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Methodological Survey on Big Data in Business Process Evolution and Management

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Abstract: Modern business management and progress are highly dependent on techniques, methods, pre-processing and analysis of Big Data. Business industries continue to be attracted by the help and benefits of big data analytics. This paper provides a methodological survey on big data in business analytical process for corporate innovation through combining the startup methodology with management. By interpreting the statistical survey and analysis on big data, competency taxonomy for big data and business intelligence can be developed.

Keywords: Big Data, Business Process, Business Management, Data Analysis

I Introduction

With the development of information and computer application technologies, business process evolution and management has become the essential technology which represent big enterprises and industries to operate efficiently [1]. Business process evolution and management is a systematic approach to develop end-to-end business strategies and to improve performance continuously. Business process is considered as not only the abstract of management experience and qualities, but also the core of its management [2, 3].

The initial raw big data for business can be structured or unstructured. Structured data is simple to process, since the format is fixed. Transaction records, sensor readings and GPS (Global Positioning System) locations are examples of structured data. Unstructured data has no fixed format, and requires other means of processing. Unstructured data includes text, but also images and video content [4]. Often unstructured data has some meta-data attached that provide some information about the unstructured data, e.g. tags describing the content, date and location of an image or a video. Open data is data released under some license that gives users free access to the data. Open data is often shared through specialized thematic or organizational repositories [5]. Open data made available through such repositories is predominantly structured data and it can be in a different format – human or machine readable. The existing technologies for data mining can be a good source for gaining business value based on big and open data [6].

Current many researchers and engineers are devoted to the research of workflow engine technology, especially of making workflow broadly adaptable in business process model. Dynamic changes to business process model can be supported to some extent in file, however workflow based on it is still a process of control driving and the order of activities must be sure, not be changed before building the process. What's more, the most changes of the workflow must be done because of the strongly dependence among the activities. Some way was given to replace a part once the workflows run errors or need to fix, but this assumption of the similar work flow is puzzling and few. Some literatures proposed business process model based on data-driven. For example, a FreeFlow was designed and the state of activity was divided into user state and system state. User state representation requires additional data from the user while, the system state indicates that the flow can automatically run. Although this new way can be helpful of the integration of data and the construction of the entire process, the time of developing program is too longer than traditional business process model based on data-driven and designers need to have a more in-depth understanding of the relevant fields, and so it is not realistic. What is more influential is case handing in the field of data-driven approaches. The approach changed the way of business process model based on data-driven from what

II Business Value Chain to Big Data

The business value chain to big data can be established by making a specific value chain for previous data. This approach and framework focus on the primary activities and specified three main activities: Data discovery, data integration and data exploitation [7, 8]. The data discovery phase includes the following activities:

- Collect and annotate: Create an inventory of data sources and the meta data that describe them.
- Prepare: Enable access to sources and set up access-control rules.
- Organize: Identify syntax, structure and semantics for each data source
- Integrate: Establish a common data representation of the data, Maintain data provenance.

- Analyze: Analyze integrated data.
- Visualize: Present analytic results to decision makers as an interactive application that supports exploration and refinement.
- Make decisions: Determine what actions (if any) to take based on the interpreted results.

III Related Work

Hazen *et al.* [9] describes business model as three techniques – descriptive, predictive, and prescriptive, providing examples of how all three can be utilized and identifying potential areas. This research presents crucial research agenda for the continued success and expansion of the big data analytics trend which will focus on how to best incorporate established methods for alternative generation, corporate value structuring, modeling of organizational risk attitudes, and the ranking and selection of competing courses of action.

Li *et al.* [10] reviewed several data driven business process approaches, then proposes a method for data driven business process optimization based on big data according by keywords and process flow, and the key research methods are also given. Meanwhile, the automatic process flow with some curtain intelligence is designed. And the system structure and processing flow of the system and the prospective prospect are also expounded in this research.

Seggie *et al.* [11] provided a framework that firms can act upon to incorporate big data and the lean startup methodology into their innovation processes. Big data is not a panacea: it does not eliminate the main learning challenges induced by confirmation, communication and control. The lean startup methodology complements big data analytics, helping it realize its potential for corporate innovation under technological and demand uncertainty. In this way, firms will be better able to evolve their business models to ensure the greatest chance of successful innovation and the ability to not only survive but thrive in uncertain environments.

Debortoli *et al.* [12] presented research contributions to the scientific body of knowledge on business intelligence and big data which has several implications for practitioners. By uncovering highly demanded skill sets for business intelligence and big data experts, they complemented existing scientific work on business intelligence and big data maturity models. The empirically grounded taxonomies they developed can be used as a foundation for future empirical studies on business intelligence and big data, such as efforts to develop measurement instruments for studying business intelligence and big data professionals or teams.

IV Business Data Collection and Analysis

The Analysis indicates, model often requires multiple iterations in which experts review statistical results, and inputs (e.g., documents, terms) and parameters (e.g., term weights, number of factors to be extracted, loading thresholds) are fine-tuned in order to yield optimal results as presented in Figure 1.

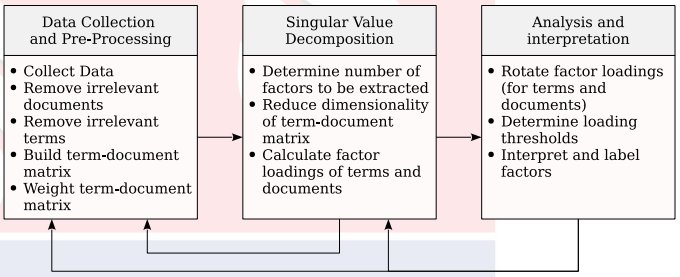

Figure 1: Business Data Collection and Analysis Process

4.1 Data Collection and Pre-Processing

It is text-mining procedures, in which the vocabulary is reduced in this document collection by removing stop words (e.g., "and," "or", "then") and eliminating terms that occurred in less than 1% of the documents.

4.2 Singular Value Decomposition

The singular value decomposition is performed using the statistical computing software *R*. The first step of singular value decomposition is to define the number of factors (topics) to be extracted.

4.3 Analysis and Interpretation

This is the final step consisted of the manual sense-making and interpretation of the extracted factors and associated high-loading terms and documents.

V Conclusion and Future Work

Most research on big data has focused on technological challenges and applications, not on business perspectives. The business motivation came from a specific big data applications, where a sustainable business models are needed. We reviewed model as a framework to identify business opportunities related to big data. The analysis of the value chain identified many different opportunities ranging from producing units for data collection to visualizing results. The analysis also revealed several areas fit for outsourcing. Outsourcing may create niches for specialized businesses. Big

data is often published as open data. We have therefore examined alternative revenue models for big data and big data results. One approach is to get a sponsor to publish the data or results as open data. Another approach is to allow for advertising on the site where the data or results are published. We aim to continue researching viable approaches to big data from a business perspective. This will be done through empirical studies combined with exploring alternative approaches to business models, e.g. business canvas modelling.

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