



**HOW TO MANAGE BIG DATA IN MOBILE CLOUD
COMPUTING**

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Chapter 1: Introduction

1.1 Context for the Research

Introduction

The drastic increase in the organizational and present-day working loads has necessitated the generation and eventual procurement of enormous magnitudes of data in several fields and industries. The drastic increase in the use of the mobile phones among the people of the various regions of the globe, in general, has led to the development of the Mobile Cloud Computing aspects, with the term in question denoting the overall combination of cloud computing, wireless networks and mobile computing. The initiation of the same leads to the conduction and eventual completion of several tasks through the use of certain applications, with the implementation of appropriate computational and effective experiences being enabled as a result. The following

study aims to provide relevant information pertaining to the management of big data in mobile cloud computing. The discussions pertaining to the various requirements and the justification for the research topic in question have been provided. The aspects and features of the study and the details regarding the main resources required in the given study have been highlighted and discussed as well. Herein, this study is about the ways of managing the big data in mobile cloud computing, with an intricate focus on the main aspects and features of the same.

Background of the Research Study

The advent of mobile cloud computing (MCC) has been the result of a demand by many people in many industrial sectors and fields regarding the management of certain tasks within the mobile phones. The increased workload has led to the need for the completion of several tasks in technological tools such as mobiles, for the sake of initiating greater effectiveness and time management. As such, the implementation of mobile cloud computing has led to the procurement of a significantly greater degree of ease in completing several operations in mobiles through the various applications (Hashem *et al.* 2015). The gain of a rich computational experience and the gain of great computational resources by the users of mobile phones have led to greater operational efficiency in the long run. The development of this kind of situation has led to the generation of a huge amount of big data, with the amount of data easily exceeding the initial expectations in the given context (Assunção *et al.* 2015).

The management of this huge amount of data is immensely necessary for the sake of preventing any kind of long-term losses and issues, with the advent of such issues causing great disruptions in the overall working flow in the long run as well. This research study helps in the determination of the most effective ways of managing the big data in mobile cloud computing, so as to prevent the aforementioned issues and problems in inflicting great damage.

1.2 Aims for the Proposed Research

Research Objectives

The main objectives of the given research study are:

- To determine the most effective ways of managing big data in mobile cloud computing

- To effectively ensure the greater understanding of the main aspects of big data management from the context of mobile cloud computing
- To gather appropriate data pertaining to the research topic in question
- To develop a relevant conclusion to the main research questions of the given topic

Research Hypotheses

The main research hypotheses are:

- H0: Big data cannot be managed in mobile cloud computing in an appropriate manner
- H1: Big data can be effectively managed in mobile cloud computing

Research Questions

The research questions for consideration in the case of the given research study are:

- What are the main ways of managing big data in mobile cloud computing?
- How can the existing methods of big data management in mobile cloud computing be improved?
- What are the main issues and challenges associated with big data management in mobile cloud computing?

1.3 Rationale for the Proposed Research Study

What is the main issue?

The main issue for consideration in the given context is the determination of the effectiveness of the main ways of managing big data in mobile cloud computing. Despite the greater propensity of use of the mobile cloud computing aspects among many people across the globe, the presence of certain problems in the big data management aspects have been noted (Rahimi *et al.* 2014). The huge amount of data and the sheer magnitude of the same have been a major reason for the issues since the management of such a great amount of data is quite difficult as it is.

Why is it an important issue?

The advent of the big data management problematic aspects in mobile cloud computing is an important issue for consideration since the lack of effective methods in enabling the management

of the same is a direct harbinger of severe data loss and application failure issues in many regions (on a global context). This kind of issue has to be mitigated as soon as possible, for the sake of preventing greater data and information loss.

Why is it an issue now?

The aforementioned issue is a crucial factor for consideration in the present day since the degree of dependency of the people and business entities on mobile cloud computing in the modern day is especially great. The lack of any relevant solutions to the issue is a problem which assumes a danger of immense proportions, especially in the present day context (Rittinghouse and Ransome, 2016). The implementation of the relevant solutions is a matter which needs immediate mitigation, especially considering its importance in the modern day.

What does the main research shed light on?

The research in question has attempted to shed relevant light on the determination of the main ways and methods in which the big data can be managed in mobile cloud computing in an effective and appropriate manner. The consistent implementation of the said methods can enable the procurement of a greater degree of consistency and effectiveness in terms of the given research topic and prevent additional losses as a result of the associated issues in the long run.

1.4 Time, Cost and Project Management

Rationale for the implementation of a Determined Timeline

The allocation of the various tasks of the overall research in certain time periods enables the appropriate completion of the overall operation in an effective manner. As such, the completion of the overall tasks is ensured in a smooth and effective manner as well, with a determined timeline providing an appropriate layout for the entire project. The implementation of a determined timeline makes it easy to include the relevant elements during the completion of the project in the long run.

Timeline of the Research Process

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Research Activities	Week One	Week Two	Week Three	Week Four	Week Five	Week Six	Week Seven
<i>Accommodation of the overall process of planning</i>	✓						
<i>Explanation of the Varied Research Segments</i>		✓					
<i>Data and Information Analysis</i>			✓				
<i>Designing of the appropriate solutions for the issues</i>				✓	✓		
<i>Design Specification Creation</i>				✓	✓		
<i>Initial Testing</i>						✓	
<i>Scrutinizing of the other important aspects</i>						✓	
<i>Final compilation of the Research Task</i>							✓

Table 1: Timeline of the Research Activities

(Source: Created by Self)

Costing of the Research

The determination of the overall costs pertaining to the completion of the main operations of the given research work is necessary for the sake of enabling the smooth completion of the overall task in an appropriate manner. The determination of the main values of costing and the initiation of the processes in accordance with the same help in the completion of the final operations effectively. The use of the methods in accordance with the determined costs enables the prevention of unnecessary costs and issues in the long run. The determination of the various aspects of the costing and budget accounting is thus an immensely necessary matter for consideration and counts as one of the main initial steps in the entire research project in particular. The details pertaining to the budget have been provided in the following table:

<u><i>Main Criteria of the Associated Tasks</i></u>	<u><i>Allocated Budget</i></u>
Planning of the main tasks and the gathering of the resources	\$1000
Maintenance of the resources	\$500
Gathering and merging of the required information	\$400
Costs associated with the initiation of the research techniques	\$300
Management of the overall research analysis tasks	\$300
Analyzing the gathered results	\$200
Final evaluation	\$100
Total	\$2800

Table 2: Allocated Budget for the Overall Research Project

(Source: Created by Self)

Chapter 2: Literature Review

2.1 Literature Introduction

The following sections aim to provide the details of the existing relevant information pertaining to the management of the big data in the mobile cloud computing aspects, with a significant focus on the information which is available in the present day. The various themes and prospects associated with the given research topic have been highlighted and discussed in an intricate manner, with the procurement of relevant insights in the given context being immensely crucial for the safe and efficient completion of the given study in the long run. The evaluation of the main factors associated with the aforementioned and the discussions regarding the implementation of the themes in the present day (as gleaned from the existing research literature in the given topic) have been provided in the following sections as well. Herein, this section provides a review of the literature pertaining to the aspects of big data management in mobile cloud computing, with a significant magnitude of focus being provided on the main aspects and features of the same.

2.2 Literature Theme One

Implications of ensuring the security of the data in an appropriate manner enable the management of the big data in mobile cloud computing aspects

The entire process of data gathering generally does not end at the simple collection and allocation of the procured information. The collection of the necessary magnitude of information is generally followed by the implementation of the required security measures in the long run. While the mobiles and related applications are becoming increasingly more sophisticated, the threats posed by the external sources remains mainly the same. The main challenge associated with the security aspects of big data management (especially in the context of the mobile cloud computing) is the fact that it is immensely difficult to strike an appropriate balance between the accessibility and protection aspects of the data in question (Baek *et al.* 2015). In other words, the development of a certain kind of situation is necessary, wherein the big data in question is accessible to the main customers, intended beneficiaries of the organizational services and the relevant people, while simultaneously being inaccessible to the external unauthorized personnel

in the long run. The advances made by the modern technological fields have enabled the procurement of a relevant degree of success in the given context, with the management of big data through the initiation of appropriate security measures being possible (and even widely implemented) in a consistent and effective manner (Han *et al.* 2015).

Since the degree of similarity between the computational tools and the mobile applications of the modern day advanced mobile phones is high, the measures used for the initiation of the relevant magnitude of security have been observed to be similar as well. Indeed, the development of applications pertaining to the implementation of Firewall security and the scanning of the malware has been noted as well, with the success of the said applications enabling the presence of a considerable degree of security in the big data pertaining to the mobile cloud computing aspects. Furthermore, the use of the applications providing protection against different kinds of spam has been observed as well, with the said applications enabling adequate protection against malicious programs and bugs in a comparatively effective manner as well (Zeydan *et al.* 2016). The collection of the relevant information, thus, has to be accompanied by the initiation of the adequate measures of security in a consistent and effective manner. This is so since unprotected big data cannot be managed effectively, with the mismanagement of the said data leading to long-term losses and associated crises (Botta *et al.* 2016).

The loss of relevant information and required data is associated with disastrous consequences, to the point of potentially initiating the collapse of the entire operation in the long run. In case of mobile applications, the losses can strike severe blows in a personal and professional context to the users, with the mismanagement of the big data (as a result of the lapses in the security aspects) having potentially devastating long-term implications. As a result, the implementation and wide-scale use of the data security aspects through the initiation of the relevant applications and mobile software is immensely necessary, to the point of having severe positive implications in the big data management context (especially from the point of view of the mobile cloud computing aspects). Securing the overall data through the use of relevant database services and the use of help from the database service experts have often proven to be very beneficial in the given regard as well. The determination of the threats posed by the external threats and the magnitude of potential losses which they can inflict provides a sense of urgency pertaining to the initiation of the safety precautions as well (Yi *et al.* 2017).

The implementation of the required security measures and the creation of relevant backups can prove to be helpful in the securing and protection of the big data effectively. As such, the presence of a proper degree of data security is directly associated with big data management (even in systems such as the mobile cloud computing), with the initiation of the aforementioned data security features within the mobiles in an effective manner enabling the securing and eventual management of the information (regardless of the magnitude of the data under consideration) satisfactorily (Yang *et al.* 2017).

2.3 Literature Theme Two

Implications of the management of the audit regulations enable the appropriate management of the mobile cloud computing big data

The management of the overall databases pertaining to the collection of the data relevant to mobile cloud computing requires the maintenance of the appropriate components at all points of time. The presence of the required resources ensures the procurement of the intended results regarding the objectives in a consistent manner. The regulations and standards decreed by the developed audits enable the proper management of the main tasks and operations in the given context, to the point of aiding in the gain of a considerable magnitude of competency in the said regard. Following the various regulations decreed by the main audit standards is a proper measure in terms of data management, regardless of the magnitude of the overall data under consideration. The management of the data in accordance with the highlighted standards and guidelines prevents the negative consequences of the potential losses of data from coming to a pass, with the procurement of a relevant degree of success in this regard being associated with

the smooth completion of the data-based operations in a consistent and sustainable manner (Sookhak *et al.* 2017).

The data pertaining to the different kinds of mobile applications and the mobile cloud computing aspects have to be effectively maintained in accordance with the standards set forth by the audit process. Managing the same helps in the eventual mitigation of the associated issues and problems effectively, with the loss of data being one of the major issues prevented as a result of the smooth completion of the same. Information such as payment data and credit score information have to be classified and maintained accordingly, with the implementation of the appropriate audit regulations preventing the long-term mismanagement of the necessary information under all circumstances (Luan *et al.* 2015).

2.4 Literature Theme Three

Implications of the classification of the main threats and the devising of the strategies in accordance with the same aid in the management of the mobile cloud computing big data

The presence of a distinct classification of the potential threats in the big data security aspects has been observed to be considerably beneficial in the devising of the relevant security management counter strategies in an effective and efficient manner. The main kinds of external threats which can prove to be hindrances in the management of the big data in the mobile computing aspects include the human threats, the different kinds of artificial threats and the threats posed by the natural elements. The threats posed by humans are mainly the problems posed by the external hackers and as such, the initiation of the relevant counter-strategies can be planned accordingly. The artificial threats include the attacks by the mobile application viruses and different kinds of malicious software. Data encryption is necessary for the mitigation of the aforementioned threats in an appropriate manner. Finally, the threats posed by the natural

elements include the problems pertaining to the exposure of the mobiles to the elements of nature (such as water and excessive heat), thus leading to the loss of relevant data (Lo'ai *et al.* 2016).

The presence of a wide range of threats (and the varying nature of the said threats) necessitate the implementation of the change management strategies since the various big data management trends keep on changing with the changing times. The use of relevant mobile software for the management of the associated changes is helpful in this regard, with the introduction of the new tools in accordance with the associated requirements needing to be followed by their eventual implementation. The presence of a certain degree of flexibility is needed for the adaption of the ever-changing ways of big data management (Chang and Ramachandran, 2016). As such, the classification of the main security threats and the devising of the strategies in accordance with the nature of the different types of the same is necessary for enabling the long-term management of the big data associated with mobile cloud computing. This is especially so since the continuous management of the associated changes is ensured in a detailed manner as a result of appropriate classification (and eventual mitigation) of the related threats (Tawalbeh *et al.* 2015).

The overall implications of the threat classifications and the devising of the tactics in accordance with the threat types thus ensure the better management of the overall mobile cloud computing big data in an even more efficient way. Furthermore, the satisfactory fulfillment of the aspects of change management leads to the mitigation of the risks related to the inappropriate completion of the updating and data security features, thus enabling the better maintenance of the big data of mobile cloud computing systems.

2.5 Literature Conclusion

The literature conducted by the previous researchers have managed to provide relevant insights related to the big data management aspects, even from the point of view of mobile cloud computing. The discussed themes and the existing methods reflecting the features of the same have gained a certain degree of success in the intended objectives in this context. Features such as data security management, data hazard classification (and the devised counter-tactics) and audit regulation maintenance (along with their effects on big data management) have been discussed. The factors associated with the aforementioned and their various impacts have been highlighted in the given sections as well.

3. Methodology

Introduction

The chapter will provide an overview of the different tools and techniques that will be required to take control of the management process in a big data in mobile cloud computing. The maintenance of the methodology will be effective in providing correct performances of the works that will be done in the following points. The points will also provide illustration of the different levels performances that will be required in managing big data computing system.

3.1 Research methodology

The portion will help in analyzing the different methods through which the study will be conducted an investigation that will be done in order to provide a necessary understanding about the study. Both quantitative and qualitative analysis will be conducted as to identify the information required to understand the problem under cloud computing. Qualitative analysis will elaborate the different methods that will make it easy for the illustration to be conducted and also evaluate the opportunities to make decisions. On the other hand Quantitative analysis will help in elaborating the needs and working procedures of the employees and also will help in illustrating the different procedures through which it will be effective in finding the exact proportion of their responses.

3.2 Population and sampling

In conducting quantitative analysis it is necessary to say that a sample design will be conducted which will help in elaborating the different procedures through which the managing of big data in mobile cloud computing. In this context, the sampling will be done by taking 3 IT companies who conducts the designing process and elaborates and managing big data in mobile cloud computing. The companies are practicing the network of remote servers to host internet to stores and process data rather than the local servers in their local computers (Jin *et al.* 2015). This will be done by taking 30 IT managers and open sapling process will be conducted. With this in mind it will be effective enough to know about the preferences of the managers. With the help of this thing it will be effective to know about the ways through which the working procedures of the mangers can be attained. In this context, it will be necessary to analyze the result which can be earned through providing samplings and making survey questions. With this survey questions it

will be effective to know about the working criteria of the managers and will be efficient enough to provide information about the working procedures and deal with the situations efficiently (Yan *et al.* 2016). This may said as to be effective for the company as this will help the company to take control of the performances and also to make an efficient working performances for the company. Without using many resources the company would be able to know about the preferences of the managers. The company would need to be efficient enough through which the want of the managers can be conducted and with online survey the company would be able to know about the performances and take necessary steps to try adding managers into the company.

3.3 Data collection and data analysis

Data will be collected by using a questionnaire as this will provide effective data information through which it may said as to be effective to draw attention to the working procedures and make effective information out of the conduction of questionnaire. This application of questionnaire will help in providing effective data feedback and to know about the preferences of the managers. With the help of this it may need to be the duty of the company to take necessary steps to deal with the situation and talk about the different procedures that will help the conduction of the survey.

Now as per the study it would have been better to use the observation and experiment procedures. However, sometimes it would have been hard to take control o the two concepts this is because both the observation and experiment will not provide effective data and the ways through which the preferences of the managers can be known (Roman *et al.* 2018). In order to conduct an effective survey it will be necessary for the companies to conduct the preferences of the managers With the help of this it will be said as effective for the company to work accordingly and perform the data analysis as this will help in performing and maintaining the analysis of data and know the preferences of the managers.

Practical issues that are involved in this process may be that the questionnaire provided to the mangers may not be conducted on time. This is because the resources that had been provided to the managers were not efficient enough to conduct proper working procedures. On the other hand, time may said to be as a factor that matters the working procedures and make it hard for the companies to take control of the data collection process.

The process that is being used in the survey is quantitative and qualitative and both are being conducted through online processes (quantitative) and face-to-face interview in qualitative collection process. In this context it will be effective for the company to know about the preferences of the managers and time can also be saved as the whole quantitative process is being conducted through online procedures (Suciu *et al.* 2015). Talking about the qualitative process it can be said that the works that are being done in this process would be face-to-face interview. This means that the works that are being done will be through taking interviews that will be done in front of the managers. This will also help in providing effective feedbacks for the companies and take up necessary working data to deal with the survey. In this context it will be effective to say that this survey will help in providing effective collection of data and will also help in maintaining the works as per the requirement.

Quantitative analysis will help the company to know about the preferences of the managers. This will help the company to take control of the performances and work as per the requirement this will help in maintaining the process as all the process is being done through online process and will make it effective for the company to save time and work without using much resources. It may also be said that in context of comparing this online survey with other collection process, online survey process is much better and easy without using much resources.

Qualitative process is being conducted through using face-to-face conversation and this means that the company would need to use any of its resources much and time saving can also be done. This will help the company to take control of its procedures and make effective working data for the preferences of the managers. Qualitative approach will help the company to know about the working procedures and to conduct different procedures through which it may say as to be effective and conductible in context of the managers.

3.4 Ethical issues

Researchers will be provided in the content and purpose of the survey through which judgment can be taken into consideration and will help the managers to participate in the survey. In this case the managers would need to keep some points into consideration and confidentially need to be kept. In this context the company would need to be working through which the needed things can be disclosed and working procedures of the company can be known (Baccarelli *et al.* 2016).

These methods are being concluded in order to take necessary decisions and work to get results. In this context the company would need to be as per the context under which the company would be able to take necessary steps in order to deal with the situations. The report would need to include information resulting to the sponsored, the way it was conducted and the person or company who conducted it the survey will also include a sequence of questions and a proper description of the population as a sample. Sample size is necessary for the company to know as with the help of that size it will be possible for the company to take control of the process and work as per the requirement. Performing by going to the managers may not help the company as it would require resources and time which may not be same every time. It may need to be the duty of the company to take control of the necessary points in context of the company which are

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This will help the company to know about the processes through which it will be effective for the selection of the managers and work according to it. With this in mind it would need to be the duty of the company to effectively take the works into consideration and work accordingly so that it becomes easy to use the survey through online procedures and take the preferences of the managers in participating without any problem.

3.5 Limitation to the research

The approach will help a company to conduct its performances and select the managers without any issues. However, there may be different cases through which it may become hard for the company to effectively know about the working procedures of the company and conduct the works as per the requirement. As the company performs online survey as it is said to be effective to know about the preferences of the managers without using any resources and time expense. In this context the company would need to be working through which the needed things can be disclosed and working procedures of the company can be known. These methods are being concluded in order to take necessary decisions and work to get results. In this context the

company would need to be as per the context under which the company would be able to take necessary steps in order to deal with the situations.

Conclusion

As per the above illustration of the data collection procedures it had been discovered that the online data survey will help the working procedures of the company and had helped the selection process of the managers. In this context it would need to be the duty of the company to apply for effective measurement systems through which it will make it effective and to the point for the company working on the survey.

Conclusion

The above illustration on the development of the Mobile Cloud Computing aspect had been illustrated in an effective manner and will help the company to take control of the performances that are being done in the company and with the help of which it will be effective in concluding the performances and take up effective measurement opportunities in the survey process. In this context, it can be concluded that the use of online survey process will said to be as useful for the conduction of the data collection process and will make it appropriate for the company to take control of the working procedures in an effective manner.



References

- Assunção, M.D., Calheiros, R.N., Bianchi, S., Netto, M.A. and Buyya, R., 2015. Big Data computing and clouds: Trends and future directions. *Journal of Parallel and Distributed Computing*, 79, pp.3-15.
- Baccarelli, E., Cordeschi, N., Mei, A., Panella, M., Shojafar, M. and Stefa, J., 2016. Energy-efficient dynamic traffic offloading and reconfiguration of networked data centers for big data stream mobile computing: review, challenges, and a case study. *IEEE Network*, 30(2), pp.54-61.
- Baek, J., Vu, Q.H., Liu, J.K., Huang, X. and Xiang, Y., 2015. A secure cloud computing based framework for big data information management of smart grid. *IEEE transactions on cloud computing*, 3(2), pp.233-244.
- Botta, A., De Donato, W., Persico, V. and Pescapé, A., 2016. Integration of cloud computing and internet of things: a survey. *Future Generation Computer Systems*, 56, pp.684-700.
- Chang, V. and Ramachandran, M., 2016. Towards achieving data security with the cloud computing adoption framework. *IEEE Trans. Services Computing*, 9(1), pp.138-151.
- Han, Q., Liang, S. and Zhang, H., 2015. Mobile cloud sensing, big data, and 5G networks make an intelligent and smart world. *IEEE Network*, 29(2), pp.40-45.
- Hashem, I.A.T., Yaqoob, I., Anuar, N.B., Mokhtar, S., Gani, A. and Khan, S.U., 2015. The rise of “big data” on cloud computing: Review and open research issues. *Information Systems*, 47, pp.98-115.
- Jin, X., Wah, B.W., Cheng, X. and Wang, Y., 2015. Significance and challenges of big data research. *Big Data Research*, 2(2), pp.59-64.
- Lo'ai, A.T., Mehmood, R., Benkhelifa, E. and Song, H., 2016. Mobile cloud computing model and big data analysis for healthcare applications. *IEEE Access*, 4, pp.6171-6180.
- Luan, T.H., Gao, L., Li, Z., Xiang, Y., Wei, G. and Sun, L., 2015. Fog computing: Focusing on mobile users at the edge. *arXiv preprint arXiv:1502.01815*.

Rahimi, M.R., Ren, J., Liu, C.H., Vasilakos, A.V. and Venkatasubramanian, N., 2014. Mobile cloud computing: A survey, state of art and future directions. *Mobile Networks and Applications*, 19(2), pp.133-143.

Rittinghouse, J.W. and Ransome, J.F., 2016. *Cloud computing: implementation, management, and security*. CRC press.

Roman, R., Lopez, J. and Mambo, M., 2018. Mobile edge computing, fog et al.: A survey and analysis of security threats and challenges. *Future Generation Computer Systems*, 78, pp.680-698.

Sookhak, M., Gani, A., Khan, M.K. and Buyya, R., 2017. Dynamic remote data auditing for securing big data storage in cloud computing. *Information Sciences*, 380, pp.101-116.

Suciu, G., Suciu, V., Martian, A., Craciunescu, R., Vulpe, A., Marcu, I., Halunga, S. and Fratu, O., 2015. Big data, internet of things and cloud convergence—an architecture for secure e-health applications. *Journal of medical systems*, 39(11), p.141.

Tawalbeh, L.A., Jararweh, Y., Ababneh, F. and Dosari, F., 2015. Large scale cloudlets deployment for efficient mobile cloud computing. *Journal of Networks*, 10(1), p.70.

Yan, Q., Yu, F.R., Gong, Q. and Li, J., 2016. Software-defined networking (SDN) and distributed denial of service (DDoS) attacks in cloud computing environments: A survey, some research issues, and challenges. *IEEE Communications Surveys & Tutorials*, 18(1), pp.602-622.

Yang, C., Huang, Q., Li, Z., Liu, K. and Hu, F., 2017. Big Data and cloud computing: innovation opportunities and challenges. *International Journal of Digital Earth*, 10(1), pp.13-53.

Yi, S., Li, C. and Li, Q., 2015, June. A survey of fog computing: concepts, applications and issues. In *Proceedings of the 2015 workshop on mobile big data* (pp. 37-42). ACM.

Zeydan, E., Bastug, E., Bennis, M., Kader, M.A., Karatepe, I.A., Er, A.S. and Debbah, M., 2016. Big data caching for networking: Moving from cloud to edge. *IEEE Communications Magazine*, 54(9), pp.36-42.

