

<b>Project Title</b>	<b>Multiclass Fish Image Classification</b>
<b>Skills take away From This Project</b>	<b>Deep Learning, Python, TensorFlow/Keras, Streamlit, Data Preprocessing, Transfer Learning, Model Evaluation, Visualization, and Model Deployment.</b>
<b>Domain</b>	<b>Image Classification</b>

### **Problem Statement:**

This project focuses on classifying fish images into multiple categories using deep learning models. The task involves training a CNN from scratch and leveraging transfer learning with pre-trained models to enhance performance. The project also includes saving models for later use and deploying a Streamlit application to predict fish categories from user-uploaded images.

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### **Business Use Cases:**

1. Enhanced Accuracy: Determine the best model architecture for fish image classification.
  2. Deployment Ready: Create a user-friendly web application for real-time predictions.
  3. Model Comparison: Evaluate and compare metrics across models to select the most suitable approach for the task.
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## Approach:

- Data Preprocessing and Augmentation
  - Rescale images to [0, 1] range.
  - Apply data augmentation techniques like rotation, zoom, and flipping to enhance model robustness.
- Model Training
  - Train a CNN model from scratch.
  - Experiment with five pre-trained models (e.g., VGG16, ResNet50, MobileNet, InceptionV3, EfficientNetB0).
  - Fine-tune the pre-trained models on the fish dataset.
  - Save the trained model (max accuracy model ) in .h5 or .pkl format for future use.
- Model Evaluation
  - Compare metrics such as accuracy, precision, recall, F1-score, and confusion matrix across all models.
  - Visualize training history (accuracy and loss) for each model.
- Deployment
  - Build a Streamlit application to:
    - Allow users to upload fish images.
    - Predict and display the fish category.
    - Provide model confidence scores.
- Documentation and Deliverables
  - Provide comprehensive documentation of the approach, code, and evaluation.
  - Create a GitHub repository with a detailed README.

## Dataset

- The dataset consists of images of fish, categorized into folders by species. The dataset is loaded using TensorFlow's ImageDataGenerator for efficient processing.
- Dataset: [Data as Zip file](#)

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## Project Deliverables

1. Trained Models: CNN and pre-trained models saved in .h5 or .pkl format.
2. Streamlit Application: Interactive web app for real-time predictions.
3. Python Scripts: For training, evaluation, and deployment.
4. Comparison Report: Metrics and insights from all models.
5. GitHub Repository: Well-documented codebase.

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### Project Guidelines:

- **Follow coding standards:** Consistent naming conventions, modular code.
- **Data validation:** Ensure all data is accurate and complete.

<b>Streamlit Doc</b>	<a href="https://docs.streamlit.io/library/api-reference">https://docs.streamlit.io/library/api-reference</a>
<b>Streamlit recording (Tamil)</b>	<a href="#">Special Session for STREAMLIT Tamil</a>
<b>Project Live Evaluation</b>	 Project Live Evaluation
<b>GitHub Reference</b>	 How to Use GitHub.pptx
<b>Project Orientation (English)</b>	<a href="#">Orientation</a>

### **Project Evaluation metrics:**

- Maintainable: It can be maintained, even as your codebase grows.
- Portable: It works the same in every environment (operating system)
- You have to maintain your code on **GitHub**. (Mandatory)
- You have to keep your **GitHub** repo public so that anyone can check your code. (Mandatory)
- Proper readme file you have to maintain for any project development (Mandatory)
- You should include basic workflow and execution of the entire project in the readme file on **GitHub**
- Follow the coding standards: <https://www.python.org/dev/peps/pep-0008/>
- You need to Create a Demo video of your working model and post in **LinkedIn** (Mandatory)

### **PROJECT DOUBT CLARIFICATION SESSION ( PROJECT AND CLASS DOUBTS)**

**About Session:** The Project Doubt Clarification Session is a helpful resource for resolving questions and concerns about projects and class topics. It provides support in understanding project requirements, addressing code issues, and clarifying class concepts. The session aims to enhance comprehension and provide guidance to overcome challenges effectively.

**Note:** Book the slot at least before 12:00 Pm on the same day

**Timing:** Monday to Saturday (4:00PM to 5:00PM)

**Booking link :** <https://forms.gle/XC553oSbMJ2Gcfug9>

### **LIVE EVALUATION SESSION (CAPSTONE AND FINAL PROJECT)**

**About Session:** The Live Evaluation Session for Capstone and Final Projects allows participants to showcase their projects and receive real-time feedback for improvement. It assesses project quality and provides an opportunity for discussion and evaluation.

**Note:** This form will Open on Saturday and Sunday Only on Every Week

**Timing:** Monday-Saturday (5:30PM to 7:00PM)

**Booking link :** <https://forms.gle/1m2Gsro41fLtZurRA>

