements and operation processes at a transaction level
Frequency	Periodic	Continuous
Measurement	Static	Dynamic
Method	Manual Manual confirmation Documents vouching by sampling Inventory count Use statistics and/or ratio	Automated Automatic confirmations Data analysis of the entire population RFID, barcode Use data analysis and/or data mining techniques

Predictive Modeling

Using appropriate data analysis techniques, a predictive audit model can be constructed. The model is created based on historical transactional data with the assumption that current or future data will behave in a manner similar to historical data. The results of the predictive model can direct the auditors' attention to suspicious items.

Predictive model formation
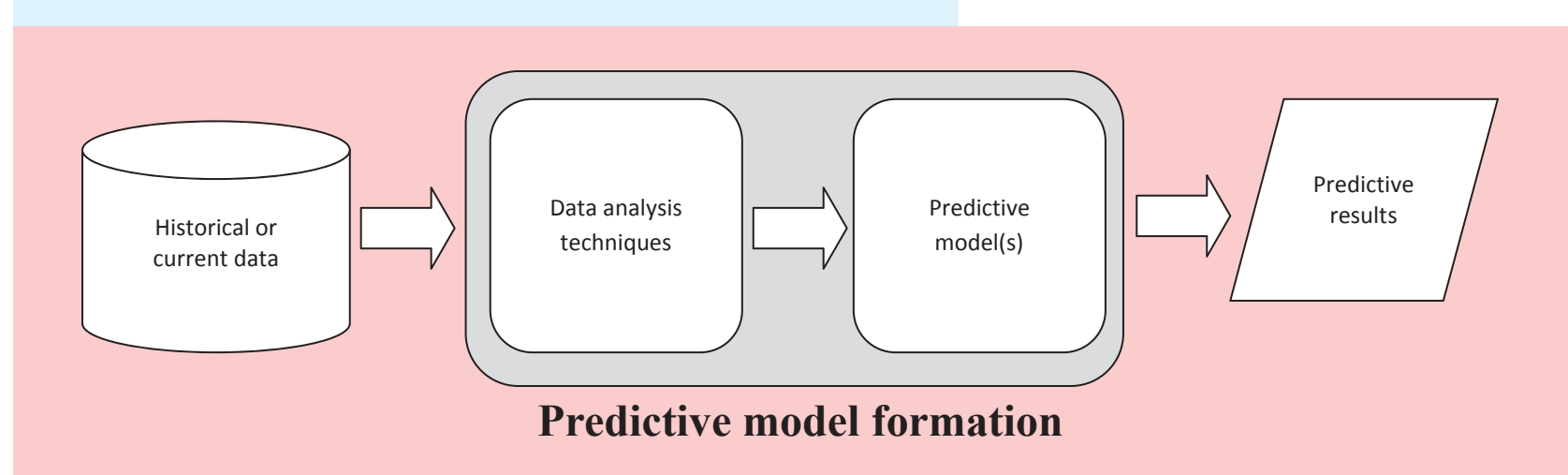
Conclusion

Predictive audit can be a turning point for auditing. It is a forward looking audit that focuses more on the upcoming event rather than looking back at the past activities. Using data mining techniques and other analytical methods, the predictive models can be created to predict the future result of the transactions or pre-identify an area with a high possibility of exceptions.

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