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"Applications, Models and Uses of Data Mining in E-Governance for Sustainable Development"

Dr Deepak Kalra

ABSTRACT

The innumerable Governmental bodies around the globe collect voluminous amounts of data in a massive amount of formats and collect huge and vital information from its citizens, employees, organizations and other community in multifarious formats through diverse channels such as the conventional postal system and also to the contemporary e services which includes websites and social media. The huge storage of information when kept idle will not suffice the day to day requirements and does not deliver any benefits out of storage for decision making or planning purposes. So it is the prime most duty of the Government to unearth the hidden data from the data pool being collected to extract useful and purposeful information and the underlying trends for decision making purposes. The contemporary data mining procedures and techniques help to perceive the fraudulent activities and other security threats and it is mainly used to measure influence factors like the need and desire of the Citizens, Character, behavior out of these collected data and the underlying techniques deployed that normally affects the e-governance services which includes services between government-to-employees(G2E), government-to-government (G2G), government-to-business (G2B), government-to-citizen (G2C) mainly for the purpose of delivering government services, information exchanges, transactions in communications, integration of standalone systems. The aim of this paper is to show how the data mining can assist the Government in terms of decision making from the huge data bank which is collected from a range of sources of the community at large. This paper elucidates the various applications and uses of data mining techniques for decision making and knowledge management through e-governance.

Keywords: Data Mining, Decision Making, e-governance, Knowledge Management

I. INTRODUCTION

The evolution of Information and Communications Technology (ICT) has extended resources for more rapid and enhanced communications, competent storage, recuperation and processing of data, exchange of data and distribution of information to its users, groups, individuals, businesses, governments and organizations (Padmapriya. A, 2013). In view of the Government the emergence of computerization and web enabled association with the process of re-engineering, guarantees faster and effective information processing thereby leading the information to be quicker without compromising its quality by better decision making with a higher reach and liability with paramount utilization of its resources and all-embracing good governance.

The rising responsiveness and awareness among people about their fundamental rights and the ensuing interests' augments in terms of its expectations from the government to execute and deliver the complete paradigm shift of governance by knowledge management. Dissimilar governments and organizations describe this term to ensemble their own aims and objectives. From time to time, the term "e-government" is also used instead of e-Governance". In accordance to the World Bank (Hart, J., and Kamber, M, 2001) "E-Government attributes to the exercise by government agencies of information technologies which includes the Internet, Wide Area Networks and mobile computing that have the capability to alter relations with businesses, people and other arms of the government. These technologies are capable of serving improved delivery of government services to its populace, enhanced interactions with commerce and industry, inhabitant empowerment through right to information, or further well-organized government management. UNESCO characterizes e-Governance as (Hart, J., and Kamber, M,

2001) “Governance refers to the implementation of political, economic and administrative authority in the administration of a country’s affairs, including its general public”.

It also includes the expression of their wellbeing and exercise of their legal rights and ethical requirements. “E-governance may be comprehended as the attainment of its governance by means of the electronic medium, in order to assist a well-organized, quick and apparent process of publicizing information to the public at large and mainly for performing the government administration activities.” Data mining is an extensive category of technologies and applications for collecting, storing, examining and giving access to data to assist the choice makers in making appropriate and fitting decisions. Data Mining, also recognized as knowledge unearthing in the database, assigns to haul out implicit latent functional information and data from a huge quantity of defective, noisy data, blurring, random data which people are unaware in the previous stage (S.C. J. Palvia and S.S. Sharma, 2007).

This paper is formulated as follows. In Section 2, it elucidates the need for study and in section 3, literature review on e-Government and its applications provided. In Section 4, an objectives of e-Governance is given. In Section 5, the adoption and applications of Data Mining though e-governance proposed and discussed with its practical usage in various government services like G2G, G2B G2C, and G2E. The paradigm shift examined through various Common and specific applications used by different government organizations of selective parts of the world as a Case Study in Section 6. The results and findings of this case study are given in Section 7. In Section 8, discussed on key issues and challenges in implementation of data mining techniques for knowledge discovery in the global context and given conclusions in the Section 9.

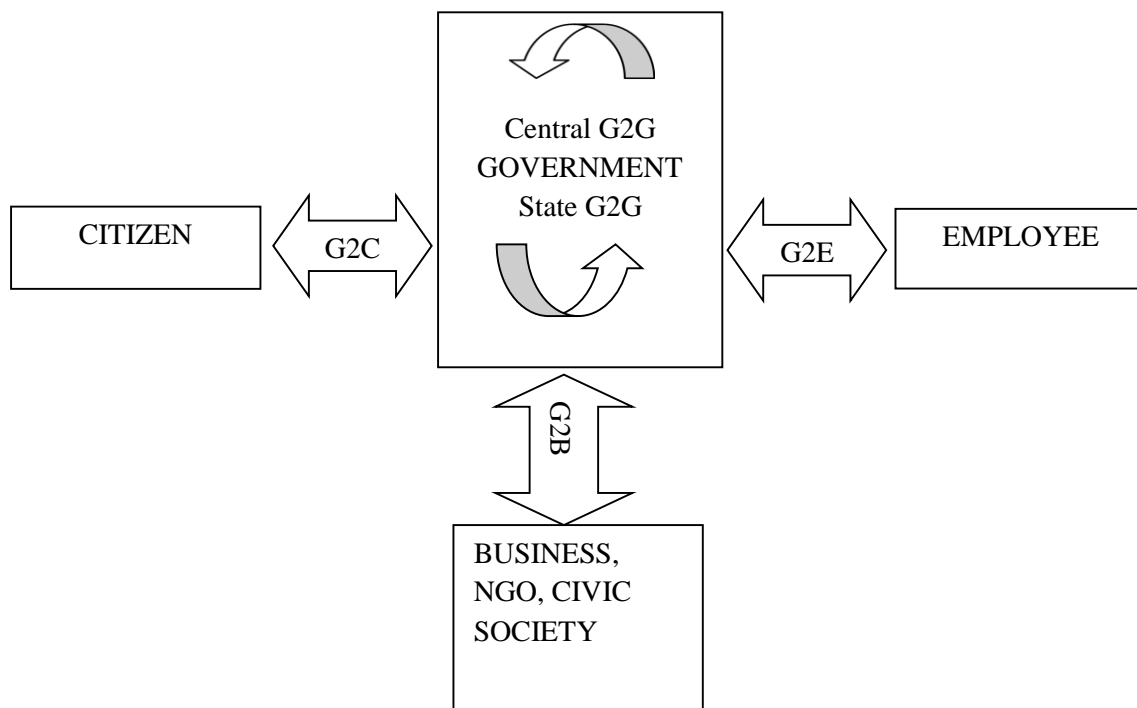


Fig 1: Various Services of the Government (G2C, G2E, G2B, G2G)

II. NEED FOR STUDY

Data mining in e-Governance plays a significant role to examine data. The applications and uses of Data Mining in e-governance can be stored and computerized and data mining techniques may also be employed to help in answering numerous essential and decisive questions related to its populace at large. Without data mining it is hard to realize the full prospective of data collected by the Governments for its e-governance as data under analysis is immense, highly dimensional, scattered and uncertain. Many Governments struggles with the deployment of data collected and it is only through its e-governance

system that is integrated with data mining for decision making and analysis can support to discover the knowledgeable and constructive data for its effective administration.

III. LITERATURE REVIEW

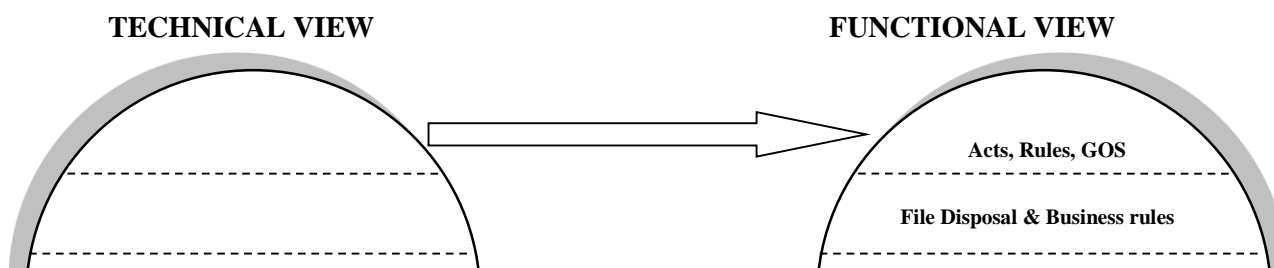
The revolution from conservative government services to E-government services foreruns a new epoch in public services. E-government services are capable of replacing the government's long-established services with services of enhanced quantity, excellence and reach, and augment resident's satisfaction, by means of Information and Communication Technology (ICT). E-governance intends to formulate the connections between, government and business enterprise (G2B), government and citizens (G2C) and friendly inter-governmental department dealing (G2G), expedient, apparent and lesser expensive (Singh. V.J., Chande. A, 2014). A mounting amount of edifying text regarding government resolutions, information, rules and regulations are now disseminated on the web using a range of portals, such that citizens can look through and read in detail about them. This estimates, nevertheless, that the knowledge seekers are competent of entrapping the immense volume and intricacy of the lawfully worded credentials (Haran. M. H, 2016).

Government regulation policies are capacious, profoundly cross-referenced and repeatedly unclear. Government information is in formless / semi-structured form, the sources are manifold and the compositions are diverse thereby constituting serious obstruction to their probing, indulgent and make use of by ordinary citizens. In the G2G field, the government departments are in greater need of a scheme that is capable to afford information reclamation, data exchange, metadata-homogeneity, and appropriate information of dissemination across the administrative channels of national, regional, state, and local governments (Kettani. D,2014).

The increasing demand for and involvedness of government regulations on different aspects of economical, social, political life, and calls for advanced knowledge-based framework for knowledge gathering of information, its flow and the distribution. Also, Government regulations are repeatedly updated by government departments to replicate environmental changes and innovations in policies. Tools that can identify indistinctness, discrepancy and disagreement are needed because the Government regulations, enhanced provisions, legal primacy and interpretive course of action together produce a colossal volume of documents with potentially alike content but likely differences in terms of its format, context and terminology. Infrastructures and the information that can combine, compare and contrast diverse regulatory documents will very much augment and aid the understanding of prevailing regulations and dissemination of new ones.

Government regulations ought to be reclaimable and explicable with ease by lawyers, policy makers as well as general populace of the world. In spite of several attempts, it is accepted that e-government services are hitherto render the preferred pro-citizen services and are generally targeted towards inner efficiency (Alarape. M.A, Suleiman, M.A, 2014). (Kwon et. al. 2007), suggested a system that facilitates the rule makers comprehend and react to the public comments, prior in finalizing the projected regulations. These public comments are the oriented with views and arguments about the regulations. The skill of recognition and classification of major subject of the claims and opinions provided by the tool helps Government to preview and summarize the comments (Kwon et. al. 2007).

Kumar, D. and Panchanatham, (2017) hypothesized that the accomplishment of e-governance lies in applying the ideology in a logical and holistic way by many people across the country, states time and again over a stipulated period. E-Governance by now is playing an indispensable role in the worldwide economy. The multifarious agencies of the United Nations Organization (UNO) and the World Bank are providing an immense support for the most of E-Governance initiatives. E-Governance augments the effectiveness of citizen and Government communications. (Purao and Desouza, 2011; Abrahams, 2009) evaluates the complication in e-government applications pose a challenge to designers and developers, because of the fragmented nature of government administration and communication process. The integration of technologies to deliver government services are given in Figure. 1



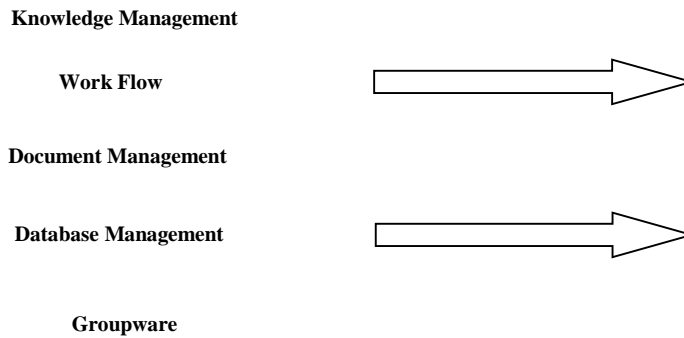


Fig. 2 Integration of technologies to deliver an electronic workplace
[Source: (Satyanarayana, J. 2013)]

Bhatnagar, S. (2009) reported that the early government applications were focused on building management information systems for planning and monitoring). The process of information systems development is a formal step by step scientific process that does not coincide with practical experience (Avison et al, 2004). Heeks (2003) suggested that e-Government system should be country specific and not an off-the-shelf system from another country. Most of the government applications are not a “One Size Fits All” solution every application must take into account the variable factors influencing that application. It is just because each society has dissimilar requirements and priorities, there are no unique model for e-government and no worldwide standard for e-government readiness (AI-Eryani, 2009). E-Government applications countenance innumerable challenges because of the disjointed nature of government administration and its communication processes (Abrahams, 2009). A top-down approach has been followed by several e-government applications which have often not worked and the resultant system has not been able to fulfill the needs of the citizens despite the cost of these applications (Agarwal, 2007). Bhatnagar, S. (2009) pointed out that the early government applications were centered on building administration data frameworks for arranging and checking). The procedure of data frameworks improvement is a formal well-ordered logical process that does not agree with down to earth involvement (Avison et al, 2004). Heeks (2003) believed that e-Government framework ought to be nation particular and not an off-the-rack framework from another nation. A large portion of the administration applications are not a “One Size Fits All” arrangement each application must consider the variable components affecting that application. Since each general public has diverse necessities and needs, there is nobody showing for e-government and no all-inclusive standards for e-government preparation (AI-Eryani, 2009). E-Government applications confront challenges as a result of the divided idea of government organization and its correspondence forms (Abrahams, 2009). A best down approach has been trailed by a few e-government applications which have frequently not worked and the resultant framework has not possessed the capacity to satisfy the necessities of the residents in spite of the cost of these applications (Agarwal, 2007).

IV. OBJECTIVES OF E-GOVERNANCE

The main objective of E-governance is to attain smart governance. E-governance ends up in major advantages in the government organization administration. The utilization of ICT in Government activities has given a replacement plan of governance called e Data Mining in E-Governance Models and Applications governance (Kodukula, S. 2008) to attain the subsequent advantages we had like e-governance. Krishna, D. V. (2014) depicts that an honest e-governance provides:

- Augmented potency in numerous Governmental processes
- Transparency and anticorruption all in all transactions
- Persuade the voters for his or her partaking in e-governance.
- Develop client orientation and maintain client relationships
- To generate higher choices and work a lot of flexibly
- Political commitment and effective body relationships

- To save precious time of the national by providing services at his place

V. E-GOVERNANCE MODELS

S.No	Model	Principle	Applications	Instances
1	Broadcasting / Wider Disseminating on Model	More learned individuals can see better the administration techniques and exercise its rights and obligations. Access and confirm data existing in the neighborhood area from outside sources	Setting Government laws and enactment on the web. Making accessible data relating to legislative budgetary plans, strategies, consumptions and introductions on the web. Receiving court judgments/legal proclamations for normal natives and making priority for future activities on the web.	Information Services Terminal of National Informatics Center (GISTNIC) is an example of this model. In this project the Government propagates of information of about 25 subjects such as Economy, Education, Census, Tourism, etc
2	Critical Flow Model	Engage positioning users to whom the accessibility of the exacting information set would make a critical difference in initiating good governance. intrinsic characteristic of ICT that makes the notion of distance and time redundant	Endows with information on corruption of a department or government officials. Availability of information about human rights violation and criminal prosecution records against government officials to concerned citizens. Provide environment related information to local communities.	Administers research studies, enquiry reports and appraisals.
3	Comparative Analysis Model	This model incessantly assimilates new facts and uses them as benchmark to appraise. Used to get a snapshot of past and present state of affairs. Lays in the unlimited capacity of ICT to store information in a retrievable manner and transmit it all geographical and hierarchical barriers.	Enforcing informed decision making at all stages by enhancing the background knowledge and endow with a rationale for future course of action. Evaluating the performance record of any government official or ministry.	Evaluating the efficiency of current policies and actions of the past.
4	Mobilization and Lobbying Model	It is based on planned, strategic, directed flow of information to build strong virtual allies to strengthen action in the real world. This is able to effectively overcome	Civilizing the voices of marginalized groups who are conventionally marginalized from the decision-making process. Encouraging wider	Promoting public debates on global issues, subjects of upcoming conferences, treaties etc.

		geographical, institutional and bureaucratic barriers to shape concerted action. Provides a strong virtual arm to several activities such as directing campaigns against a particular individual or decision making body.	participation in decision-making processes.	
5	Interactive-Service Model	It is G2C2Gmodel. This model captures the potential of ICT and leverages it for greater participation, efficiency and transparency in the functioning of government. Make possible various services offered by the government to be directly accessible to citizens. It creates an interactive Government-to Citizen to Government (G2C2G) channel in various functions. Decision.	Maintaining an interactive communication channel with decision makers such as video conferencing and online dialoguing. Conducting electronic ballots for election of government officials. Conducting public opinion polls on issue of wider concern before formulation of policies and legislative frameworks. Filling of petitions, feedback and reports by citizens with the concerned governmental body.	Carrying out video conferencing and online discussion to policy makers

Table 1 : E-Governance Model suggested by Dhulipalla Vijay Krishna (2014)

VI. DATA MINING TECHNIQUE FOR E-GOVERNMENT

The Data Mining is connected with the process of extracting legitimate, formerly unknown, understandable, and actionable information from big databases and using it to make appropriate business decisions (Cabena et al., 1997). The data mining is an encouraging field of information and knowledge discovery (Han et. al., 2011). Fayyad, U. M. (1996) determined six data mining functions are:

- Classification is a process that helps to find models that assess and categorize a data item into several predefined classes
- Regression is a process of mapping a data item to a real valued prediction variable
- Clustering is a process of identifying a finite set of categories or clusters to illustrate the data
- Dependency Modeling (Association Rule Learning) is finding a model which describes important dependencies between variables
- Deviation Detection (mainly referred as Anomaly Detection) is discovering the most noteworthy changes in the data
- Summarization is discovering a compact description for a subset of data.

Grossman, R. L., et. al (2013) defined five principles for the operation of data mining is:

- Lucidness, Transparency and notice
- Accountability, omissions, and indemnity

- Authority and alternatives
- Data Integrity and security
- Data Appropriateness / Minimization.

The evaluation of data mining is given at Table [2].

Evolutionary Step	Question	Technology	Product Providers	Characteristics
Data Collection 60's	What was my total revenue for the last few years	Computer, Tapes, disks	IBM, CDC	Retrospective static data delivery
Data Access 80's	What were Unit sales in UAE last February	RDBMS (Relational Databases) SQL (Structured Query Language) ODBC	Oracle Sybase Informix IBM Microsoft	Dynamic Data Delivery
Data Warehouse and Decision Support	What were Unit Sales Price in UAE last March	Online Analytical Processing (OLAP) Multidimensional Database, Data Warehouses	Pilot Comshare Arbor Cognos Micro strategy	Dynamic Data Delivery in Multiple Level
Data Mining (NOW)	What will be the Unit Sales Prince in UAE next month? Why?	Advanced Algorithms Multiprocessor computers Massive databases	Pilot Lockheed IBM, SGI Many more...	Prospective Proactive Information Delivery

Table 2: The Evolution of Data Mining

The government organizations were using the data mining applications to detect fraudulent activities, but in due course of time they have started using it for the purpose of measuring, improving the overall program performance and recovered millions of dollars in deceitful Medicare payments (Cahlink, G., 2000). There have been several promising reports of thriving data mining applications which are used in various government applications such as the healthcare (Milley, A. 2000), the employee's performance prediction (Jantan, H., et. al, 2010), prediction of the joblessness rate to make decisions and design policies (Xu, W., et al, 2013) and to detect the anomalies in tax patterns (Rao, V. R., 2014).

VII. KNOWLEDGE MANAGEMENT IN E-GOVERNMENT

A thriving e-Governance necessitates Knowledge Management (KM). The objectives for KM proposals in the public sector include (Riege, A., & Lindsay, N., 2006):

- Taking full advantage of efficiencies across all public services by connecting information across different levels of government and across borders
- Expand new or combined systems to amalgamate and reachable knowledge base
- Progress accountability and extenuating and
- Distribute enhanced and more cost effective services.

HuiYuen Yum (2007) reported that, KM is central to information sharing and access between government agencies and between the government and the citizens. The governments of rising countries can use KM as a main driver towards enhancing productively in public sector productivity and building trust in government by focusing on a few novel policies and designating the appropriate department to drive these policies into effective implementations. A survey conducted by HuiYuen Yum in the year 2007, stated that all the respondents are conscious of KM and have KM programs in place, are locating the program, or probing the need for such programs. 67% of the partakers of the survey pointed out that the objective of KM programs is to share knowledge and to offer access to information and expertise. This survey also accounted that the paucity of time and lack of attentiveness and comprehending are the topmost two reasons for resisting the KM initiatives. Insufficient or zero knowledge management practices within the Government normally leads to loss of prospects as a result of lost institutional memory, knowledge gaps and non-availability of fitting inputs for decision making (Rao, V. R., 2014).

VIII. USAGE OF E-GOVERNMENT DATA MINING APPLICATIONS (eGDMA) IN DECISION-MAKING

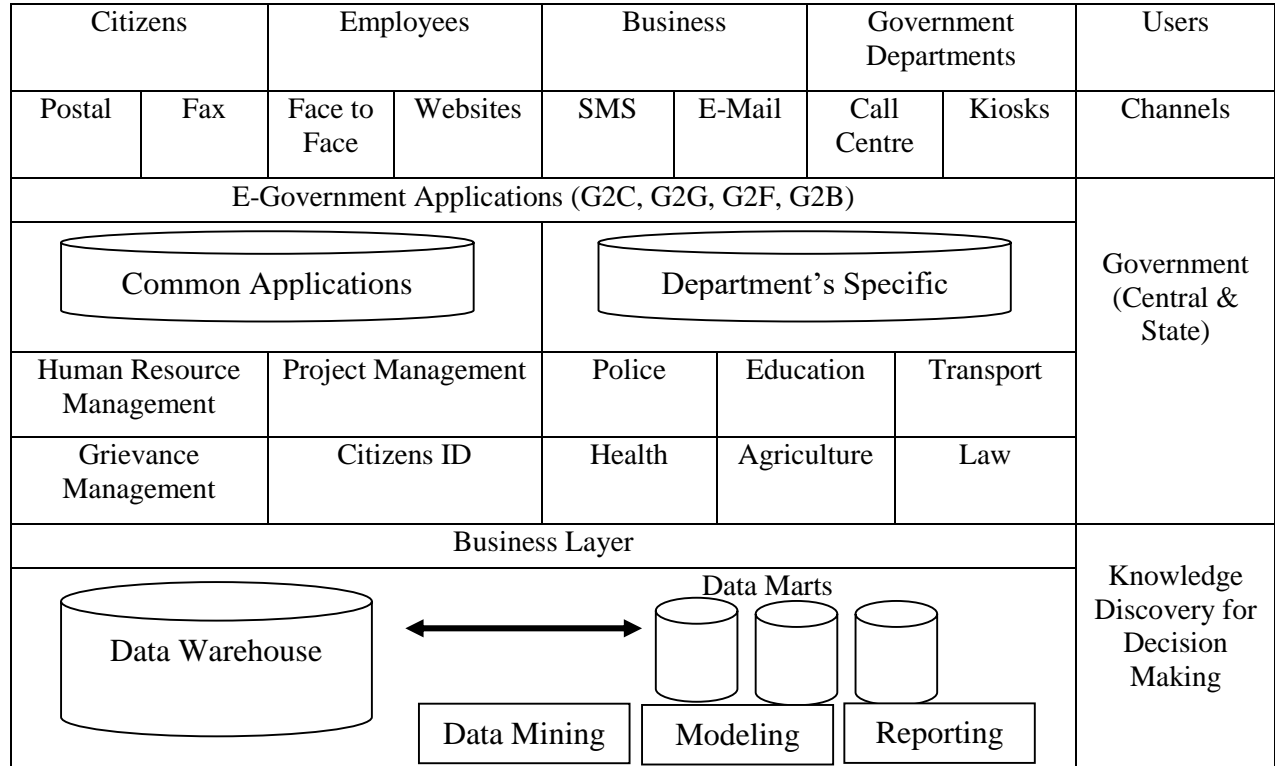


Fig. 3 E-government Data Mining Application (eGDMA)

Some examples of G2C, G2G, G2B and G2E are:

(a) Government-to-Citizen (G2C) applications:

Who are our citizens? What services are to be promoted through which channel? (Traditional Channel like Phone, Fax, Face to Face, and/or Modern channels like Website, SMS, Kiosk, CSC or mixed channels?). Which Channel is more preferred by whom? And Why? What is the behavior of those citizens? What is their age? And Area? (Rural or Urban). What is the reason for not using any services or channels by the citizens? What types of citizen services have the biggest impact on government revenue? Which citizens are not paying House/Income/Commercial/Sales taxes or misusing schemes/services? Will the citizen default on a loan/Utility bills, or they pay back in time? Which citizens are responding to the new services/schemes? What is the behavior of those citizens? In which area government services are not reaching to citizens? Why? Are citizens are availing services such as certificates like birth, death, marriage certificates through Citizen Services Centers (CSCs), Kiosks?

(b) Government to Government (G2G) applications:

i. Agriculture:

Integrated agriculture data can be used to track the quantity and quality of crop information by taking the attributes like land capability, soil health, quality/type/timing/usage of seeds/ pesticides/ fertilizers, weather issues such as no rain/heavy rainfall (cyclone), flood, drought, irrigation facilities. Where farmers can sell their product with best prices without middle man? How and through which channel the agriculture related information can send quickly to the farmers? While giving compensation to farmers when crops are affected by the flood/drought/natural calamity, the government can generate the questions like: Is these crops are insured? How Banks can withdraw these loans? How much compensation to be given to the farmers? based on these questions the government can provide compensation to the right farmer at right time (through banks lined with citizen-ID) to reduce misuse/fraud.

ii. Disaster management:

Factors like the age of the building (Building Department), electrical issues (Electricity Department), illegal/quality of construction\ lack of earth residence (Building construction/ Sanctioning Authority / Revenue Department), Loan details (Banks), Identity of the citizens (ID proof) and departments like police, fire, ambulance, hospitals & communication channel (Wired and/or Wireless) capabilities of the departments can be correlated to take decisions to save citizens in a timely manner in case of disaster. The government organizations can make management decisions to identify effective treatments and patients receive better healthcare services.

iii. Track Departments' (G2G) Efficiency:

Which departments' schemes and /or services are effective (or not effectively) delivered to citizens? Why some departments are not delivering their services properly? What are the reasons for success or failure of a particular department? And how to improve those services? To answer to these questions, the data of the departments such as Infrastructure, Human resources and Quality of their services may be lined to identify the pattern and improve services.

iv. Education:

The Students' performance can be linked with factors like the students' medium of teaching, students' habits, behavior, parents' qualifications, number of hours studied, the type of teaching facilities. Why some schools/students are not doing well? What type of students requires government schemes and how long? Which students are availing scholarships? Are scholarships are reaching timely to the right students at the right time, without middle man?

v. Fraud Detection:

Which citizens are availing Below Poverty Level (BPL) government schemes, Is these citizens have other facilities such as land (Plot/Flat) or vehicles. This integrated information can be used to identify fraud or misuse of government schemes.

vi. Health:

Data mining applications can be used to identify and track chronic disease and high-risk patients. Which Primary Health Centers (PHCs) can connect which Citizen Services Centers (CSCs)? What type of ICT infrastructure, health staff is required to provide telemedicine services to save citizen lives particularly in rural areas?

(c) Government to Employee (G2E) applications:

How many and how employees are frequently leaving the organization? What is their average age and length of service? What is their behavior? How public services affecting in these cases? Which employees are frequently on leave? What is their health status? The employee performance can be linked with employees' educational qualification age, experience, salary, health, leave, Annual Confidence Reports (ACRs), promotion, demotion, stagnation etc.

(d) Government to Business (G2B) applications:

Which companies are participating tenders? Why very few companies were participating in tenders? Why some tenders failed after award? Why the awarded company is not able to provide services efficiently as per the tender? How frequent a particular company is participating tenders? What is the rate of success in awarding tenders to a particular company? Which tenders are successes (or failure)? Why some department's tenders are failed frequently? Is the staff is capable in preparation of tenders? Are they trained in e-procurement?

IX. RESULTS AND DISCUSSIONS

Asia is home to 60 percent of mankind. With some Asian nations, including China and India, averaging around 8 to 9 percent of the mainland's GDP, Asia all in all kept on growing e-taxpayer supported organizations further. Ventures were made on a level plane to extend foundation, including support for broadband and versatile access, while in the meantime governments connected with give more noteworthy online administrations and enhance applications of data mining in e-governance. In 2016, three of the world's best 20 e-pioneers are from Asia, and the locale in general has a larger amount of e-government advancement than the world normal. While there has been change in giving e-benefits over the landmass, a portion of the biggest additions are found in Western Asia. Subsequent to the analysis of E-Government index in 2012 an another survey was taken in the year 2016 where the countries E-Government rankings were considered by United Nations E-Government survey (2016) summarizes the sustainable development of the E-Governments in Asia region. Figure 6 shows the number of countries grouped by the E-Government Development Index (EGDI) in 2016 as compared to 2014. Notably, in 2016, there are more countries with very high E-Government Development Index values (i.e., EGDI values greater than 0.75). There were twenty-nine nations scored high EGDI values during the year 2016 and this gathering contains each of the 25 nations that had additionally scored high EGDI in the last release of the Survey (DESA, U., 2014). The four additional countries that joined this group of top performers are Slovenia (ranked 21st), Lithuania (ranked 23rd), Switzerland (ranked 28th), and the United Arab Emirates (ranked 29th). It is also observed in the Survey taken in the year 201 that, the inclination that the leadership in e-government development is not exclusively dependent on the income level of a country (DESA, U., (2014). In the second- (high-EGDI) and lower-tier (middle-EGDI and low-EGDI) some lower income countries perform as well as higher income countries, if not better in some instances. Similarly, the quantity of nations with high-EGDI esteems (i.e., in the vicinity of 0.50 and 0.75) expanded to 65, up from 62. The nations which includes Barbuda and Antigua, Fiji and Egypt were discarded from high-EGDI to medium-EGDI, ten nations (the Bahamas, Bosnia and Herzegovina, Lebanon, the Philippines, Saint Kitts and Nevis, South Africa, Thailand, Trinidad and Tobago, Uzbekistan also, Vietnam) enhanced their e-government execution and made the jump from middle EGDI to high-EGDI esteems (as in Fig. 4 & 5). Then, the quantity of nations with middle-EGDI values (i.e., in the vicinity of 0.25 and 0.50) declined from 74 to 67 nations.

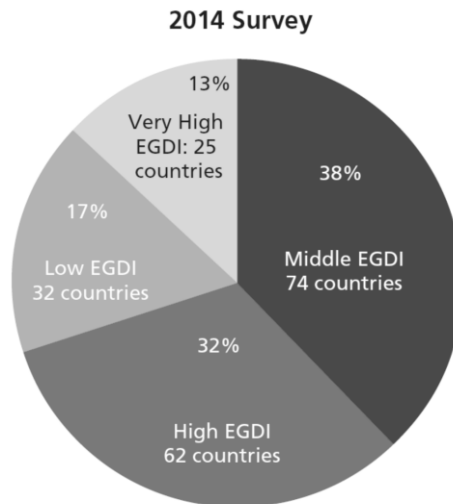


Fig. 4 Number of countries grouped by E-Government Development Index (EGDI) levels, in 2014
(Source: United Nations E-Government survey, 2014)

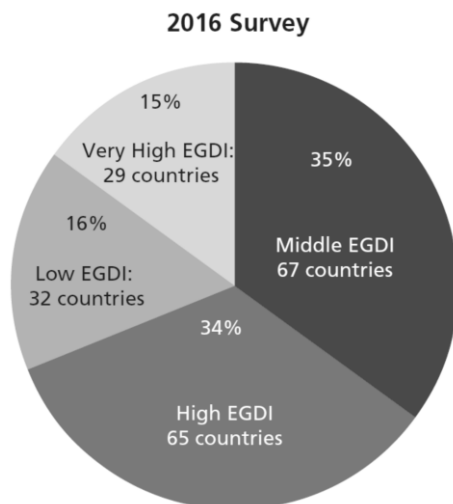







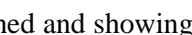


Fig. 5 Number of countries grouped by E-Government Development Index (EGDI) levels, in 2016
(Source: United Nations E-Government survey, 2016)

The best performing nations in the locale are recorded in Table 3 with Very High EGDI levels. For the Gulf Cooperation Council (GCC), which includes six Arab nations, e-government itself has turned into an improvement pointer. Much accentuation has been set on propelling e-government in the locale, as both a methods and an end in improvement. In advancing learning sharing among the GCC nations, the biennial GCC e-government Awards are displayed to government substances that have illustrated brilliance in e-government. The Republic of Korea (positioned third), Singapore (fourth), Japan (eleventh), Israel (positioned twentieth), Bahrain (24th), and the United Arab Emirates (29th) are among the worldwide pioneers with Very-High-EGDI levels, while Kazakhstan (33rd), Kuwait (40th), Saudi Arabia (44th) and Qatar (48th) are among the best Asian nations with High-EGDI levels.

Country	Region	Sub-Region	OSI	HCI	TII	EGDI	EGDI Level	2016 Rank	
Republic of Korea	Asia	Eastern Asia	0.9420	0.8795	0.8530	0.8915	Very High	3	
Singapore	Asia	South-Eastern Asia	0.9710	0.8360	0.8414	0.8828	Very High	4	
Japan	Asia	Eastern Asia	0.8768	0.8274	0.8277	0.8440	Very High	11	
Israel	Asia	Western Asia	0.8623	0.8619	0.6175	0.7806	Very High	20	
Bahrain	Asia	Western Asia	0.8261	0.7178	0.7762	0.7734	Very High	24	
United Arab Emirates	Asia	Western Asia	0.8913	0.6752	0.6881	0.7515	Very High	29	
Kazakhstan	Asia	Central Asia	0.7681	0.8401	0.5668	0.7250	High	33	
Kuwait	Asia	Western Asia	0.6522	0.7287	0.7430	0.7080	High	40	
Saudi Arabia	Asia	Western Asia	0.6739	0.7995	0.5733	0.6822	High	44	
Qatar	Asia	Western Asia	0.6739	0.7317	0.6041	0.6699	High	48	

Note: The Ranking Trend lines show the nation rankings, with 1 being the best positioned and showing up at the base of the vertical pivot, and 193 being the most minimal positioned and showing up at the highest point of the vertical hub. In this manner, the lower is the graphical point, the higher is the positioning. The even pivot speaks to the overview times of the UN E-Government Survey, i.e. 2003, 2004, 2005, 2008, 2010, 2012, 2014 and 2016.

Table 3. Top 10 countries for e-government in Asia (Source: United Nations E-Government survey, 2016)

X. CONCLUSIONS

This paper principally discusses on applications and uses of data mining of the government organizations for its sustainable development and how data mining techniques can assist the government in make use of huge data for decision making through its e-governance. The Data mining can be effectively utilized by the government to resolve the patterns or relationships from outsized data warehouse. To sustainably develop the e-governance with the help of data mining successfully is very imperative to the government decision and policy makers. Even if, these governmental organizations are storing voluminous data for generations, but as and when needed essential information at right time, they are incapable to obtain the same due to several reasons. The technology is accessible, but the government should be convinced in figuring out their issues and challenges related to common standards in storage and contribute the information amongst various stakeholders in the process of decision making. The application, uses and methods of data mining in e-governance would help, not only in developing the internal competence but also it incredibly increases in decision making. The results and findings of data mining in e-governance of selected countries and Asia and their rankings may be helpful to the emerging counties and planners for understanding the global scenario for implementing e-governance and its importance by unearthing the hidden information from various e-Government databases to progress the part of decision making by constituting guidelines for new governmental e-governance projects and for providing better services to the existing and ensuing stake holders.

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