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Utilizing Machine Learning and Cloud Services to Improve Disaster Information Systems

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Abstract

Cloud services have enabled various information system developments. In this paper, we explore the use of Amazon Sagemaker cloud services and AWS Data Exchange in disaster information systems. We proposed cloud architecture for a disaster information system and found some of the datasets provided on AWS Data Exchange could be leveraged for such system.

A. Introduction

Information is a crucial aspect in disaster management. Therefore, we need a good disaster information system. Various disaster information systems have been developed, including geographic information systems for disasters, disaster mitigation, post-disaster management, and others.[1]–[8] [9]–[20]

As cloud computing continues to grow, many of these disaster information systems are hosted in the cloud. This can be utilized further by integrating information systems into other cloud services, such as storage, databases, machine learning, and others. In order to improve the capabilities of disaster information systems, machine learning can be utilized. [21], [22], [30], [31], [23]–[26], [26]–[29]

In this research, we explore utilizing cloud services and machine learning to enhance disaster information systems and propose related cloud architecture.

B. Research Method

In this research, we explore cloud services and machine learning as shown in the table below.

Table 1. Cloud Services

Services	Examples
Compute	EC2, Instance Compute, BareMetal, VM
Storage	S3, NVMe
Database	RDS, ADB
Machine Learning	Sagemaker, Collab

Table 1 shows cloud services with examples. In this research, we will leverage AWS and its services to propose an architecture that can be utilized in the development of a disaster information system.

C. Result and Discussion

In determining the appropriate computing architecture, we need to look at the associated use-cases. One of the problems faced is the availability of datasets, the updates and its integration into information systems.

By having relevant and credible datasets, we could do improve disaster information systems. Examining some data-related services in cloud, such as AWS Glue, Amazon EMR, Amazon SageMaker, Amazon QuickSight, and Amazon Athena, it is easier to get insights from disaster data.

We could also leverage AWS Data Exchange makes it simple to exchange data in the cloud. We can find and subscribe to disaster-related data products, download data sets or copy them to Amazon S3 and analyze them with AWS's analytics and machine learning services. A proposed architecture of such solution could be seen in Figure 1:

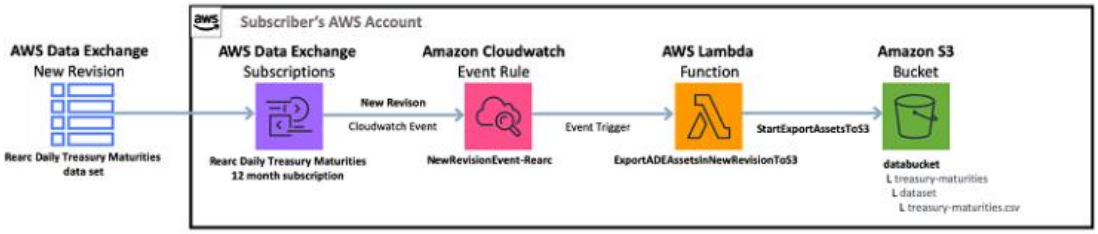

Figure 1. Automating the retrieval for new data set revisions [32]

D. Conclusion

The proposed architecture can be utilized for the development of disaster information systems. By integrating machine learning models, the information systems could be developed further.

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