Big Data Applications: Adaptive User Interfaces to Enhance Managerial Decision Making

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ABSTRACT

Big data applications may present opportunity for business executives to make better informed decisions. However, how well such application can support and effect managerial decision making still remains a challenge. From a case study of a traditional business in adopting new technology, it was found that an underlying issue that impeded effective and efficient managerial decision making lied in the human computer interaction process, and the design of the system user interface can be the culprit. With the rise of big data revolution, it seems that this underlying issue has still not been resolved for the applications to best support the executive users. This paper therefore shares research findings and developments in the social media and human language technology, and suggests employing adaptive user interfaces for big data applications to better support managerial decision making.

Categories and Subject Descriptors

• **Information systems~Decision support systems**   • **Human-centered computing~User centered design**   • *Human-centered computing~Human computer interaction (HCI)*   • Human-centered computing~Ethnographic studies   • *Computing methodologies~Artificial intelligence*

Keywords

Managerial decision making, management, information systems, human computer interaction, adaptive user interface design, decision support systems, big data, human behavior analysis, personality.

1. INTRODUCTION

The advent of information technology has significantly attributed to the growth of e-commerce, and impressed traditional business to transform and leverage on new technology in their operations to gain competitive advantage [1]. The developments of Internet technology and contents have, as a result, introduced business intelligence systems and decision support systems in the cloud to business owners and senior executives to support their decision making and transformation processes [2, 3, 4]. Whilst some organizations may still be struggling with the use of technology in their business, the big data revolution has arrived and fascinated business owners and senior executives to want to learn more and exploit it [5, 6, 7].

From a case study of a traditional business in adopting new technology, it was found that an underlying issue that impeded effective and efficient managerial decision making lied in the human computer interaction (HCI) process, and the design of the system user interface can be the culprit [1]. With the rise of big data revolution, it seems that this underlying issue has still not been resolved for the applications to best support the executive users. This paper proposes the development of adaptive user interfaces for big data applications to improve user engagement so as to better support the managerial decision making process.

2. MANAGEMENT CHALLENGES

Big data propagated the hype for its volume, velocity, and variety in giving business victory [6]. And research showed that organizational management has become more reliant on data in making decisions, rather than intuition, and is being demanded to change for the new challenges despite no return on investment yet on big data applications [5, 6]. There exists a critical issue if this phenomenon persists on, affecting not only the large organization but also small business. There was suggestion to collate and integrate all data from a single source, yet this may not be an effective way to generate the best information for everyone [5]. Exploiting technology is good, but it is important to realize the limitation and understand the problem [8].

In a case study of a small traditional business in adopting new technology in the operation, it was found that system design caused impediment in the manager's decision making process. This is an underlying issue which could perhaps explain the difficulty that still exists in employing new applications [5]. Thus it is important that attention be paid to this aspect of the application development to support and lessen the management's challenges in adopting new technology in business, rather than indulging further into bigger data [5].

One option is to develop adaptive user interfaces for big data applications to support better managerial decision making and organizational transformation processes.

3. ADAPTIVE USER INTERFACES (AUI)

Measuring and enhancing user engagement is an important factor in HCI. Efforts were seen in the development of the machine facet

of HCI to enhance user satisfaction, and significant technical progress achieved in the area of computer graphics, multimodal user interfaces and digitized contents. From user studies in social gaming and human robot interactions, we observed that user engagement has an association with a user's personality traits, thus advocate research into the human facet of HCI to further enhance user satisfaction [9, 10]. The idea to develop adaptive user interface (AUI) was therefore derived and would encompass two aspects, namely adapt by human behavior [11, 12] and user preferences [13, 14]. These findings are also applicable in the design of big data applications and decision support systems.

3.1 AUI and Personality

From a descriptive research on social gaming using a video-enhanced diary method, it was found that natural human behavior and the gamers' decision making process can be elicited and speculated during HCI [11]. Extroverted and introverted gamers tend to display gaming and decision making patterns with respect to the characteristics of their personality types. Outside the social gaming platform, another research also found that during project discussions, highly dominant people took to the conversation floor more often than less dominant people [12]. From human behavior analysis, users would gain better satisfaction if they could demonstrate their traits. In similar vein, in applying these to business environment, likely there could be a unique decision making pattern with respect to a senior executive's personality, which could be similar or differ from the subordinate's, thus drawing data from a single source can have different effects [5]. If further research could shed light and insight to this aspect, perhaps it would be easier for the organizational management to adapt to new technology with ease.

3.2 AUI and Personalized User Preferences

Understanding the personality of the executive user may not suffice. From research on user acceptance of voice user interface, it was found that the impact of different language used in the systems could have different impact on different users [13] and the success of a social game can also be affected by the gamers' preference on the pricing model of the game [14]. Thus, a decision support systems and big data application that can provide different executive users with personalized services for their preferences would be able to gain better success.

3.3 AUI and Other Considerations

Different users can be unique in their own ways, just like different people possess different effective learning styles. Executive users may also be unique in accessing data and making decisions with the data, and it is important to understand how the big data application or new technology can be adapted to an individual's strength. For example, if managers prefer face-to-face communications [1] as opposed to mechanical visual and text presentations, then by implementing spoken dialog systems with natural language processing, artificial intelligence, and speech translation features in existing big data applications or decision support systems could be an option to further enhance their decision making. However, developers and end users should also be aware that there could be other limitation in these technology or possible need for customization [15, 16].

4. CONCLUSION

All in all, it is important to understand the users so that they can best benefit from any new technology. With the provision of a user interface that can adapt intelligently to users, this could perhaps ease executive users from technical barriers in exploiting new technology and allow them a smoother ride in the big data wagon. The development of an adaptive UI is a budding research and to finally adopt this in any management support systems, it would still require more executive users to support the studies.

5. ACKNOWLEDGMENTS

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