



**Department of Computer Science and Engineering,
Amrita School of Computing, Coimbatore**

19CSE445- CLOUD COMPUTING

2024-2025-Even

Case Study Report

Topic: MultiCloud Stock Forecasting and Analytical System

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Problem Statement

This project aims to integrate various cloud services with advanced deep learning architectures, such as Long Short-Term Memory (LSTM), to build a scalable, interpretable, and production-ready stock price forecasting system. It processes historical market data to train predictive models, generates future stock price estimates, and stores the results in a database for efficient retrieval and analysis. The system also provides data visualization and financial insights, enabling users to make informed investment decisions based on real-time predictions and trend analysis.

Project Objectives:

1. Develop a cloud-based multivariate stock forecasting system using LSTM models.
2. Automate data processing and model training using AWS Glue and SageMaker.
3. Enable secure and scalable data storage with AWS S3 and DynamoDB.
4. Ensure cross-cloud data integration by transferring predictions from AWS to Azure.
5. Store and manage forecasted data efficiently in Azure Blob Storage.
6. Provide real-time stock trend analysis through Azure Power BI Embedded.
7. Optimize model performance using hyperparameter tuning in SageMaker.
8. Ensure security and compliance while accessing and visualizing data across cloud platforms.

Project Modules:

1. Data Collection & Storage (AWS S3) – Fetch stock data from Yahoo Finance and store it in structured S3 buckets.
2. Data Preprocessing (AWS Glue) – Clean, normalize, and structure the dataset for model training.
3. Model Training & Deployment (AWS SageMaker) – Train an LSTM model and store it in AWS S3 for future use.
4. Prediction & Data Storage (AWS DynamoDB & Azure Blob) – Store forecasted values in DynamoDB and sync with Azure Blob Storage.
5. Visualization & Reporting (Azure Power BI Embedded) – Load predictions from Azure Blob and create interactive dashboards.
6. Cross-Cloud Integration & Automation – Ensure smooth data transfer and model execution across AWS & Azure services.

Cloud Services Used:

1. AWS Services:

- a. Sage Maker AI
- b. AWS Glue
- c. AWS DynamoDB
- d. AWS S3 storage

2. Azure Services:

- a. Azure Blob Containers
- b. Azure Power BI Embedded

Project Execution Steps:

1. Setup AWS SageMaker AI Notebook:
 - a. Create a notebook instance
 - b. Choose instance type **ml.t3.medium**
2. Setup AWS S3 buckets:
 - a. Create a new bucket
 - b. Structured the bucket as given below:
 - i. Original Dataset
 - ii. Models(Store Model)
 - iii. Processed(Store preprocessed data)
3. Setup AWS DynamoDB:
 - a. Create a table in DynamoDB with Date as the Primary Key and prediction as another column

4. Azure service:
 - a. Create a storage account and resource group
5. Azure Blob:
 - a. Create a blob container using the storage container
 - b. Make the access level from public to private
6. Use Jupyter Lab from notebook instance:
 - a. Code to fetch the data from S3 bucket
 - b. Preprocess the data and save it in S3 bucket(in processed folder)
 - c. Create the model and save it in S3 bucket (models)
 - d. Fetch the data and model. Predict the output.
 - e. Save the predicted output in DynamoDB table using AWS Glue.
 - f. Save the predicted output from DynamoDB to Azure Blob Container
7. Azure Power BI Embedded visualization:
 - a. Fetch the data from Azure blob container using valid key
 - b. Transform the json data to column data by accessing the storage and proceed with visualization.

Screenshots:

The screenshot displays the AWS SageMaker console interface. On the left, there is a navigation sidebar with sections for 'Applications and IDEs' (including Studio, Canvas, RStudio, TensorBoard, Profiler, Notebooks, and Partner AI Apps) and 'Admin configurations' (including Domains, Role manager, Images, and Lifecycle configurations). The main content area shows the details for a notebook instance named 'sample'. At the top right of this section are buttons for 'Delete', 'Stop', 'Open Jupyter', and 'Open JupyterLab'. Below these is the 'Notebook instance settings' section, which includes fields for Name, Status (InService), Notebook instance type, Platform identifier, ARN, Creation time, Last updated, Elastic Inference, Volume Size, and Lifecycle configuration. An 'Edit' button is located to the right of the settings. Below the settings is the 'Git repositories' section, which is currently empty with a message 'There are currently no resources.' At the bottom of the console is the 'Permissions and encryption' section. The footer of the console shows the copyright notice '© 2025, Amazon Web Services, Inc. or its affiliates.' along with links for 'Privacy', 'Terms', and 'Cookie preference'.

AWS SageMaker notebook instance

Amazon S3

General purpose buckets

Directory buckets

Table buckets

Access Grants

Access Points

Object Lambda Access Points

Multi-Region Access Points

Batch Operations

IAM Access Analyzer for S3

Block Public Access settings for this account

Storage Lens

Dashboards

Storage Lens groups

AWS Organizations settings

Feature spotlight 11

stock-prediction-data-01

Info

Objects

Metadata

Properties

Permissions

Metrics

Management

Access Points

Objects (3)

Copy S3 URI

Copy URL

Download

Open

Delete

Actions

Create folder

Upload

Find objects by prefix

	Name	Type	Last modified	Size	Storage class
<input type="checkbox"/>	google_stock_price_full.csv	csv	March 23, 2025, 11:35:31 (UTC+05:30)	344.8 KB	Standard
<input type="checkbox"/>	models/	Folder	-	-	-
<input type="checkbox"/>	processed/	Folder	-	-	-

AWS S3 bucket structure

DynamoDB

Dashboard

Tables

Explore Items

PartiQL editor

Backups

Exports to S3

Imports from S3

Integrations

Reserved capacity

Settings

DAX

Clusters

Subnet groups

Parameter groups

Events

Tables (1)

Any tag key

Any tag value

Find tables

StockPredictions

StockPredictions

Overview

Indexes

Monitor

Global tables

Backups

Exports and streams

Permissions

Addition

Protect your DynamoDB table from accidental writes and deletes

General information

Partition key

Sort key

Capacity mode

Table status

Alarms

Point-in-time recovery (PITR)

Resource-based policy

Additional info

Items summary

AWS DynamoDB table details

aws [Search] [Alt+S] United States (N. Virginia) woclabs/user:3737061+AKAAASH_M_5 @ 6148-2128-2467

DynamoDB > Explore Items > StockPredictions

DynamoDB

- Dashboard
- Tables
- Explore Items
- PartiQL editor
- Backups
- Exports to S3
- Imports from S3
- Integrations New
- Reserved capacity
- Settings

▼ DAX

- Clusters
- Subnet groups
- Parameter groups
- Events

Tables (1)

Any tag key

Any tag value

Find tables

StockPredictions

StockPredictions Autopreview [View table details](#)

▼ Scan or query items

Scan Query

Select a table or index

Table - StockPredictions

Select attribute projection

All attributes

Date (Partition key)

2024-01-05

► Filters

Run Reset

Completed. Read capacity units consumed: 0.5

Items returned (1) [Actions](#) [Create Item](#)

1 2 3 4 5 6 7 8 9 10

<input type="checkbox"/>	Date (String)	Predicted_Close
<input type="checkbox"/>	2024-01-05	0.95312804

CloudShell Feedback

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Sample querying in AWS DynamoDB

Microsoft Azure Search resources, services, and docs (6 +) Copilot cb.en.urfcoe22301@cb.s... AMRITA VISHWA VIDYAPEETHAM

Home >

Storage accounts ✨ ...

Amrita Vishwa Vidyapeetham (amrita.edu)

+ Create Restore Manage view Refresh Export to CSV Open query Assign tags Delete

Filter for any field... Subscription equals all Resource group equals all Location equals all Add filter

Showing 1 to 1 of 1 records. No grouping List view

<input type="checkbox"/>	Name ↑↓	Type ↑↓	Kind ↑↓	Resource group ↑↓	Location ↑↓	Subscription ↑↓
<input type="checkbox"/>	stockpred	Storage account	StorageV2	stock-market	Central India	Azure for Students

< Previous Page 1 of 1 Next >

Give feedback

Azure Storage Account

Microsoft Azure

Search resources, services, and docs (G+/I)

Copilot

cb.en.u4cse22301@cb.s...
AMRITA VISHWA VIDYAPEETHA...

Home > Storage accounts > stockpred | Containers >

stockmarket

Container

Search

Upload

Change access level

Refresh

Delete

Change tier

Acquire lease

Break lease

View snapshots

Create snapshot

Give feedback

Overview

Diagnose and solve problems

Access Control (IAM)

Settings

Authentication method: Access key (Switch to Microsoft Entra user account)

Location: stockmarket

Search blobs by prefix (case-sensitive)

Show deleted blobs

Add filter

Name	Modified	Access tier	Archive status	Blob type	Size	Lease state
predictions.json	3/24/2025, 9:29:11 PM	Hot (Inferred)		Block blob	280 B	Available

Azure Blob Container

Microsoft Azure

Search resources, services, and docs (G+/I)

Copilot

cb.en.u4cse22301@cb.s...
AMRITA VISHWA VIDYAPEETHA...

Azure services

Create a resource

Storage accounts

Power BI Embedded

Free services

Azure AI services

Quickstart Center

Azure AI services

Kubernetes services

Virtual machines

More services

Resources

Recent

Favorite

Name	Type	Last Viewed
stockpred	Storage account	2 minutes ago
stock-market	Resource group	2 hours ago
stockprediction	Power BI Embedded	2 hours ago

See all

Navigate

Subscriptions

Resource groups

All resources

Dashboard

Tools

Azure resources used

Microsoft Azure

Home > Storage accounts > stockpred

Storage accounts

Amrita Vishwa Vidyapeetham (amrita.edu)

+ Create Restore ...

Filter for any field...

Name ↑

stockpred

stockpred | Access keys

Storage account

Search

Set rotation reminder Refresh Give feedback

Access keys authenticate your applications' requests to this storage account. Keep your keys in a secure location like Azure Key Vault, and replace them often with new keys. The two keys allow you to replace one while still using the other.

Remember to update the keys with any Azure resources and apps that use this storage account.
[Learn more about managing storage account access keys](#)

Storage account name
stockpred

key1 Rotate key
Last rotated: 3/24/2025 (0 days ago)
Key
a3U7KDBDz2j7k1q01eAJHOOTKVkv+odFo+rVDY12psnE/uWdVICYbtpofTjv43ik9... Hide
Connection string Show

key2 Rotate key
Last rotated: 3/24/2025 (0 days ago)
Key
Show
Connection string Show

Azure Key fetching details

stockPredictionsFinal • Last saved: Today at 11:58 pm

File Home Help Table tools Column tools

Name Folder Path Format Text Summarization Don't summarize Data category Uncategorized Sort by column Sort Data groups Groups Manage relationships Relationships New column Calculations

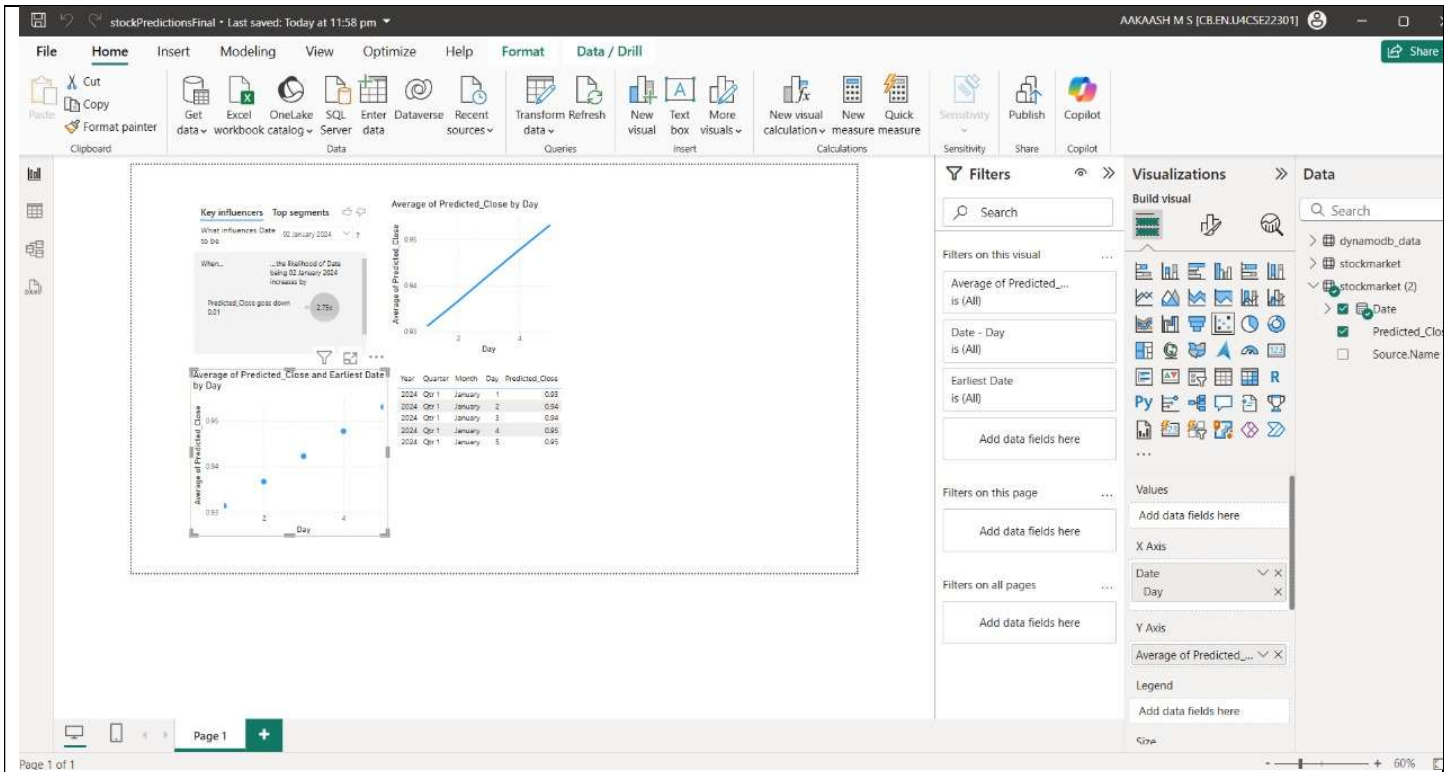
Name	Extension	Date accessed	Date modified	Date created	Folder Path
predictions.json	.json		24-03-2025 15:59:17		https://stockpred.blob.core.windows.net/stockmarket/

Table: stockmarket (1 rows) Column: Folder Path (1 distinct values)

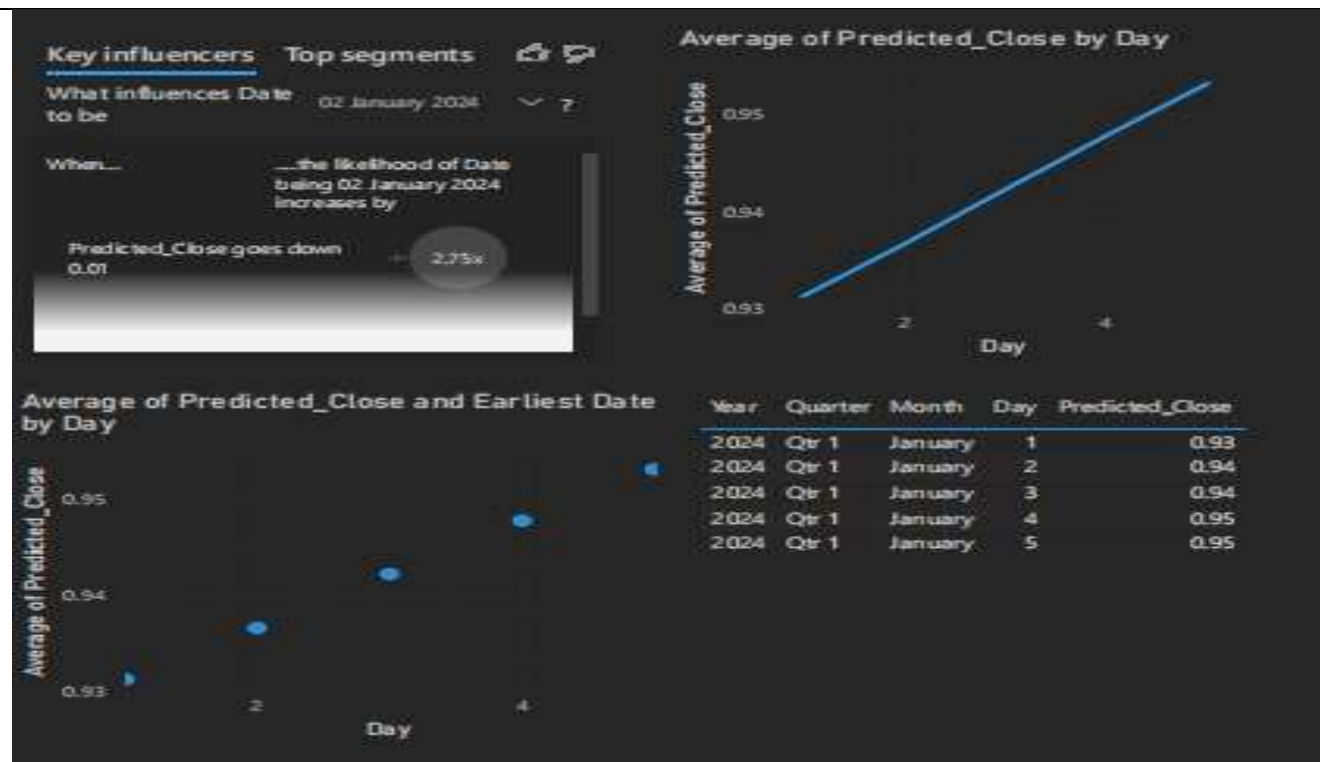
Search

- dynamodb data
- stockmarket
 - Date accessed
 - Date created
 - Date modified
 - Extension
 - Folder Path
 - Name
- stockmarket (2)
 - Date
 - Predicted_Close
 - Source.Name

Azure access details



Azure PowerBI overview and data view



Visualization in Azure PowerBI for the predicted sample data

Github Link: <https://github.com/msaakaash/MultiCloud-Stock-Forecasting-Analytics>