### Hydration Essentials: Classifying Water Bottle Images

**Milestone1: Project Initialization and Planning Phase**

""Hydration Essentials: Classifying Water Bottle Images"" is a project that uses computer vision and machine learning techniques to classify images of water bottles into different categories based on their features and characteristics. The project aims to streamline and automate the process of categorizing water bottles for e-commerce platforms, inventory management, and quality control purposes. By training a model on a diverse dataset of water bottle images, including variations in size, shape, material, and color, the project can quickly and accurately classify new images, providing valuable insights for manufacturers, retailers, and consumers.

### Activity1: Define Problem Statement

Problem Statement: The manual classification of water bottle images in our project is a time-consuming and physically exhausting task. This process requires significant human effort to inspect, categorize, and label each image accurately. As a result, productivity is hindered, and the repetitive nature of the task leads to physical fatigue. To enhance efficiency and reduce the physical strain on team members, an automated solution for classifying water bottle images is needed. This solution should leverage advanced image recognition and machine learning techniques to accurately and swiftly classify images, thereby streamlining the workflow and alleviating the burden of manual classification.

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### Activity2: Project Proposal (Proposed Solution)

The proposed project, "Hydration Essentials: Classifying Water Bottle Images" aims to leverage deep learning for more accurate applicant credibility predictions. We will be able to know fundamental concepts and techniques of Convolutional Neural Network and gain a broad understanding of image data. Learning how to pre-process/clean the data using different data preprocessing techniques and how to build a web application using Flask framework.

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## Activity3: Initial Project Planning

Initial Project Planning involves outlining key objectives, defining scope, and identifying different water bottle images .It encompasses setting timelines, allocating resources, and determining the overall project strategy. During this phase, the team establishes a clear understanding of the dataset, formulates goals for analysis, and plans the workflow for data processing. Effective initial planning lays the foundation for a systematic and well-executed project, ensuring successful outcomes.

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# Milestone2: Data Collection and Preprocessing Phase

The Data Collection and Preprocessing Phase involves executing a plan together by using data from Kaggle, ensuring data quality through verification and addressing missing values. Preprocessing tasks include cleaning, encoding, and organizing the dataset for subsequent exploratory analysis and machine learning model development.

## Activity1: Data Collection Plan, Raw Data Sources Identified, Data Quality Report

The dataset for " Hydration Essentials: Classifying Water Bottle Images" is sourced from Kaggle. It includes images of different water levels in bottles. Data quality is ensured through thorough verification, addressing missing values, and maintaining adherence to ethical guidelines, establishing a reliable foundation for predictive modeling.

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## Activity2: Data Quality Report

The dataset for "Hydration Essentials: Classifying Water Bottle Images " is sourced from Kaggle. It includes images of different water levels in bottles. Data quality is ensured through thorough verification, addressing missing values, and maintaining adherence to ethical guidelines, establishing a reliable foundation for predictive modeling.

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## Activity3: Data Exploration and Preprocessing

Data Exploration involves analyzing the pictures of water bottles to understand levels. Preprocessing includes handling missing values, scaling, and encoding categorical variables. These crucial steps enhance data quality, ensuring the reliability and effectiveness of subsequent analyses .

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# Milestone 3: Model Development Phase

The Model Development Phase entails crafting a predictive model for images of different water levels in bottles. It encompasses strategic features election, evaluating and selecting models (Random Forest, Decision Tree, KNN, XGB), initiating training with code, and rigorously validating and assessing model performance for informed decision-making in the lending process.

## Activity1: Feature Selection Report

The Feature Selection Report outlines the rationale behind choosing specific features (e.g., Gender, Married, Credit History) for the hydration essentials model. It evaluates relevance, importance, and impact on predictive accuracy, ensuring the inclusion of key factors influencing the model's ability to discern credible loan applicants.

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## Activity2: Model Selection Report

The Model Selection Report details the rationale behind choosingRandomForest,DecisionTree, KNN, and XGB models for loan approval prediction. It considers each model's strengths in handlingcomplexrelationships,interpretability,adaptability,andoverallpredictiveperformance, ensuring an informed choice aligned with project objectives.

**Ref.template:**[**ClickHere**](https://github.com/SmartInterns-Content/AI-ML-DA-Templates/blob/main/Machine%20Learning%20and%20Natural%20Language%20Processing%20Templates/3.%20Model%20Development%20Phase/Model%20Selection%20Report%20template.pdf)

**SmartLenderModelSelectionReport:**[**ClickHere**](https://github.com/SmartInterns-Content/AI-ML-DA-Templates/blob/main/Sample%20Project/3.%20Model%20Development%20Phase/SL%20Model%20Selection%20Report.pdf)

## Activity3:InitialModelTrainingCode,ModelValidationandEvaluation Report

The Initial Model Training Code employs selected algorithms on the loan approval dataset, settingthefoundationforpredictivemodeling.ThesubsequentModelValidationandEvaluation Reportrigorouslyassessesmodelperformance,employingmetricslikeaccuracyandprecisionto ensure reliability and effectiveness in predicting loan outcomes.

**Ref.template:**[**ClickHere**](https://github.com/SmartInterns-Content/AI-ML-DA-Templates/blob/main/Machine%20Learning%20and%20Natural%20Language%20Processing%20Templates/3.%20Model%20Development%20Phase/Initial%20Model%20Training%20Code%2C%20Model%20Validation%20and%20Evaluation%20Template.pdf)

**SmartLenderModelDevelopmentPhaseTemplate:**[**ClickHere**](https://github.com/SmartInterns-Content/AI-ML-DA-Templates/blob/main/Sample%20Project/3.%20Model%20Development%20Phase/SL%20Initial%20Model%20Training%20Code%2C%20Model%20Validation%20and%20Evaluation%20Report.pdf)

# Milestone4:ModelOptimizationandTuningPhase

The Model Optimization and Tuning Phase involves refining machine learning models for peak performance.Itincludesoptimizedmodelcode,fine-tuninghyperparameters,comparingperformance metrics, and justifying the final model selection for enhanced predictive accuracy and efficiency.

## Activity1:HyperparameterTuningDocumentation

TheGradientBoostingmodelwasselectedforitssuperiorperformance,exhibitinghighaccuracy during hyperparameter tuning. Its ability to handle complex relationships, minimize overfitting, andoptimizepredictiveaccuracyalignswithprojectobjectives,justifyingitsselectionasthefinal model.

## Activity2:PerformanceMetricsComparisonReport

ThePerformanceMetricsComparisonReportcontraststhebaselineandoptimizedmetricsfor various models, specifically highlighting the enhanced performance of the Gradient Boosting model. This assessment provides a clear understanding of the refined predictive capabilities achieved through hyperparameter tuning.

## Activity3:FinalModelSelectionJustification

The Final Model Selection Justification articulates the rationale for choosing Gradient Boosting as the ultimate model. Its exceptional accuracy, ability to handle complexity, and successful hyperparametertuningalignwithprojectobjectives,ensuringoptimalloanapprovalpredictions.

**Ref.template:**[**ClickHere**](https://github.com/SmartInterns-Content/AI-ML-DA-Templates/blob/main/Machine%20Learning%20and%20Natural%20Language%20Processing%20Templates/4.%20Model%20Optimization%20and%20Tuning%20Phase/Model%20Optimization%20and%20Tuning%20Phase%20Template.pdf)

**SmartLenderModelOptimizationandTuningPhaseReport:**[**ClickHere**](https://github.com/SmartInterns-Content/AI-ML-DA-Templates/blob/main/Sample%20Project/4.%20Model%20Optimization%20and%20Tuning%20Phase/SL%20Model%20Optimization%20and%20Tuning%20Phase%20Template.pdf)

# Milestone5:ProjectFilesSubmissionandDocumentation

ForprojectfilesubmissioninGithub,Kindlyclickthelinkandrefertotheflow.[**ClickHere**](https://github.com/SmartInterns-Content/AI-ML-DA-Templates/blob/main/Machine%20Learning%20and%20Natural%20Language%20Processing%20Templates/Final%20submission.png)

Forthedocumentation,Kindlyrefertothelink.[**ClickHere**](https://github.com/SmartInterns-Content/AI-ML-DA-Templates/blob/main/Machine%20Learning%20and%20Natural%20Language%20Processing%20Templates/ML%20%26%20NLP%20Final%20Project%20Report%20Template.pdf)

# Milestone6:Project Demonstration

IntheupcomingmodulecalledProjectDemonstration,individualswillberequiredtorecordavideoby sharing their screens. They will need to explain their project and demonstrate its execution during the presentation.