A Study on Learning Management Systems, Data Mining and Their Role in Decision-Making

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Abstract:
This paper aims at giving the roles of Learning Management system (LMS) and Data mining moreover it shows of the use of management information systems and data mining techniques provides organizations in all fields with the ability to explore and focus on the most important information in databases. Data mining techniques also focus on building future predictions and exploring behavior and trends, allowing the right decisions to be made and taken in Good time. Furthermore, it discusses the tools and strategies of Data Mining and Management information system to create sustainable development in the work of various organizations.

I.   Introduction:

Our current era (The Internet era and the digital economy) is characterized by the great torrents and the widespread spread of data to the extent that it has become impossible for analysts to extract meaningful information by resorting only to traditional approaches to preliminary data analysis. Management information system provides the necessary information to the maker or decision-maker to obtain this information from formal or informal systems, by converting data after processing it into information.

With the presence of large amounts of data stored in databases and data stores, the need to develop powerful tools for analyzing data and extracting information and knowledge from it has increased, from here the so-called Management information system and data mining emerged as a technologies aimed at extracting knowledge from huge amounts of data. They are a modern technologies that have imposed itself strongly in the era of informatics, and its use provides companies and organizations in all fields the ability to explore and focus on the most important information in databases, and prospecting techniques focus on building future predictions and exploring behavior and trends, allowing the right decisions to be made. and taken at the right time which in turn is considered a stage of a more complex process, and the exploration of knowledge in databases, as well as it is closely related to another very important development process, which are data warehouses. As many of the leading companies and organizations today use the process of exploring knowledge in databases in a systematic and organized manner as it constitutes the core of the work that depends on it in activating activity and achieving competitive advantage.

II.   Literature Review

Liao and Chou, (2013) The principles of the organization in the field of data mining are relevant concerns. This is a method for discovering the association of objects or characteristics. In addition, the synchronous partnerships are largely determined and used as context when deciding. Yang and Chen studied the connection between clinical and pathology findings in the area of medical care on the basis of a data association mining process. Various rules for the detection of the pathologic stage of lung cancer have been established and tested.

Lee et al. (2014) Principles of Association mining are also used to define the interaction as more comprehensive aggregation groups by using a cluster analytical methodology. The joint movement of Taiwan and Hong Kong stock markets has been investigated by Liao and Chou and the potential clusters of stock indexes have also been discussed, utilizing affiliation and clustering laws, among the two stock markets. In order to detect points of interest and affiliation, a framework was also proposed for the mining of Flickr

geographical pictures with a mixture of clusters and association regulations mining.

Nedic et al. (2014) In the business intelligence world, data mining strategies play an important part. The summary is not sufficient and restricted in the above three functions only. For instance, Nedic proposed a new solution focused on 4 traffic noise modeling optimization techniques, which might help to monitor the noise level within urban areas. This technique uses sophisticated algorithms of optimization that reflect another field of data mining.

Daniel et al. (2017) used 4 lexicon-based text analysis tools in the area of financial marketing to evaluate tweet feelings from the financial world, which also led to the case popularity identification [46]. Has examined the negative range of financial news through net optimism that measures the material in the field of social network analysis according to the word frequencies of pre-defined dictionaries, Stieglitz and Dang-Xuan investigated the relation of social networking feelings with the actions of people exchanging knowledge utilizing a lexicon to achieve the intensity of emotions In a context for social media-related public policy computer sciences, Chung und Zeng represented an imood system which addressed a sense and network analysis based on Lexicon orientation approach. More notably, Deng's latest paper proposes to apply current feeling Lexicons to the description of domain- specific feelings.

First: the concept of Learning Management system and Data Mining:Learning Management system:

I.   Learning Management system is "the study of information systems focusing on their use in business and management". Laudon, K. C., & Laudon, J. P. (2011:G-7).

II.   Learning Management system is very crucial to use and to study. "What makes management information systems the most exciting topic in business is the continual change in technology, management use of the technology, andthe impact on business success". Laudon, K. C., & Laudon, J. P. (2011:6)

III.   It is designed to perform the functions of different management system.

IV.   It's a system that provides information to whoever makes the decision.

V.   It is a system that processes data with a computer.

Accordingly, it is noticed that learning management systems: are the tool by which data are processed electronically by the computer, or it is a system that produces administrative information by computer, or are the processes by which computers are used to solve administrative problems.

Data Mining:

Data mining appeared in the mid-nineties in the United States of America, and it combined statistics and information technologies (databases, artificial intelligence, machine learning).

There are several definitions of this concept, including:

I.   "Automated or automated exploration of interesting and unclear patterns hidden in a specific database". Basheer Abbas (2005:84).

II.   An accurate and intelligent, interactive and sequential analysis process that allows the managers of activities when using this process to make decisions and take appropriate actions in the interest of the activity for which they are responsible and the organization in which they work. Bazsalica M Naim, (2001:61).

III.   An analyzes of a large amount of data in order to create rules, examples and models that can be used to guide and inform decision-makers, and to predict future behavior. Abdul Sattar, et al. (2006).

IV.   An analysis of large-sized groups of observed data to search for potential relationships and summarization of the data in new formats to be understandable and useful to its user. Hand D, et al. (2001)

From the previous definitions, it can be said that data mining is a process of extracting or discovering useful and exploitable knowledge from a large group of data. It helps to explore hidden knowledge and unexpected models, as well as explore new databases that exist in large databases.

Second: the drivers of the LMS and data mining revolution:

Drivers of the LMS and data mining revolution can be divided into two main parts: Basheer Abbas, Al-Alaq. (2005).

A.   Supply-side factors:

1.   Effects of information technology developments, especially data storageand processing technology.

2.   Technological development has accelerated in performance, production,methods and means of communication.

3.   Low electronic communication costs, which facilitated access to databases.

4.   Emergence of new analysis methods, most notably neural networks, genetic algorithmic systems, decision trees and rules of induction.

5.   The increase in complexities in the tasks of managing institutions due to the technical and knowledge progress.

6.   The increase in influences and variables (political, economic, social and technical) that affect the

course of work, whether at the local or international level.

7.   Computer reconstruction revolution that resulted in the birth of new generations of user-friendly software, such as: Microsoft Windows, and client-server software.

8.   The tremendous development in storage methods, and among the most prominent of these methods are those related to data warehouses and their markets.

B.   Factors related to demand side:

1.   Growing need for rapid analytical results on the part of fierce competition institutions and rapid changes in the work environment.

2.   Intense competition between institutions, which necessitates rapid decision-making based on accurate information that includes all factors affecting the work environment.

3.   Hierarchical organization receded, as managers had to rely on themselves to obtain their needs for analytical information, after the role of support analysts who relied on them receded.

4.   The authoring and publishing movement flourished, especially in the field of information technology, the Internet, and everything related to the era of the digital economy.

Third: Data mining tools:

Data mining models are two types:

▪   **Predictive Models:**

Predictive models aim at predicting the value of some properties such as forecasting the purchase probability of a customer.

▪   **Descriptive Models:**

A Descriptive models are divided into two types: cluster models that allow the grouping of individuals, events, or products into clusters, and correlation models that allow identifying relationships between them.

There are several tools for data mining, the most important of which are:

I.   Summarization:

Summarization refers to techniques for breaking down big data blocks into summary measures, which provide a general description of the variables and their relationships. Basheer Abbas (2005:92).

II.   Classification:

Classification is interpretation or prediction of an individual's characteristic through other characteristics. Bazsalica, et al, (2001: 68- 69)

III.   Prediction:

Prediction is similar to classification or estimation, except that the data are classified on the basis of predicting their future behavior or estimating their future value. Berry J. A. M., Linoff G. S., (2004:10)

IV.   Clustering:

Clustering or segmentation is the search for homogeneous groups in a community of individuals. Bazsalica M., Naim P., Bazsalica, et al, (2001:66)

V.   Rule Analysis:

Correlation is the search for relationships or associations that exist between several properties. Bazsalica, et al, (2001:68)

VI.   Change and deviation detection:

It is based on exploring very important changes in data through previous measurements or standard values.

Fourth: The stages of the LMS and Data mining process:

Stages and steps of the LMS and data mining process can be summarized asfollows: Abdul Sattar Al-Ali, et al. (2006).

1.   Business Understanding:

The first requirement for knowledge discovery is an understanding of the problems and issues faced by the business. In other words, how to achieve the greatest benefit from data mining, which requires a clear and specific formula for business objectives.

2.   Data Understanding:

The issue of knowing what and nature of data is an important factor in the success of data mining and knowledge discovery. Knowing the data well means helping designers to use the algorithms or tools used for specific problems with high precision. This leads to maximizing the chances of success as well as raising the effectiveness and efficiency of the knowledge discovery system.

▪   **Data Collection:**

It is the step directed towards determining the source of the data in the study, including the use of external general data such as taxes and others.

▪   **Data Description:**

It is the step that focuses on describing the contents of a single file or tables.

- **Data Quality and Verification:**

This step determines whether minimizing or omitting some unnecessary data or poor quality which may not be used in the study because a good model needs good data, which is why the data must be correct and have accurate content.

- **Exploratory Analysis of Data:**

Techniques such as visualization or Online Analytical Processing (OLAP) process are used to perform the initial data analysis. This step is important and necessary because it focuses on developing hypotheses related to the problem under study.

3. Data Preparation:

It includes the following steps:

- **Selection:**

It means selected the expected variables and sample size.

- **Construction and Transformation Variables:**

New variables must always be formulated to build effective models.

- **Data Integration:**

The data sets in a data mining study can be stored in multi-purpose databases that need to be consolidated into a single database.

- **Data Formatting:**

This step is related to rearranging the data fields as required in the data miningmodel.

- **Model Building and Validation:**

Building and formulating a correct and accurate solution model is through a process of right and wrong, as such a process often requires the help of specialists in data mining with the aim of testing and examining variousalternatives to obtain the best model for solving the problem under study.

- **Evaluation and Interpretation:**

Once the form is formulated and its stability and authenticity is verified, a validation process is conducted to verify the stability of the data package fed by the form. Since the results of this data are known, the expected results are compared with the actual results in the stability of the running data package. This comparison verifies the accuracy of the model.

- **Model Deployment:**

This step includes publishing and distributing the template within the organization to aid the decision-making process and that the valid model must also achieve the satisfaction of the beneficiaries as long as the selection of the model must be done through an experimental study or a miniature form of the comprehensive study.

Fifth: The fields of application of LMS and Data mining in business organizations:

LMS and Data mining have known great success and its applications have increased in business organizations due to the great growth in data, especially in databases and data stores, as well as the intense competition in the market, which drives these organizations to make the most of the data they own by using data mining.

Data mining began to be used in distribution organizations, and then quickly moved to banks, insurance institutions, telecommunication companies (especially mobile phones), water and electricity establishments, and recently air and rail transport ... etc. Its first applications were in the field of managing the relationship with the customer by analyzing customer behavior in order to make them more loyal and to suggest products according to their desires.

Generally, there are several fields of application of data mining in business organizations, including:

1. Marketing:

Artificial neural networks have been used in targeted marketing studies including market shares. These methods helped the marketing to use the customer allocation approach according to the basic demographic facts such as gender, age and groups, as well as their purchasing patterns.

2. Partition:

Data mining methods have been used effectively in forecasting sales, as many variables are taken in studies such as multiple market variables, customer capabilities based on buying habits such as the analysis of the shopping cart or the market basket helped a lot in finding which products could be bought together by the customers.

3. Banks:

Business and Financial Forecasting have proven to be an excellent method for applying data mining techniques. These techniques have been used in finding guaranteed prices, future price predictions, and stock performance. The use of such methods has also achieved success in the development of digital measurement systems in determining the risk of loans and financial fraud.

4. Insurance:

Data mining methods have also been used extensively in the field of insurance companies, especially in allocating customer groups, with the aim of determining policy prices and expected future claims fluctuations, and identifying false claims.

5. Telecommunications:

It effectively used data mining methods such as neural networks in an attempt to reduce - the churn - that appears when an organization loses customers during competition and goes to other competitors.

6. Operations Management:

Neural networks have been used in planning, scheduling, project management,as well as quality management.

III. Conclusion:

Merging of the advantages of information technology with statistical methods and algorithms has led to the availability of the necessary capabilities to predict future behavior and then develop appropriate solutions to problems before they arise in the event that they arise, or as a means of prediction for the purpose of development and modernization in general in various fields, all by using LMS and data mining exploration techniques, It constitutes a stage of a more comprehensive path, is the exploration of knowledge in databases, which has become a major concern responsible for all countries with all their institutions.

References:

[1]. Laudon, K. C., & Laudon, J. P. (2011). Essentials of management information systems. New Delhi: Pearson Education India.
[2]. Y. Eguigure, A. Zapata, V. Menendez, and M. Prieto, "Quality Evaluation Model for Learning Objects from Pedagogical Perspective: A Case of Study," Iberoam. J. Applied Computing, Vol. 3, Issue 1, pp16-28, 2011.
[3]. S. C. Cechinel and S. Alonso, "Analyzing Associations between the Different Ratings Dimensions of the MERLOT Repositor," Interdisciplinary J. E-Learning and Learning Objects, Vol. 6, Issue 3, Page. 1-9, 2013.
[4]. Bazsalica M., Naim P., Data mining pour le Web, éd. Eyrolles, Paris, 2001, P. 61.
[5]. Hand d., Mannila H., Smyth R., Principles of Data Mining, MIT Press, London, 2001, p. 01.
[6]. Bazsalica M., Naim P., Op. Cit., pp.68-69.
[7]. Abdul Sattar Al-Ali, Amer Ibrahim Kandilji, Ghassan Al-Omari, Introduction to Knowledge Management, Dar Al-Masirah for Publishing, Distribution and Printing, First Edition, Amman, 2006, p. 157.
[8]. Bashir Abbas, Al-Alaq, Digital Management: Domains and Applications, Emirates Center for Strategic Studies and Research, Abu Dhabi, 2005, pp.89-91.
[9]. Bashir Abbas Al-Alaq, Digital Management: Domains and Applications, Emirates Center for Strategic Studies and Research, Abu Dhabi, 2005, pp. 92-94.
[10]. Berry J. A. M., Linoff G. S., Data Mining Techniques For Marketing, Sales, and Customer Relationship Management, 2 ed., Wiley Publishing, INC, Indianapolis, 2004, p. 10.
[11]. Bazsalica M., Naim P., Op. Cit., pp.66.
[12]. Bazsalica M., Naim P., Op. Cit., pp.68.
[13]. Turban, Efraim and Volonino, Linda (2010). Information Technology for Management,Transforming Organizations in the Digital Economy, 7th edition, Asia, John Wiley & Sons Ltd.
[14]. Abdul Sattar Al-Ali, Amer Ibrahim Qandilji, Ghassan Al-Omari, previous reference, pp. 98-99.
[15]. Branzei, R., S.Tijs and J.Timmer (2005), "Collecting Information to Improve DecisionMaking", Economic Research Vol.26, No.1, pp1-15.
[16]. Frishammar, J. (2003). Information use in strategic decision making.Management Decision, 41(4), 318-326.