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The impact of new technologies in the field of tourism services

Vasile MAZILESCU
vasile.mazilescu@ugal.ro
Dunarea de Jos University of Galati, Romania

Abstract
Electronic tourism is part of the electronic commerce and it brings together some of the fastest growing technologies, such as the information technology and communications, the hospitality industry, and the management/marketing/strategic planning industry. The electronic tourism-specific activities involve the existence of tour operators, travel agencies and other entities with interests in the field of virtual tourism by means of a dedicated portal. The phenomenon itself has implications both for the tourism service consumer, and for the entities listed above. Semantic and cognitive technologies based on Artificial Intelligence, Big Data and IoT represent the focus area for the future of e-tourism. Data mining technologies made available through cloud computing services are an absolutely necessary feature for the business area nowadays, and implicitly for the tourism service filed.

Keywords: e-Tourism, Artificial Intelligence, Big Data

1. Introduction

Electronic tourism involves the following aspects for end consumers: e-information, e-reservation (or online reservation for hotels, transportation, etc.) and electronic payment. The *e-information* stage involves the provision of information through dedicated portals, electronic brochures, audio travel guides, photo albums (still images and panoramas), real time imagines or videos, even travel diaries through blogs or even dedicated virtual communities, such as,the guides provided by means of virtual cities [7], [8]. On-line reservations*(e-reservation*) are mostly used in hotels, airlines, and car rental services. The on-line reservation services, as information society services, need to comply with the legal requirements provided by the legislative acts regulating internet services, in general, and electronic commerce services and the conclusion of distance contracts, in particular. Consumers can use credit cards, electronic cheques, digital cash or even microcash, when payments amount only to a few cents, for *electronic payment*. Many of the electronic payment systems used on the Internet are the electronic equivalent of the physical systems, such as credit cards, cheques, etc. Even digital money, meant to represent the hard currency, is available [4]. The efficiency of Internet marketing can be determined rather promptly and precisely by means of statistics, obtained through online technologies, which are used to outline the customers' profile and actions, ultimately leading to a better understanding of and adjustment to the needs of the targeted segment. Online tourism primarily relies on information dissemination, however the main purpose is the direct sale, by removing physical and time barriers through electronic commerce technologies [9], [10]. For instance, in hotel industry, reservation scan be made by means of operational reservation systems, and by means of real time reservation systems [5]. There is big potential for direct sale, based on a number of advantages for tourism service providers, such as: automation, elimination of the travel agent's commission, reduction of internet reservation costs over traditional methods, and increase of reservations due to new methods of accessing the Web (PDAs, mobile phones, etc.). The paper presents, after in introductory section, in Section 2 some aspects regarding Semantic Web and the importance of semantic embedded in the new intelligent technologies. Section 3 is a very useful argumentation of technologies with a special impact on the tourism industry and Section 4 outlines some conclusions of our research.

2. Semantic Web

Semantic Web is an extension of the present Web, allowing for the formal description of the resources existing on the Internet (Web pages, text and multimedia files, databases, services and so on). Among its advantages, the most important is the prompt and precise identification of relevant resources for the user, as well as the automatic operation of resources by intelligent agents. The concept of Semantic Web was introduced by Tim Berners-Lee, the inventor of the World Wide Web, about 20 years ago. The disadvantage of present search engines is that they operate on string matching – in other words, they identify words specified in the query in a corpus of target documents. As a consequence, they return the files that contain at least one of the two words from our example. Yet the subject of those documents might not be of interest for the user. That is why the user has to skin over and manually sort the results in order to extract only those documents he is interested in. A semantic search engine would consider the whole system instead, therefore the concept of software agent and not the corresponding string, and it would return only the results that are relevant to the user. The result of such semantic interrogation would be a description of the software agent concept in terms of properties of this concept and a possible list of examples.

At the pyramid base stands the Unicode standard, which is used in representing and manipulating the text in various languages, as well as the standard for building URIs, which is useful for identifying the resources published on the Web (multimedia files, Web pages, blogs, etc.). At present, the de facto standard for data describing and transferring on the Web is XML, which has a series of limitations. One of these limitations is the lack of a formal semantics of the XML Schemas, which burdens the communication between applications and services that do not share the same schema or the same interpretation of a schema. As a certain level of semantics was intended to be added to the XML language, the RDF language was born, which describes the resources using triples, arranged in structures similar to graphs. The RDF Schema is used in a hierarchy of types in order to organize the resources and the properties. The OWL language extends the RDF(S) language, introducing a series of more advanced constructors that allow more expressive descriptions than the possible ones using RDF(S) triples. OWL also allows defining constraints upon properties, such as cardinal constraints, value restrictions or predefined characteristic constraints for properties (*i.e.* transitivity, symmetry, etc.). To be noted that RDF(S) and OWL languages are based on the theory of description logics, which guarantees a non-ambiguous semantic interpretation of the declarations made in those languages. Moreover, using the inference engines specific to the description logic, new knowledge can be automatically derived from RDF(S) or OWL descriptions. The knowledge using RDF(S) and OWL languages can be interrogated by the standard language SPARQL, which is very similar to SQL.

Traditionally, data can be represented hierarchically in a XML structure or interlinked in a database. The Semantic Web introducesa new data organization consisting of RDF (Resource Description Framework) graphs. RDF is a simple model of describing the resources on the Web (multimedia files, blogs, Web pages, Web services, databases, etc.) and the metadata associated to them, such as title, author, publication date, etc. RDF describes a resource considering its properties. A useful framework for developing semantic applicationsis AllegroGraph, which offers functionalities of RDF(S) triples storing and management in a structure called triplestore. Data interrogation in AllegroGraphis made with SPARQL –a standard language defined by W3C – using the graphical interface AllegroGraph Web View or programmatically through an API offered by Franz [1]. The interrogations with SPARQL are similar to the SQL interrogations and the results are RDF(S) sub-graphs of the target graphs. Usually, the information is presented in a table. During the last 15 years, the idea of Semantic Web has spread considerably, as well as the technology adoption by the big players on the IT market. The W3C Corporation believes that the semantic technologies are mature and that they are going to be adopted on a larger scale at least by the early adopters. Market analysts are also extremely optimistic about the evolution of semantic technologies and their future adoption. One of the main reasons for data / resources annotation and publishing using semantic technologies arises from the advantages of integrating

them with the Linked Data Cloud. The Linked Data Cloud is a collection of data that have already been annotated and published on the Web and which can be exploited in order to increase the value and the visibility of its own data. In other words, Linked Data is intended to break down the barriers of exploiting scattered and isolated data silos. Describing data using semantic language (RDF(S) or OWL),they can be exploited in an invariable manner, they can be interconnected and they are available to anybody.

3. Thinking Systems: between Artificial Intelligence (AI), Big Data and IoT

Thinking Systems are a category of distributed technologies using cloud computing architectures, that use the processing of natural language (deep level), along with data mining and machine learning processes in order to interact more naturally and amplify human knowledge and expertise. Such systemshall self-learn and interact to provide people with expert assistance in a fraction of the time necessary at present [1], [2].

AI can be billions of times smarter than humans. It can learn very fast and hugely exceed human intelligence. We will have intelligent computers and there will be a thing called "computer super consciousness". It is foreseen that technology and human capabilities will merge. Such merger between technology and human biological capabilities can be developed in order to heal or help disabled persons, or in order to give people greater powers and capabilities, better visual or hearing acuity, greater power, enhanced senses.

In March 2017, OpenAIcreated the so-called "agents" (certain types of AI), which invented their own language in order to cooperate and reach their objective more efficiently. Soon after that, Facebook successfully reported that they had trained the "agents" to negotiate and even lie. By 2025, people will inevitably have around the houseAI assisted robots which will help them with the work around the house or do such work for them. Also, people need to adapt to this new epoch about to come, by connecting directly to the AI neural network systems. It is about the merger of biological intelligence, biological neural network with the artificial one. It is mostly about the bandwidth, the speed of the connection between your brain and the digital version of yourself, particularly output. This is the solution, the means to keep up with AI, in order to be able to control it and protect us. Researchers use artificial neural networks to understand human brain. If, for now, they cannot see what happens in the neural system or even deep inside a neuron in the human brain, they can observe and study what happens when stimulating the neuron or rather the synthetic unit. Thus, it is discovered both how human brain works and how AI learns. Moreover, researchers succeeded in linking two humans, brain to brain, by using the thoughts of one of them to control the physical actions of the other. Researches regarding brain to brain link are just the beginning of much ampler studies, thus learning how to create a direct link from a human's biological brain to the synthetic brain of an AI. In only five years, machines could come to possess more human specific abilities. The most powerful computers are still one million times less smart than the human brain, he says. At present, normal computers, the best of them, have the equivalent of one billion synapses, while the human brain has more than 1,000 trillion. This however changes by the year.

Data mining techniques and their applications have a very important role in the cloud computing context. Since cloud computing is gaining more and more ground in all business areas and even in scientific research, it becomes a focus area for the implementation of data mining techniques. Cloud Computing denotes the new trendin Internet services that rely on servers tohandle tasks [3]. The data mining in Cloud Computing allows organizations to centralize the management of software and data storage, with assurance of efficient, reliable and secure services for their users. As Cloud computing refers to software and hardware delivered as services over the Internet, in Cloud computing data mining software is also provided in this way. The main effects of data mining tools being delivered by the Cloud are:

- Customers only pay for the data mining tools that they need at a certain point, which reduces company's costs with software licenses. They do not have to pay for complex data mining suites.
- Customers do not have to maintain a hardware infrastructure, as they can apply data mining through a dedicated browser. Again, this reduces company's costs since they only have to pay the costs that are generated by using Cloud computing.
- Customers have access to data mining services anywhere and everywhere since they are available through cloud computing and can be accessed on any device connected to the Internet, through a browser (Figure 3).
- Using data mining through Cloud computing reduces the barriers that keep small- and medium - sized companies from benefiting from the data mining instruments, due to smaller costs as compared to traditional data mining suites.
- The implementation of data mining techniques through Cloud computing will allow the users to retrieve meaning ful information from virtually integrated data warehouse that reduces the costs of infrastructure and storage.

The tech industry has undergone fundamental shifts in the way software is built, delivered and, at last, experienced by ordinary Joe – the consumer. From batch jobs to applications running on PC's and then web-based and mobile apps, such disruptions involve significant changes in hardware coupled with new kinds of applications. Moreover, modern applications emphasize a new edge or disruptive and accelerated change: the use of Big Data. The increasing demand for next generation analytics platforms that provide near real-time responses to customers, triggered by real time data such as click streams, social media, sensors combined with the power of distributed batch execution, only prove again that intelligence should, by default, be at the core of any software application. In the past years, there has been a gradual change in what a software application emphasizes. In the '90s until recently, a software application pointed out mainly to functionality. Later – mostly due to consumerism –functionality was considered a "must have", and the central focus switched to design. In the last years, there is an evident tendency of integrating more and more intelligent behaviour in applications, while functionality and design have become the new "must have".

The need for intelligent behaviour is not new, but with past technologies, it was a very hard goal to achieve. Despite difficulty of use, classical statistical methods were used to generate predictive models, which received a lot of criticism from the industry. New predictive models emerged, but that created new problems as well. One of the main drivers of change is the need of increasing the amount of data to be analysed, together with increasing the accuracy of the models. But this demand leads to a new problem: computational power is growing exponentially when increasing accuracy. The response to this challenge is the appearance of a new set of technologies focused on Big Data and data analytics. They offer high computing power on highly parallelized cheap commodity hardware. These two technologies make the option of including intelligence in every software application far more appealing because now they are cost-effective and able - more than before – to transform data into profit through intelligent behaviour. Companies that inject Big Data and analytics into their operations show productivity rates and profitability 5% to 6% higher than those of their peers. Big Data is full of valuable, unanswered questions. The challenge is to find a way to separate signal from noise in data, determining actual predictive indicators, capable to transform data in knowledge which, in turn, generates profit. This is the moment when you need analytics. After defining the business goal, the following next steps are necessary [6]: Acquire raw data from multiple data sources with different volumes and different velocity; Cleanse the acquired raw data; Store raw data; Integrate data (structured, unstructured, real-time, etc.); Transform, aggregate the data, and store the results. Knowledge is profit for those firms that deploy big data predictive analytics solutions to reduce risks, make

smart decisions, and create differentiated, more personal customer experiences. The answers are in the data, but only if companies look for them. Predictive analytics uses algorithms to find patterns in data, by analysing Big Data sources. The patterns are materialized in predictive models. Patterns might predict similar outcomes, therefore using them can improve business performance or mitigating risks. To improve performance with Big Data advanced analytics, companies need to develop strengths in three areas:

- *multiple data sources*: upgrade it architecture and infrastructure for easy merging multiple internal and external sources of data. also, choose the right data.
- *prediction and optimization models*: build analytic models that balance complexity with ease of use, focussing on the biggest drivers of performance.
- *organizational transformation*: create simple, understandable tools for people on the front lines and update processes and develop capabilities to enable tool use

When you plan to use analytics, there are two options: use off-the-shelf analytics packages, or build custom-made analytics applications. As stated in McKinsey report, off-the-shelf analytics packages can be cost-effective and faster to install than custom-made, tailored models. But they lack the qualities for a killer app, one that is built on real business cases and can energize managers. After defining the business goal, the following main steps are necessary to build a Big data analytics project: Understand data from a variety of sources (internal and external); Prepare the data (integrate, clean, transform); Create the predictive model (finding out patterns); Evaluate the predictive model (are the patterns real?); Deploy the model (make use of prediction); Monitor the effectiveness of the model (evaluate predictions accuracy).

At global level, Internet traffic will triple by 2020, with particular growth of mobile data traffic. Also, over one billion new Internet users will join the global community, from 3 billion in 2015, to 4.1 billion in 2020, and online gaming will be the fastest growing residential application, indicates the Cisco Visual Networking Index (VNI) report. Transforming digitalization worldwide by using personal devices and the spreading of machine-to-machine (M2M) connections will have an even greater impact on traffic growth. Over the next five years, global IP networks will support 10 billion new devices and connections, up from 16.3 billion in 2015 to 26.3 billion by 2020. According to the quoted source, by 2020 there will be an average of 3.4 devices and related connections per capita, up from 2.2 devices and connections in 2015. The number of users and devices benefitting from the networks will increase even more in the next period, both in the residential area and in the business segment. In this context, now more than ever, we need to be aware of the need to have secure and scalable infrastructures. The evolution of the "Internet of Things" phenomenon is a traffic generator. Applications such as video surveillance, smart metering, health monitoring, and other M2M services mean new networking requirements and the gradual increase of traffic. Globally, M2M connections will grow nearly threefold, from 4.9 billion in 2015 to 12.2 billion by 2020, accounting for nearly half (46%) of all connected devices. The medical field will increase fivefold, recording the fastest growth, from 144 million connections in 2015 to 729 million in 2020. Connected dwellings will generate the highest percentage of M2M connections, nearly half, with a total of 5.8 billion by 2020, from 2.4 billion in 2015. Video and content services continue to generate the highest traffic compared to other applications. Video content will account for 79% of the Internet traffic by 2020, from 63% in 2015. By 2020, three thousand billion minutes of online video will be consumed each month. HD and Ultra HD video content will account for 82% of the Internet video traffic by 2020, from 53% in 2015. With increasing dependence on broadband and fixed networks, service providers, governments, companies and individual consumers are all more preoccupied with security. Over the next five years, DDoS attacks will increase from 6.6 million to 17 million. It is expected that:

- *IP traffic will grow threefold globally over the next five years*. The maximum Internet traffic time increases faster than average Internet traffic. The maximum Internet traffic time will increase nearly 5 times (4.7 times) from 2015 to 2020.

- *Speeds in fixed broadband networks will almost double,* from 24.7 Mbps in 2015 to 47.7 Mbps by 2020.
- *Traffic on the smart phone will overtake traffic on the PC.* The way individual consumers and business users access IP networks and the Internet is changing, moving from PCs to mobile devices. By 2020, 71% of total IP traffic will come from non-PC devices, including tablets, smartphones and TVs, as compared to 47% in 2015. Until 2020, smartphones will generate 30% of total IP traffic, while the contribution of PCs to total IP traffic will drop to 29%.
- *Video content generates the highest Internet traffic.* The volume of the video content on the Internet will increase fourfold between 2015 and 2020. The video content generated by end-users will be 82% by 2020 as compared to 68% in 2015. Video traffic in the business segment will be 66% of the total traffic by 2020, from 44% in 2015. Traffic generated by video surveillance devices almost doubled over the past year and will increase 10 times by 2020. The traffic generated by virtual reality has increased fourfold in the past year and will increase 61 times by 2020.
- *Trends in the take-up of services.* Online games will have the fastest growth among residential applications, from 1.1 billion users in 2015 to 1.4 billion users by 2020.
- Location Based Service (LBS) will be the fastest-growing mobile service, from 807 million users in 2015 to more than 2.3 billion users by 2020.
- Personal videoconferences or videoconferences at the workplace will be the fastest - growing business service on the Internet, from 95 million users in 2015 to 248 million users by 2020.
- *Global expansion of Wi-Fi networks.* Globally, the total number of public Wi-Fi hotspots, including at residential locations, will increase sevenfold, from 64 million in 2015 to 432 million in 2020. Extended access to Wi-Fi will provide various scaling and optimization opportunities for network operators (more mobile transfer, VoWiFi, smart cities, connected transportation and IoT related strategies). This trend also improves quad-play capabilities and provides additional access to television services everywhere.
- *Individual consumers and companies prefer mobile networks to fixed ones.* In 2015, devices connected to Wi-Fi and mobile networks generated 62% of the internet traffic (Wi-Fi: 55%, mobile: 7%, fixed: 38%). By 2020, the devices connected to Wi-Fi and mobile networks will generate 78% of the Internet traffic (Wi-Fi: 59%, mobile: 19%, fixed: 22%).

Emerging technologies such as Artificial Intelligence (AI), augmented reality (AR), virtual reality (VR) and progress in the Internet of Things (IoT) and cloud computing have become reality due to exponential developments in software, analytics and power processing, develop and catch up in this direction. These advances are already easy to see in our cars and homes connected to the internet, in our banking business and transactions, and even transforming how farmers manage their crops and animals.

In the next few years, Artificial Intelligence (AI) will change the way we spend time acting on data and not just managing it. Companies will exploit artificial intelligence so that it performs data-based "thinking activities", significantly reducing the time spent exploring, debating, planning and testing each innovation. It will eliminate the bottlenecks and give people the freedom to make more decisions and to move faster, being sure that the new extraordinary ideas will not get bogged down. Some theorists say AI will lead to job losses, but these new technologies may also create jobs, opening up new opportunities for people. For example, we will have a new type of IT expert whose field of activity will be training and fine-tuning artificial intelligence. These specialists will be responsible for setting trading performance classification parameters, i.e. what should and should not be classified as good business results, setting action rules, defining what is benefit, and so on. Once implemented, technology will be able to

recommend beneficial commercial opportunities at the speed of light. Starting in 2018, we will take giant steps to incorporate accessible information almost instantly into cities, organizations, homes and vehicles equipped with IoT technology. Given the decrease in the cost of processing power and the fact that the price of a switching node tends to $0, we will soon have 100 billion interconnected devices and then a trillion. The huge amount of data so combined and the power of processing together with the power of artificial intelligence will make cars better manage physical and human resources. We will become "digital pilots" of the technology and environments that surround us. The technology will work as an extension of our person. All objects will become intelligent and will allow us to have smarter lives. We can see this in our "supreme mobile devices," which are equipped with ultrasonic sensors, a technology that uses laser beams to measure the distance between vehicles and gesture recognition. Over time, these innovations will make automotive driving a daily reality. Long before this, we'll get used to cars that program themselves on the service, providing information about the necessary operations, and planning their own software upgrades. Also, it will not be long before the boundaries between the "real" reality and the augmented reality (AR) begin to disappear. The commercial viability of augmented reality is already evident. For example, teams of builders, architects and engineers use AR headphones to visualize new buildings, coordinate their efforts on the basis of a unique project image, and train field workers when a technician can't be on the spot on that day. Of course, virtual reality has strong prospects. This will undoubtedly transform the field of entertainment and electronic games in the near future due to the exciting experiences it offers, but a sure bet is that AR will become the main way to maximize human efficiency and reap the benefits of "tribal knowledge "Of an evolving work force. Dell's Digital Transformation Index shows that 45% of middle-sized and large-sized organizations believe that this type of organization will be overtaken in the next five years, and 78% of them believe that newly-established organizations (startups) pose a threat to their businesses. It is more important that organizations never put customer satisfaction first. In the next year, mainly through predictive analytics, automated learning technology (ML) and artificial intelligence, companies will better understand their customers and meet their needs as they occur, if not even before that moment.

Customer support services will fundamentally rely on improving the interplay between man and machine. Therefore, instead of passing customer interactions to first-generation chat boys and predefined messages, people and virtual artists based on artificial intelligence will work together in a single team.

Over the next decade, emerging technologies, such as VR and AI, will help people identify and act on their information without emotionally interfering or external subjective ideas, while helping them to exert their human judgment there where applicable. In the short term, we will be witnessing artificial intelligence applications in hiring and promoting procedures, their role being to filter deliberate and unintentional subjectivism. At the same time, virtual reality will increasingly be used as an interrogation tool, facilitating the provision of merit-based opportunities, for example by masking the identity of a potential employee with the help of an avatar. By using emerging technologies for these purposes, "bias check" will one day become a routine tool, such as "spell check", but with company-wide benefits. In 2018, there will be a tremendously high number of players in front of the screens or wearing VR headphones that will compete in a high-definition virtual universe. As hundreds of millions of new players and viewers will join this phenomenon, electronic sports will enter the mainstream. The phenomenon of electronic sports indicates a general trend, namely that even human activities such as sport have been digitized. Technology has brought sport to everyone. You do not need to have a certain structure or shape of your body. If you have rapid tactile reactions and motor skills, you can play and win. In addition, traditional sports, such as cycling, have made progress in collecting data to identify gradual but decisive advantages. In the future, all business will be technological business, and our free time will turn into an interconnected experience.

Cloud is not a destination. It is an informational model in which orchestration, automation and intelligence are deeply embedded in IT infrastructure. In 2018, companies will be overwhelmingly oriented towards a multi-cloud approach, benefiting from the value of all models of this technology, from public to private, from hosted to managed models and SaaS models. However, as more and more applications and workflows move into cloud computing, the cloud data silos proliferation will become something inevitable, inhibiting the ability of organizations to exploit the full potential of analytical data and AI initiatives. This can result in situations where applications and data end up in a wrong cloud, with unwanted consequences. We believe the next step is the emergence of the "mega cloud" that will interconnect the many public and private cloud and make them behave like a holistic, coherent system. The Mega cloud will provide a smart, federated perspective on an entire IT environment. In order to make the mega cloud appear, we will need to create multi-cloud innovations in the area of networks (to move data between cloud), storage (to place data in the cloud correctly), in the (to use ideal processing and acceleration for work activities), orchestration (to interconnect networks, storage media and cloud computing), and a new opportunity, customers will need to incorporate AI and ML for to meet new standards in automation and in-depth analysis based on this next-generation IT environment. In this increasingly interconnected world, our dependence on service providers is higher than ever. Organizations are not simple isolated islands, but rather rather high-interconnectivity systems that exist within larger systems. The waves of chaos propagate further and faster now that technology connects us with each other in an amazing way. We have to think that one of the worst data security incidents in history occurred because attackers used authentication data to access an external service provider's air conditioning. Because of our increasingly close relationship with computer systems, small and imperceptible breaches can lead to major collapse. Therefore, next year will be the year in which multinational companies will act in this field, also urged by the wave of new regulations such as the General Data Protection Regulation (GDPR). Prioritizing the deployment of cyber security tools and technologies to ensure real data protection and prevent threats will become an increasingly pressing necessity.

4. Conclusions

Tourism has become one of the largest industries in the world and it continues to grow every year. The World Tourism Organization forecasts that tourists' arrivals in the world will increase by as much as 200% by 2020. Thus, tourism has become a fairly competitive economic branch. However, its competitiveness is no longer natural, but is increasingly driven by science, information technology and innovation. With the exponential increase in the expansion and use of the Internet and the World Wide Web, both at home and at work, the travel service providers' opportunities to disseminate information and process reservations for potential buyers have also grown. The development processes in information technology and communications, and the Internet in particular have revolutionized the entire tourism industry, generating new business models, changing the structure of tourism-specific distribution channels, and redesigning all of the industry's products and, last but not least, influencing travel package providers, destinations and stakeholders. Thus, as long as small operators can be found, the trend will increase in their direction. Since the Internet is a kind of "playground" with a well-established web site, small businesses can advertise as professionally as their larger competitors. In this context, we are witnessing an ever-increasing development of e-commerce and, implicitly, of e-tourism. Data mining technologies provided through cloud computing services are an absolute must-have for today's business field, since it help companies make proactive, knowledge-based decisions and provide them with the future trends and predictable behaviours in the development of the business environment. The use of data mining technologies with cloud computing offers the opportunity to have access to data mining, not only to large companies but also to small and medium-sized companies, which could not afford to buy very expensive data mining solutions. Companies' need for data mining services is growing every day, so the need to integrate data

mining services into cloud computing services is becoming an increasingly pressing issue. The Internet of Things will attract global investment of nearly $ 15,000 billion between 2017 and 2025, data showing an acceleration of company plans to invest in such solutions. The Internet of Things transforms the way companies and consumers carry out their daily lives around the world, and the technology underlying this market segment is growing rapidly, whether it is about increasing theuse of Amazon Echo and voice assistants, or about analytical platforms that use artificial intelligence destined for the corporate market.

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