Architecture Design

FACE MASK DETECTION

Partha Pratim Kalita

Planning the Process

DREAM DESIGN BUILD

What is Architecture Design Document?

Any software needs the architectural design to represent the design of the software. IEEE defines architectural design as "the process of defining a collection of hardware and software components and their interfaces to establish the framework for the development of a computer system." The software that is built for computer-based systems can exhibit one of these many architectures.

Each style will describe a system category that consists of:

• A set of components (eg: a database, computational modules) that will perform a function required by the system.

• The set of connectors will help in coordination, communication, and cooperation between the components.

• Conditions that how components can be integrated to form the system.

• Semantic models help the designer to understand the overall properties of the system.

Outline of the Architecture

1. **Dataset Collection: Dataset of 1000 images containing 500 faces with and 500 without masks. Diverse and representative of the scenarios where the model will be used.**

2. **Data Preprocessing: Dataset has Images, converted images into Numpy array and Preprocess the images, normalization, and augmentation to increase the model's robustness and generalization.**

3. **Base Object Detection Model: A pre-trained object detection model that acts as a backbone for face mask detection system.**
   - Single Shot Multibox Detector (SSD)

4. **Transfer Learning: Take the pre-trained object detection model and fine-tune it on face mask dataset. During this process, the model learns to identify faces and distinguish between masked and unmasked faces.**

Outline of the Architecture

5.Classification Head: Modified the last layer(s) of the object detection model to include a classification head that can predict two classes: "with mask" and "without mask."

6. Loss Function: binary cross-entropy, depending on the number of classes in classification head.
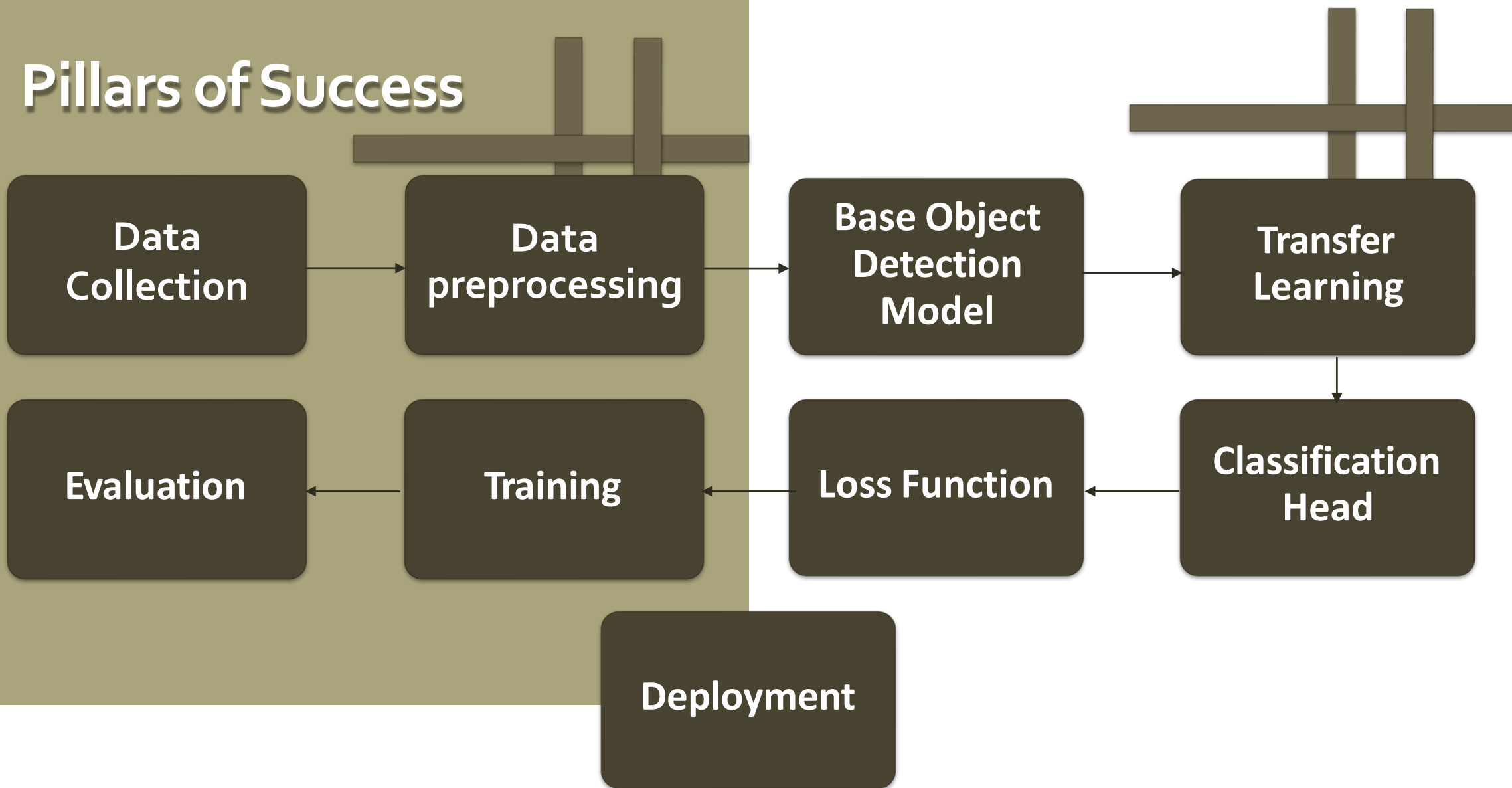
(Here we used Binary cross-entropy as loss function and ADAM as Optimizer)

7.Training: Trained the modified model on custom dataset. Depending on the dataset size and complexity of the task, fine-tuned the model for several epochs.

8.Evaluation: Evaluated the model on a separate test dataset to assess its performance in terms of accuracy.

9.Deployment: Deploy the trained model to a production environment, integrating it with application or system where it can perform real-time face mask detection.

Pillars of Success

Data Collection → Data preprocessing → Base Object Detection Model → Transfer Learning

Evaluation ← Training ← Loss Function ← Classification Head

Deployment

Thank you

youranalystpartha@gmail.com