Problem statement: Design a complete architecture using the native services of AWS and AZURE clouds for a given AI / ML case study.

Main points:

1. Take the previous data from a region
2. Add capabilities to filter the data
3. Build a model / use pre-built model
4. Add any other services if required
5. Integrate CI / CD for deployment
6. Monitoring tools / services
7. Feedback loop

Used components:

1. Amazon S3
2. Python modules
3. Amazon Lambda
4. Amazon Forecast
5. Amazon Athena
6. Amazon cloud watch
7. Azure blob storage
8. Azure pipeline
9. Azure Repos
10. Azure ML
11. Tensor Flow
12. Azure Monitoring

For AWS:

Data set : Weather data predicted from a particular region

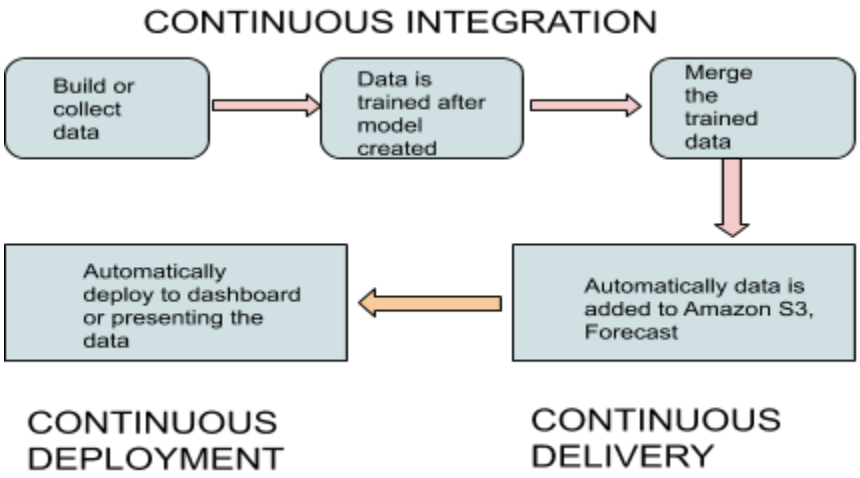
WorkFlow:

1. A .csv file is collected for the weather data which is predicted previously for a particular region.
2. This data is loaded, filtered using python inbuilt functions and libraries like pandas, sklearn. Categorical data is organised using get_dummies function and imbalanced data will be balanced.
3. The filtered file is loaded into Amazon S3 bucket.
4. Developing a model / using pre-built models using python libraries or using local models of Amazon Forecast
5. Using the data in Amazon S3 bucket , model is trained in Amazon Lambda and Amazon S3
6. Amazon forecast predicts the future data ,which again is stored in Amazon S3 bucket.

7. Amazon provides Amazon Athena , which we use for querying. It helps to solve queries easily using its inbuilt functions.
8. These queries can be asked or retrieved from history which is present in Amazon S3 or by searching.
9. We use Amazon Cloud watch service to monitor our entire application
10. Later the previous queries are again stored in Amazon S3 history for retrieving queries easily.

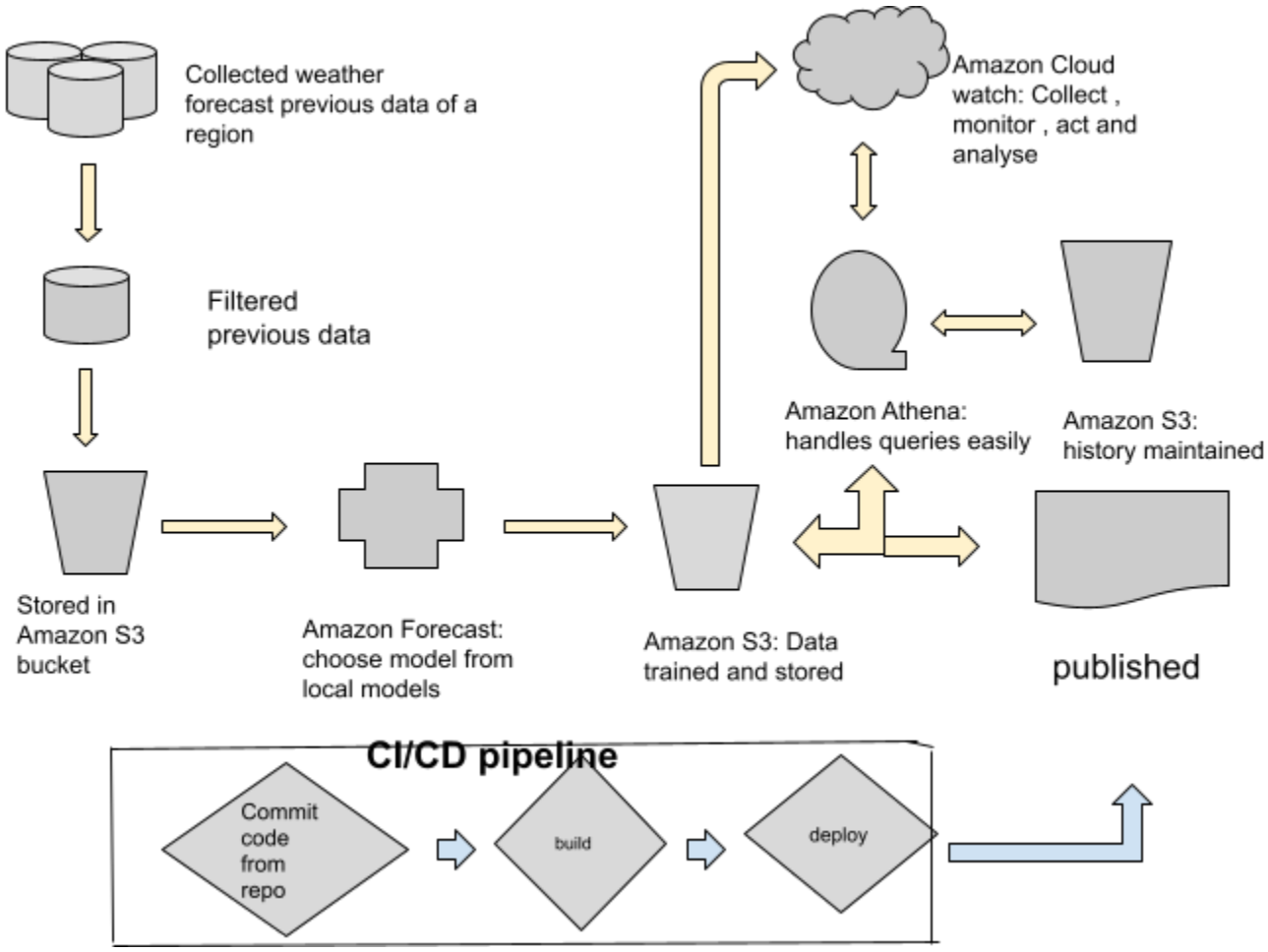
Main Tasks:

1. **Take the previous data from a region**:
    - We have to download or get the previous data and then upload it to Amazon S3 bucket in our AWS account.
2. **Add capabilities to filter the data :**
    - Using python modules like pandas and sklearn , data is aggregated and filtered. Missing values are filled or removed. If there is any duplicate data, it is removed. Sampling is done to balance fields which are imbalanced.
3. **Build a model/Use pre-built model:**
    - We have to choose a model that is flexible or develop a model. Amazon Forecast provides local models from the R forecast package.
4. **Add any services if required:**
    - Amazon cloud watch is used to monitor the entire application i.e it does collecting,monitoring, act, analysing.
5. **Integrate CI/CD for deployment:**
    - New data is continuously added into Amazon S3. Collected data and modified or predicted data is added into Amazon S3 continuously.
    - Finally the data is published or given to required platforms in various ways.



6. **Monitoring Tools / Services:**
    - Service which I have added i.e Amazon Cloud watch is monitored using Amazon step functions.
7. **Feedback loop:**
    - whatever the data is predicted is presented or published and again stored in an Amazon S3 bucket in the form of history or predicted data so that we can use it again.

Architecture:



For Azure:

WorkFlow:

1. A .csv file is collected which contains weather forecast previous data of a particular region.
2. Then the collected data is loaded using pandas and it is filtered by removing duplicates and some

python libraries are used for oversampling (i.e, to get a balanced dataset). After filtering the data , it is stored into azure blob storage.

3. Models are created using Azure Machine learning inbuilt models or python libraries and tensor flow
4. Models are trained and data is stored into Azure blob storage
5. Data is now stored into Azure sql database which helps for easy querying
6. From Azure repos we build and test using Azure pipeline into Azure sql database
7. Finally predicted data is published to web application and users

Main Tasks:

Take the previous data from a region:

- We have to download the previous data and then upload it to Azure blob storage in our Azure account.

Add capabilities to filter the data :

- Using python modules like pandas and sklearn , data is aggregated and filtered. Missing values are filled or removed. If there is any duplicate data, it is removed. Sampling is done to balance fields which are imbalanced.

Build a model/Use pre-built model:

- We have to choose a model that is flexible or develop a model. Azure ML provides local models , we also use TensorFlow to develop and train models

Add any services if required:

- Azure monitoring is used to monitor the entire application i.e it does collecting,monitoring, act, analysing.
- Azure Mysql database is used to store data , through which query processing can be done easily

Integrate CI/CD for deployment:

- New data is continuously added into Azure storage. Collected data and modified or predicted data is added into Azure storage continuously. From Azure repos using Azure pipeline the data is build and deployed
- Finally the data is published or given to required platforms in various ways.

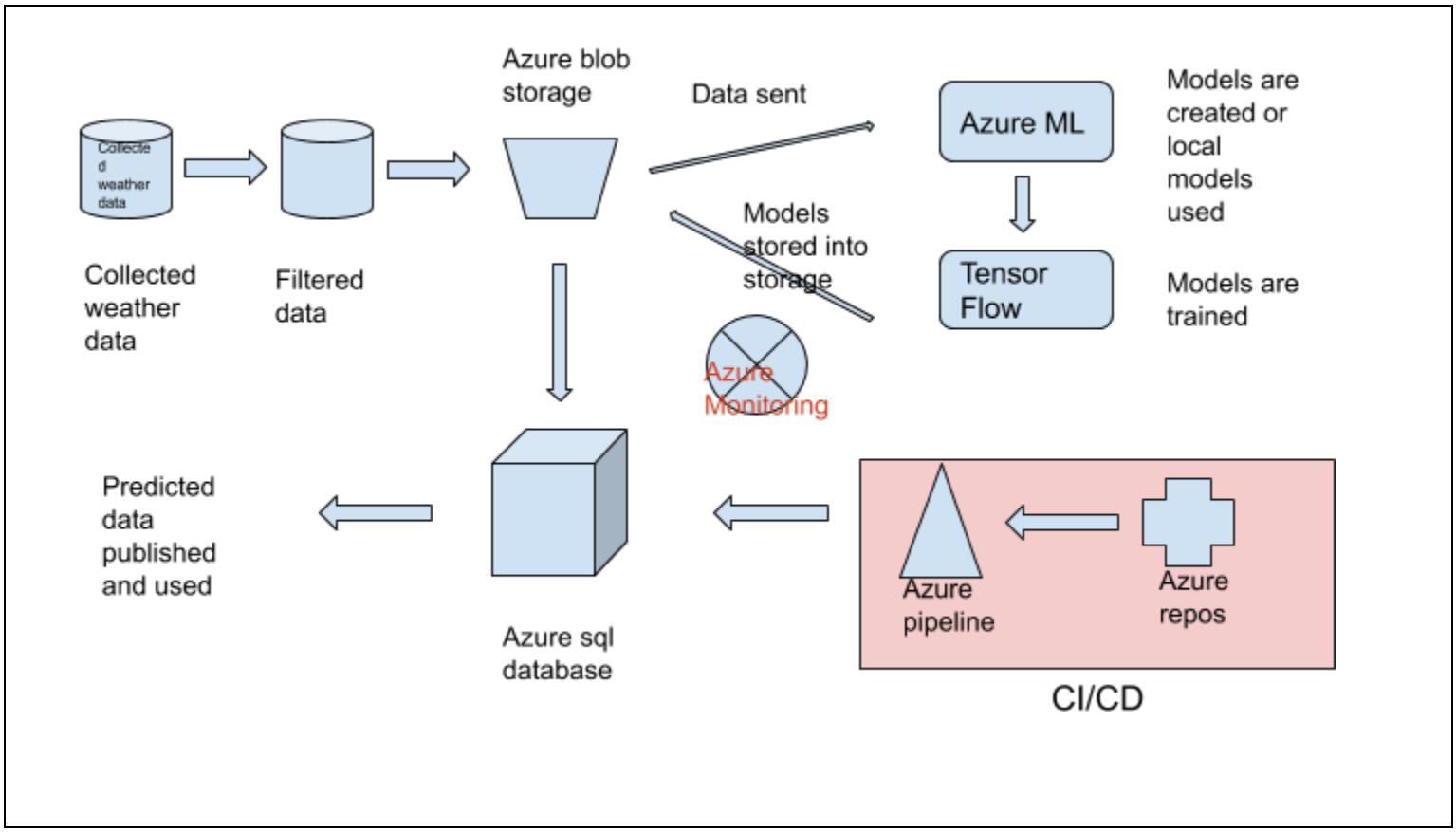
Monitoring Tools / Services:

- Azure monitoring service is used for monitoring entire applications

Feedback loop:

- whatever the data is predicted is presented or published and again stored in an Azure storage in the form of history or predicted data so that we can use it again.

Architecture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Tensor
Flow
Models are
trained
Azure
Monitoring
Predicted
data
published
and used
Azure sql
database
Azure
pipeline
Azure
repos
CI/CD