Project Design Phase-I
Solution Architecture

Date	23 October 2023
Team ID	Team-591965
Project Name	Weather Classification Using Deep Learning
Maximum Marks	5 Marks

Weather Classification System: Solution Architecture

1. Data Collection & Preprocessing:

- Weather Image Repository: A centralized storage, e.g., cloud-based storage, for storing raw weather images. This might involve integration with weather cameras, satellites, or crowd-sourced images.
- Image Preprocessing Module: A module that applies transformations, resizing, normalization, and augmentation to prepare images for model training and inference.

2. Model Training & Fine-Tuning:

- Pre-trained Model Library: Storage or access point for pre-trained architectures like Inception V3, VGG19, and Xception V3.
- Fine-Tuning & Training Module: Utilize transfer learning to fine-tune the pre-trained models on the curated dataset. This module will handle epochs, batch sizes, learning rates, and other training parameters. Regular validation checks to monitor overfitting.

3. Model Serving & Inference:

- Model Repository: Storage for the trained and optimized models ready for deployment.
- Inference Engine: Handles real-time or batch-based classification tasks. Takes an image as input, preprocesses it, runs it through the model, and returns the classified weather condition.

4. API & Integration Layer:

- API Gateway: Secure entry point that allows third-party services and apps to access the weather classification system.
- Integration Tools: SDKs or plugins for popular platforms, allowing seamless integration of the classification service.

5. User Interface:

- Web Dashboard: A user-friendly interface for meteorologists, researchers, or other users to upload images, see predictions, and monitor the system's performance.
- Mobile App: A public-facing application that allows users to get real-time weather classifications, possibly with added features like historical data, location-based predictions, etc.

6. Feedback & Continuous Learning:

- Feedback Module: Allows users to correct misclassifications, providing valuable labeled data for further model training.
- Retraining Scheduler: Periodically retrain the models with new data, especially the feedback-corrected data, to improve accuracy over time.

7. Business & Analytics Layer:

- Billing & Subscription Manager: Handle payments, subscriptions, and API usage quotas.
- Analytics Engine: Monitors system performance, user activity, and provides insights into model accuracy, API call rates, user engagement, etc.

Solution Architecture Diagram:

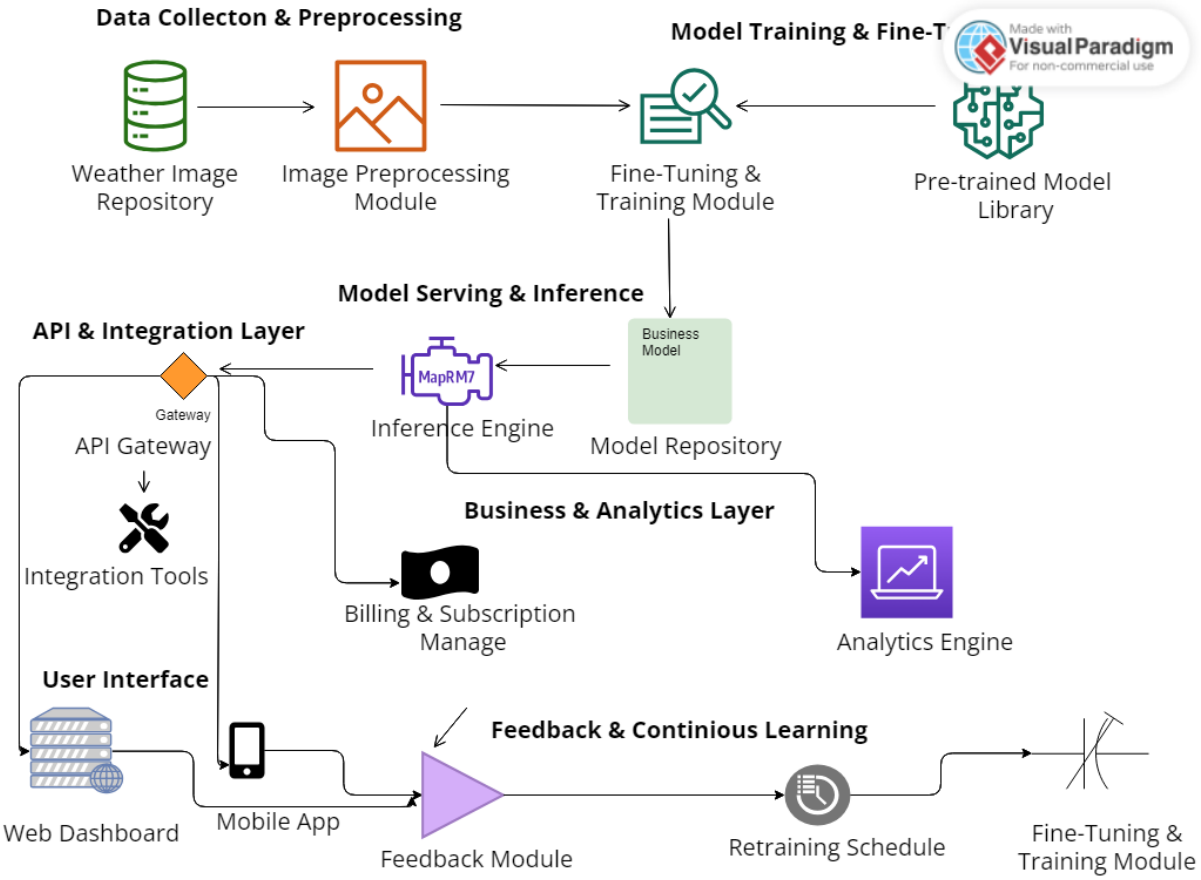

Figure 1: Weather Classification System: Solution Architecture