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Identification of fraudulent financial statements using linguistic credibility analysis

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A R T I C L E I N F O

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A B S T R A C T

The strategic use of deceptive language in managerial financial fraud is investigated with linguistic cues extracted from 202 publicly available financial disclosures. Those crafting fraudulent disclosures use more activation language, words, imagery, pleasantness, group references, and less lexical diversity than non-fraudulent ones. Writers of fraudulent disclosures may write more to appear credible while communicating less in actual content. A parsimonious model with Naïve Bayes and C4.5 achieved the highest classification accuracy. Results support the potential use of linguistic analyses by auditors to flag questionable financial disclosures and to assess fraud risk under Statement on Auditing Standards No. 99.

1. Introduction

Despite the financial disasters of Enron, WorldCom, and Global Crossings, investors were shocked recently by the financial implosions of Lehman Brothers, AIG, Fannie Mae, and Freddie Mac. These cases underscore the need for investors and companies to protect their investments by detecting fraud in its earliest stages by distinguishing between truthful and misleading information. Investors look for credibility, transparency, and clarity in externally available corporate financial statements, such as the annually filed Form 10-K, as they investigate current and potential investments. This is especially true when financial markets are shaky.

The annual costs of corporate management fraud in the United States are estimated to be in the billions of dollars [57]. Fraud in general is “an act of deception carried out for the purpose of unfair, undeserved, and/or unlawful gain, esp. financial gain” [1]. Financial reporting fraud, also known as management fraud, is a type of fraud that adversely affects stakeholders through misleading financial reports [19]. Though the ability to identify fraudulent behavior is desirable, humans are only slightly better than chance at detecting deception [7], demonstrating the need for decision aids to help assess credibility. Thus, there is an imperative need for more reliable methods of identifying deception and fraud, especially in financial statements. New methods are needed to assist auditors and enforcement officers in maintaining trust and integrity in publicly owned corporations. Furthermore, investigations to detect deceit in financial statements can aid the overall investigation to refine general theories of deception.

One novel approach is to apply text-mining methods to the financial statements of companies. Ultimately, a decision aid based on these methods could help auditors assess the fraud risk of current and future clients. This study advances ongoing investigations into corporate fraud detection through a unique application of existing text-mining methods on the Management's Discussion and Analysis (MD&A) section of the Form10-K. The annually submitted Form 10-K is a required public company filing with the Securities and Exchange Commission (SEC) that “provides a comprehensive overview of the company's business and financial condition and includes audited financial statements” [52]. 10-Ks may contain fraud in the form of intentionally misstated numbers and/or misleading statements made by the authors. In the Form 10-K, a corporate annual report mandated by the Securities and Exchange Act of 1934, the MD&A section contains written explanations regarding the current status of the company, the industry, and forward looking statements for the company. Since the MD&A is intended to give investors a sense of management's perspective on the health and future outlook of a company, it contains a discussion of the company's financial condition, the results of operations, and an analysis of the quantitative and qualitative market risks facing the company. The MD&A, an unaudited section of the 10-K, is quasi-mandatory because much of the content is only suggested by the SEC and the content is largely uncontrolled. It is the most read section of the 10-K [50], but there is little research on the language used in the MD&A. Many scholars have called for additional research in this area [13].

The structure of this paper is as follows: we summarize current practices by auditors to detect deception in financial reports, review pertinent theories and methods for detecting deception and fraud, articulate our research questions, delineate our hypotheses, describe our methodology for detecting fraudulent financial statements, report the results, and discuss the implications of the findings.

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2. Assessing credibility of financial statements

External auditors are tasked with planning and performing audits to obtain reasonable assurance about whether financial statements contain either inadvertent or intentional misstatements or omissions. As opposed to errors, intentional misstatements or omissions are part of Fraudulent Financial Reporting (FFR) meant to deceive users. Though problems in financial statements are introduced at various levels in organizations, FFR is most often committed by management. Under the Sarbanes-Oxley Act of 2002 (SOX), management, particularly the CEO and CFO, are not only responsible for creating the tone at the top for the corporate ethical culture, but are also accountable for discovering and preventing FFR in a publicly held entity.

Based on a well-planned and well-conducted audit, sufficient evidence is gathered for reasonable assurance that the risk of FFR is low but the risk is not eliminated completely. Due to concealment and/or collusion, fraud in financial statements/reports can be very difficult to detect. It is relatively rare for external auditors to find material misstatements or omissions [14,36,40]. Auditors must continually question and assess the audit evidence to maintain professional skepticism. To improve the audit processes associated with the detection of FFR, the American Institute of Certified Public Accountants' (AICPA) Auditing Standards Board (ASB) released Statement on Auditing Standard (SAS) No. 99 in 2002. Under SAS 99, auditors are required to take a more proactive approach to detecting FFR through improved and expanded audit procedures.

To identify the risk factors associated with each client, traditional audit techniques include enhanced analytical or statistical procedures, additional confirmation with external parties (e.g., customers) about unusual transactions or relationships, extra steps or observations to verify inventories, additional independent estimates to review management's estimates, and thorough review of financial data. Even with these additional procedures, auditors may not spot FFR. Therefore, specialized checklists or other procedures that augment the audit have been suggested by researchers and practitioners. For example, based on their study of SEC Accounting and Auditing Enforcement Releases (AAERs), Loebbecke et al. [40] devised a checklist of primary indicators or red flags for financial statement irregularities. These red flags are included in SAS 99. Schilit [47] described techniques for the hyper-skeptical auditor to spot major financial statement manipulation by management. Beneish [5] attempted to build a model based on extreme financial performance that identifies violators of Generally Accepted Accounting Principles (GAAP). His model successfully discriminated between fraudulent companies that experienced large positive accruals by manipulating their earnings and legitimate companies that are so-called "aggressive accruers." Logistic regression used to assess risk of FFR aid in classifying fraud vs. non-fraud engagements was helpful according to Bell and Carcello [4]. Kaminski et al. [31], focusing on a subset of Analytical Procedures (APs) used by auditors to augment typical audit procedures, found that financial ratios provide limited ability to detect FFR. However, Jones [29] identified other preliminary APs, such as market value of equity, that can help auditors assess fraud risk.

As new artificial intelligence and data mining technologies have become available, auditors have adopted some of these tools and techniques to help with fraud detection, primarily in examining the numerical data of financial statements. Gaganis et al. [25], Fanning and Cogger [20], Fanning et al. [21], Calderon and Cheh [12], and Lin et al. [39] examined the use of artificial and probabilistic neural networks for risk assessment of FFR. In 2004, Zhang and Zhou [58] reviewed various data mining techniques for financial and accounting applications such as credit card fraud detection. More recently, Kovalerchuk and Vityaev [35], Kotsiantis et al. [34], Kirkos et al. [32] applied various machine-learning techniques for data mining/classification of the financial data of FFRs. In other studies, Back et al. [3] and Kloptchenko et al. [33] mined both text and numerical data in a very limited set of financial statements for comparison, not fraud discovery, purposes. Though Minkin and Mosher [43] describe the use of message feature mining based on linguistic deception theories for processing e-texts, such as Enron's email, they do not suggest similar mining for FFR. The literature surveyed limited their investigations to numerical data, ignoring the text-based explanations that accompany the financial statements. However, the AAERs that accompany our collection of fraudulent FFRs identify evidence of deceptive communication, misdirection, and obfuscation in the text-based portions of the FFRs. This evidence suggests that the language in a FFR may be a fruitful area to investigate for fraud, especially if an automated tool can assist the auditor. In light of the lack of research on text and message feature mining of FFR, our research project offers a first step toward providing better audit risk assessment tools for auditors to detect FFRs. The current study complements past research that sought to discover numerical indicators of financial reporting fraud in financial statements [5,15,37,49] by evaluating linguistic cues of the MD&A section as indicators of financial reporting fraud. This study also investigates the usefulness of linguistic cues as a decision support model for credibility assessment.

3. Deception and fraud

Fraud is a form of deception. Deception is the act of transmitting information with the intent to foster false conclusions in the receiver [8]. Fraud "refers to an intentional act…to obtain an unjust advantage," but where there is no intent to deceive, error rather than fraud describes the act [27]. Fraud includes "a scheme designed to deceive" [56]. Management fraud is a specific type of deceptive scheme where stakeholders are adversely affected through misleading financial reports [19]. Since management fraud is a purposeful, strategic deception, behavioral deception theories and methods should help explain fraudulent behavior. This paper combines deception theory from Communication and Psychology literature with linguistic analysis techniques derived from the field of Computational Linguistics to understand the nature of the language used in fraudulent corporate SEC filings that are a traditional dataset in the field of Accounting. Prominent theories and methods for analyzing deceptive discourse include Content-Based Criteria Analysis (CBCA) [54], Scientific Content Analysis (SCAN) [17], Reality Monitoring (RM) [28], Management Obfuscation Hypothesis [6], Information Manipulation Theory (IMT) [42], Interpersonal Deception Theory (IDT) [8], Four Factor Theory [62], and Leakage Theory [18].

3.1. Content-Based Criteria Analysis

Content-Based Criteria Analysis (CBCA) is a method within Statement Validity Analysis, a technique developed to verify the veracity of a child's testimony in sex-crime cases. CBCA, however, has been used successfully in several different contexts. CBCA is based on the hypotheses that a statement based on fantasy will differ in quality and content from a statement based on actual experience. In CBCA, trained evaluators judge the presence or absence of 19 criteria. The presence of each criterion suggests that the statement was derived from an actual experience, and is therefore not deceptive. Deceptive statements should lack more criteria than truthful statements. Only some of the CBCA criteria are currently amenable to automatic analysis by computers including quantity of details, and words associated with feelings, time and space. CBCA hypothesizes that truthful messages will contain more unusual details, more superfluous details, more details overall, and more references to time, space, and feelings than deceptive messages because statements derived from actual memories of an experience should contain more contextual details than deceptive statements. It is uncertain, however, if these same cues will be of any significance in the context of managerial reports. For example, references to feelings may not appear at all in a managerial report.