

ONTOLOGY FOR ETHICAL ISSUES IN SOCIAL
NETWORKING SITES BASED ON IBN KHALDUN'S
THOUGHTS IN *AL-MUQADDIMAH*

BY

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ABSTRACT

Numerous social networking sites (SNS) are accessible on the web have made a strong position in the hearts of millions of users and motivating them to interact with others. These sites are subjected to a great deal of theft of personal information, privacy issues and the revelation of everyday activities to unexpected people. Due to the harm caused by unethical users to exploit communication technology, users feel weak and defenseless, leading to anxiety and despair as a result of these immoral behaviours. This research focused to identify the ethical issues in tweets by developing the ontology based on Ibn Khaldun's thoughts while validating and verifying the semantic relationship. The development of the ontology in this research includes four stages which highly influenced by the Methontology framework and the guideline of a practical guide to building Web Ontology Language (OWL) ontologies using Protégé. In the first and second phases of the requirement analysis stage, the document analysis method was performed where the thoughts of Ibn Khaldun from the *Muqaddimah* book were identified relating to humans and civilisation from his discourse then followed by expert verification. From these thoughts, the synonym words were identified by searching the Institute of Language and Literature (DBP) online thesaurus, also Google Trends was used to find the integration among Google search queries and data on Twitter. Then, the synonym words were set as a validated hashtag to be searched in collected tweets from Twitter through R-Programming. 1075 public's tweets were collected and then the sentiment analysis in Parallel Dots was run on the collected tweets identified that 700 of the tweets are positive statements, 229 of the tweets are neutral statements and 146 of the tweets are negative statements. In the third phase of the development and implementation stage, the conceptual and formalisation of the ontology were identified and transformed into machine-readable representations. The Protégé OWL Editor version 5.5 was used in building a semantic relationship within the ontology. The fourth phase of the evaluation stage consists of four sub-stages: validation and verification following the selected guideline and criteria for evaluation; SPARQL Protocol and RDF Query Language (SPARQL) query testing, and user assessment. The interview was conducted with 3 experts to validate the ontology and verify the semantic relationship. In the end-user test, 20 respondents were chosen to complete the questionnaire. The described methodology has successfully developed the ontology consisting of 334 concepts and 1092 instances with a total of 4378 axioms for ethical issues in social networking sites based on Ibn Khaldun's thoughts. The evaluation results included the positive endorsement and constructive judgement upon most of the ontology components. Through SPARQL query execution, the ontology model provided correct answers to all 146 competency questions. The ontology also generated a 62% suitable level through user assessment. This developed ontology model can help to provide an understanding of the structure and design of the ontology development of the ethical issues from the negative statements in tweets collected from Twitter and related to Ibn Khaldun's thoughts as a solution. Further work included the expanded of Ibn Khaldun's thoughts to a wider dimension of concepts and be extracted to a wider dimension of SNS medium.

خلاصة البحث

جعلت العديد من مواقع الشبكات الاجتماعية (SNS) التي يمكن الوصول إليها على الويب مكانة قوية في قلوب الملايين من المستخدمين وحفزتهم على التفاعل مع الآخرين. تتعرض هذه المواقع لقدر كبير من سرقة المعلومات الشخصية وقضايا الخصوصية والكشف عن الأنشطة اليومية لأشخاص غير متوقعين. بسبب الضرر الذي يسببه المستخدمون غير الأخلاقيين من خلال استغلال تكنولوجيا الاتصال، يشعر المستخدمون بالضعف والعزلة، مما يؤدي إلى القلق واليأس نتيجة هذه السلوكيات غير الأخلاقية. يركز هذا البحث على تحديد القضايا الأخلاقية في التغريدات من خلال تطوير أنطولوجيا تستند إلى أفكار ابن خلدون مع التحقق من العلاقة الدلالية والتحقق منها. يتضمن تطوير علم الوجود في هذا البحث أربع مراحل تتأثر بشدة بإطار المنهجية والمبادئ التوجيهية للدليل العملي لبناء لغة الويب (OWL) الأنطولوجيا باستخدام محمي (Protégé). في المرحلتين الأولى والثانية من مرحلة تحليل المتطلبات، تم تنفيذ أسلوب تحليل الوثائق حيث تم تحديد أفكار ابن خلدون من كتاب المقدمة المتعلقة بالإنسان والحضارة من خطابه ثم تلاه تدقيق الخبراء. من هذه الرؤى، تم تحديد المرادفات من خلال البحث في قاموس المرادفات عبر الإنترنت الخاص بمعهد اللغة والأدب (DBP)، وتم استخدام Google Trends لإيجاد التكامل بين استعلامات بحث Google والبيانات على Twitter. تم بعد ذلك تعيين المرادفات على أنها علامة تصنيف تم التحقق من صحتها ليتم البحث عنها في التغريدات المجمعة من Twitter من خلال R- Programming. تم جمع 1075 تغريدة للجمهور، ثم تم إجراء تحليل للمشاعر في Parallel Dots على التغريدات المجمعة، حيث حددت 700 تغريدة عبارات إيجابية، و 229 من التغريدات محايدة و 146 من التغريدات سلبية. في المرحلة الثالثة من مرحلة التطوير والتنفيذ، يتم تحديد المفاهيم وإضفاء الطابع الرسمي على الأنطولوجيا وتحويلها إلى تمثيلات يمكن قراءتها آلياً. تم استخدام الإصدار 5.5 من Protégé OWL Editor لبناء علاقة داخل الأنطولوجيا. تتكون المرحلة الرابعة من مرحلة التقييم من أربع مراحل فرعية: المصادقة والتحقق بعد المعايير والمعايير المرجعية؛ اختبار استعلام بروتوكول SPARQL وتقييم المستخدم RDF (SPARQL). جريت المقابلة مع 3 خبراء للتحقق من صحة الأنطولوجيا والتحقق من العلاقة الدلالية. في اختبار المستخدم النهائي، تم اختيار 20 مستجيباً لإكمال الاستبيان. نجحت المنهجية الموصوفة في تطوير علم الوجود يتكون من 334 مفهومًا و 1092 حالة إجمالي 4378 بديهية للقضايا الأخلاقية في وسائل التواصل الاجتماعي بناءً على أفكار ابن خلدون. تضمنت نتائج التقييم التأييد الإيجابي والحكم البناء على معظم مكونات الأنطولوجيا. من خلال تنفيذ استعلام SPARQL، قدم نموذج الأنطولوجيا إجابات صحيحة لجميع

أسئلة الكفاءة البالغ عددها 146. أنتجت الأنطولوجيا أيّ ضاً مستوى ملائم بنسبة 62% من خلال تصنيف المستخدم. يمكن أن يساعد نموذج الأنطولوجيا المطور هذا في توفير فهم لبنية وتصميم تطوير الأنطولوجيا للقضايا الأخلاقية من العبارات السلبية في التغريدات التي تم جمعها من Twitter والمتعلقة بأفكار ابن خلدون كحل. تضمن العمل الإضافي توسيع أفكار ابن خلدون إلى بُعد أوسع للمفاهيم واستخراجها إلى بُعد أوسع من وسيط.

APPROVAL PAGE

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DECLARATION

I hereby declare that this thesis is the results of own investigation, except where otherwise stated. I also declare that this has not been previously or concurrently submitted as a whole for my other degrees at IIUM or other institutions.

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CHAPTER ONE

INTRODUCTION

1.1 INTRODUCTION

Social web or social networking sites (SNS) like Facebook, Instagram, WhatsApp, and Twitter have shifted the way people communicate with each other. The sharing and exchanging information around the world via SNS have become a new source of valuable knowledge. Nowadays, the use of SNS is not only a mere trend to engage with the advances of communication technology but has become part of every person's life (Casado et.al, 2016; Waheed et.al, 2017). SNS tools allow individuals or groups to construct public or semi-public profiles and to facilitate communication with others they have met offline or to meet new ones (Al-Aufi & Fulton, 2015). Since the introduction of SNS, it has attracted millions of users to use it as a wireless communication platform to talk with one another when they are thousands of miles apart. Many have integrated these sites into their daily practices and as part of their routine activities to socially interact with one another (Li, Wang, Li, Che, & Li, 2016). This trend has led researchers to conduct studies on SNS and its relation to user's behaviour.

The growing research of collecting and analysing user's data from SNS services involved new ethical questions and considerations. This makes it exciting, highly interesting and innovative but also challenging at the same time. Yet, most recently, social media research is considered to consist of investigations of user behaviour on almost all platforms that display user contributions or user activities (Weller, 2015). Ethical issues will always be a challenge for computer users due to issues of privacy, security, honesty, integrity, computer crime which is simultaneously growing

with the development of tools and technologies. In Islam, ethical values always placed highest in comparison with the other aspects of human life. Islamic legislation and teaching should be referred to as a source in every aspect of our Muslim life (Ibrahim et.al, 2014).

Ibn Khaldun believes that the devoted believers commit themselves to worshipping Allah and therefore upholding good etiquettes in their life. Many modern scholars were attracted to his works, especially his prominent book entitled the *Muqaddimah* that serves as an introduction to his voluminous work on history and civilisation (Bakar, 2016). Ibn Khaldun was aware that the combination of education and a high level of science and technology increase productivity. Talents strengthen the technical potentials on thereby increase the intellectual infrastructure of society (Haniza, 2006). According to Ibn Khaldun, education acts as an extremely powerful factor in socialisation and facilitates unity of thought and action among its followers.

As this research intends to identify the ethical issues in SNS, it has thus based its development of ontologies along Ibn Khaldun's thoughts. Ontology is one of the successful advances in knowledge engineering which help extract related data and manage structured information. It indicates the concepts and relationships within the domain and provided a formal way for representing the data stream (Dou & Wang, 2015). The encoded formal semantics in ontologies is primarily utilised for effectively sharing and reusing knowledge and data.

1.2 BACKGROUND OF RESEARCH

SNS has become a popular way of spreading and sharing information through social interactions. Researchers from distinctive areas have examined the utilisation of SNS among numerous segments in order to understand these sites. It has gained much attention from users and is among the foremost used sites on the Internet. One factor that contributed to this information environment is users' voluntary information sharing on SNS. Generally, SNS provide sharing features, which

promote the dissemination of ideas, opinions, reactions, interests, activities and other forms of user-generated content for other users to consume (Kim, Lee & Elias, 2015). According to Ranking (2020), a website that tracks web traffic on the Internet including search engines and online collaboration tools showed that SNS such as Facebook ranks 2nd place while Twitter took 3rd placing as the most popular websites visited. The explosion of SNS has changed the way people connect, collaborate and live their daily lives. However, in some cases like the issues of cyberbullying on SNS, go beyond the boundaries of time and space (Taylor et.al, 2015). This may act as a warning mechanism against unacceptable behaviour from SNS users. Statistics from Cyber Security Malaysia's website showed that approximately 329 of the incidents of cyber harassment have been reported from January until June 2020 (Cybersecurity, 2020). This may act as a warning mechanism against unacceptable behaviour from SNS users.

As we move into the 21st century of the Common Era, cyber-criminals find new ways of using new technologies available for their bad purposes. More connected devices mean more assault vectors and more conceivable outcomes for hackers to target at (Benias & Markopoulos, 2017). The evolution of the web offers a quick diffusion channel of information and knowledge together with the growth of technology. The third stage of the Web, known as Web 3.0 or Semantic Web with its functionalities expands beyond the conventional search services to organise how content is looked and seen by the users. The objective is to customise and optimise the online search, based on the history, interests, and wishes of users (Almeida, 2017). The intelligent web is going to be a platform for connected data which makes the management of information more critical. Through Web 3.0, data are becoming more openly accessible and valuable to consumers by making a connection between similar data characteristics (Rudman & Bruwer, 2016).

In the upcoming Industry 4.0 as the introduction of internet technologies into the industry, it slowly changes the world around us and mixed with corresponding future visions. Beneath the Industry 4.0 concept, the technology advancement and adoption of information technology especially social media networks have increasingly impacted consumers' perception of product development, quality, variety, and speed of delivery. SNS provides the users with an accessible platform through web-based technologies to collaborate, share data, examine, and modify user-generated substance. It could be a challenge to distinguish and extract valuable information from shared data which could be misused for numerous distinctive and interesting purposes. (Stevanov, Gracanin, Suzic, & Tesic, 2017). Through the multidisciplinary range, it can extend researchers' capability of understanding new phenomena due to the utilisation of SNS for provision of improved services and create imaginative opportunities for contributions that matter for SNS research and development.

With the Internet of Things (IoT), digitally and commonly used connected devices have invaded every aspect of our lives for smarter living. In the process of data exchange and sharing, through these new platforms, cybercriminals have greater opportunities for greater assault (Benias & Markopoulos, 2017). SNS have become powerful platforms in identifying user behaviours which lead to positive outcomes in terms of viability, levels of participation, and increased social capital (Johnson & Haleboua, 2014). Many users are concerned with digital literacy due to the proliferation of data on the Web that need to be observed. The challenges for users are to utilise and filter the different resources so as to obtain the best and relevant information that are appropriate and match their requirements. Subsequently, guidelines are necessary in keeping up with Islamic values as a priority on the Muslims' agenda (Norwawi, Alwi, Ismail, Wahid & Alkaenay, 2014).

In using computers, users should be concerned to avoid violating any ethical issues such as the use of time, honesty and integrity, privacy, security, intellectual property rights and much more (Masum, 2013). Islamic ethical systems differ from secular ethical systems because it emphasises the relationship of man to his Creator (Hassan, 2016). It must be acknowledged that the issue of ethics was not totally ignored by the Islamic scholars in the usage of computers because it is related to human sociology although there is no direct relationship to information technology (Norwawi et.al, 2014). Many Islamic scholars have contributed significantly to the development of science and civilisation of human beings such are the contributions of Abu Yusuf, Al-Ghazali, Ibn Taimiyyah, Ibn Khaldun, Al-Maqrizi and others. They have enlightened the world with their valuable works and left much rich Islamic heritage (Beik & Arsyianti, 2012).

For the purpose of this research, Ibn Khaldun's thoughts have been adopted due to his new methods of study that deals with the social contexts of human civilisational organisations. His observational investigations of social phenomena were found suitable for this research. Ibn Khaldun's accomplishments within the course of historical study of human social organisations, qualified him as a founder of the philosophy of history and modern sociology. The objective of Ibn Khaldun's science of civilisation is a deep knowledge of the nature and characteristics of human social organisation. He made a major contribution to this body of knowledge which is still relevant and referred to (Bakar, 2016). From the sociology perspective, Ibn Khaldun's intellectual mind had worked out his New Science (*Ilm al-'umran al-bashari*) within the religious-cultural framework setting and influenced by the Qur'anic ethics toward knowledge acquisition and creation (Dhaouadi, 2009). The theory studied the science of human association and social organisation. The emphasis on verifiable information and precise knowledge about the laws of society and social change in the content of this book makes it unique (Osmani, 2009).

Ibn Khaldun's thoughts were all self-created, genuine and innovative. Although he lived during the 14th century his adept thoughts were able to shed light on events of current times. Even as time passed his ideas were still relevant (Fahri, 2001; Hassan, 2006). As undertaken by Ibn Khaldun, those concerned with social issues, whether professionals or other community activists, must develop Islamic based interventions and strategies that address the community's concerns from their birth to old age (Hassan, 2006). Ibn Khaldun's work represents a good choice for a study because his work is a development of "the science of society", which other researchers called "sociology". His work offers an understanding of the history of the social sciences, particularly sociology which illustrates Islamic thoughts of earlier times till today.

In looking into ethical issues of SNS, this research aims to develop an ontology model through semantic relationships based on Ibn Khaldun's thoughts. Highlighting SNS as a social platform for people to communicate with other people, Ibn Khaldun's thoughts contribute significantly to the understanding of human culture and civilisation in the field of sociology. The ontology relationship linked issues in SNS with Ibn Khaldun's thoughts from the perspective of sociology as essential listings of ethical issues in SNS. According to Gulla and Brasethvik (2008), the ontology relationship may be useful to combine approaches that address their different aspects so as to have a better set of relationships and share a domain that facilitates data understanding.

In recent years, ontologies have provided a mechanism to capture expressive, complex and meaningful information about ideas, concepts, and relationships that describe a logical domain theory. They also provide a number of potential benefits in representing and processing knowledge; the separation of domain knowledge from application knowledge, sharing of common knowledge of subjects among humans and computers and the reuse of domain knowledge for a variety of applications (Harrag et.al, 2013). In addition, ontologies give a common understanding

of particular domains that can be communicated between people and application systems. Use of ontologies are popular in the area of organisation of information, natural language processing, information retrieval, knowledge representation, and knowledge acquisition. Ontologies can be utilised to share a viewpoint of the structure of discourse, empower reuse of existing ontology domain knowledge instead of creating new ones, interoperability in support communication and co-operation among systems, examine the level of domain knowledge validation and verification (Subhashini & Akilandeswari, 2011).

1.3 PROBLEM STATEMENT

People utilise and engage with social media for different purposes such as entertainment, mentoring, networking, friendship, learning, and civic engagement. The main concern is the situations that occur whereby sentences are loaded with sarcasm as seen in certain user's tweets. With the sophistication of language, the use of sarcasm in both verbal and written text has become the norm. Through the complexity of how people communicate online, differentiating the sarcastic content is vital for accurately categorising the positive opinions from the negative. User behaviours, thoughts, and lifestyles began to change as a result of SNS. Since there were no specific rules the platforms were used to share both constructive or disruptive ideas (Mukherjee & Bala, 2017).

According to this study, the introduction of the social media concept make it difficult for users to read and make assumptions about documents' contents or text since information streaming over SNS is enormous and noisy (Alp & Oguducu, 2015). Data disclosed on SNS was accompanied with risks since the scale of the social network, individual innovativeness, and inspiring developments influence users' willingness to expose security data for perceived benefits (Li et.al, 2016). SNS has become the new vector of attacks causing numerous cases of breaching

users privacy in order to disseminate frauds and malware or to exploit unauthorised information that they have captured (Kunwar & Sharma, 2016). Each SNS involves different types of relationships and each of them creates its social structures that might affect consumers' behaviour (Gentina et.al, 2016).

Moreover, cyberbullying through electronic media platforms attempt to harm the social connections, which can psychologically ruin this age group by posting hurtful or threatening messages online, spreading rumours on SNS, taking and posting unflattering pictures of a person, or circulating sexually suggestive pictures or messages about a person (Silva, Rich, & Hall, 2016). According to that, due to the harm caused by their capacity to exploit modern technology, cyberbullying has received greater public attention. As a result of these immoral behaviours, users feel vulnerable and defenseless resulting in anxiety and depression, somatic illness, retaliatory violence, and suicide (Carter & Wilson, 2015). Youth are exposed to issues associated with unethical usage and it is uncertain whether they comprehend internet risks due to their lack of maturity (Mt Tahir et.al, 2016).

Ethics is a branch of philosophy, whereas attitude is concerned with manners, or more specifically the behaviour of individuals in society. A review of psycholinguistic theories found in the Muqaddimah demonstrates Ibn Khaldun's depth of understanding of human behaviour, including language behaviour and the impact of change on human habits (Abdussalam, 1995). In regards, relation to SNS and users behaviour, one significant role of users in social networks is their show of behaviours (Tsai et.al, 2015). Decisions are influenced by opinions and decisions made based on a person's sentiment must be examined based on sentiments. The ontology approach that can accept a text may provide sentiment analysis for each aspect based on automatically identified aspects (Silva et al., 2019).