**TEAM –** DHEEMAHI

**PROJECT -** SMART PASHUDHAN

**PROBLEM STATEMENT ID –**25005

**PROBLEM STATEMENT TITLE -** IMAGE BASED ANIMAL TYPE CLASSIFICATION FOR CATTLE AND BUFFALOES

**CATEGORY:** SOFTWARE

**MINISTRY OF FISHERIES, ANIMAL HUSBANDRY & DAIRYING**

**DESCRIPTION:**

**Background:** In dairy farming, evaluating the body structure of animals is vital to predict their longevity, productivity, and reproductive efficiency. Traditionally, Animal Type Classification (ATC)—which involves scoring animals for physical traits—is conducted by trained personnel through visual inspection and manual measurement of specific body parts. However, this manual method is prone to human error and subjectivity, even with trained professionals, resulting in inconsistent and potentially unreliable data.

With advances in Artificial Intelligence (AI) and image processing technologies, there is an opportunity to automate this process. Automated scoring based on images can ensure standardization, minimize observer bias, and improve the reliability of data captured for scientific and breeding purposes.

**Description:** The Government of India is implementing the Rashtriya Gokul Mission (RGM) since December 2014, aiming to conserve and develop indigenous bovine breeds, genetically upgrade the bovine population, and enhance milk productivity. Under this mission, Progeny Testing (PT) and Pedigree Selection (PS) programs are being carried out in key dairy breeds across the country to produce high genetic merit bulls for breeding purposes.

Animal Type Classification (ATC) is a crucial step in identifying top-performing elite dams, which are potential mothers of future breeding bulls. Currently, ATC is performed manually by a trained Animal Typer who visually examines and measures physical traits, and then records the scores in the Bharat Pashudhan App (BPA). Despite training, errors due to fatigue, bias, or measurement inaccuracies can adversely affect data quality and scientific analysis.

There is a need for an AI-driven solution that can automate this classification process by analyzing animal images, extracting body structure parameters, and assigning standardized scores with minimal human intervention. If integrated with BPA, such a solution would enhance the accuracy, efficiency, and scientific validity of animal evaluation under PT and PS programs.

**Expected Solution:** Students are expected to develop an AI-based Auto Recording of Animal Type Classification System that can:

* Use images of cattle and buffaloes to evaluate physical traits relevant to Animal Type Classification.
* Extract and quantify specific body structure parameters (e.g., body length, height at withers, chest width, rump angle, etc.) using AI and image processing techniques.
* Generate objective and consistent classification scores.
* Auto-record and store the classification data in a structured format.
* Provide seamless integration with BPA to auto-save the classification records at the time of evaluation.
* Be user-friendly and operable by field personnel with minimal technical skills.

**OUR SOLUTION:**

We propose an AI-powered, automated Animal Type Classification system that replaces manual scoring and provides accurate, standardized, and real-time evaluation of cattle and buffalo traits.

**KEY FEATURES:**

* Mobile App for Farmers
* Capture multi-angle images of animals.
* Enter animal ID and location.
* Receive automated ATC score and recommendations.
* Offline-first design for field use.
* AI/ML-Based Image Analysis
* Detect animals using YOLOv8.
* Identify body landmarks (height, body length, chest width, rump angle, etc.).
* Extract body parameters and compute ATC score.
* Predict longevity, productivity, and reproductive efficiency.
* Web Dashboard for Admins
* View region-wise statistics, average ATC scores, and trends.
* Map-based drill-down from India → State → District.
* Filter and analyze data for policy-making and breeding programs.
* Integration with Government Platforms
* Seamless syncing with Bharat Pashudhan App (BPA).
* Eliminates manual data entry and ensures standardized records.
* Decision Support & Recommendations
* Provide actionable suggestions for improving animal health, productivity, and breeding potential.
* Identify elite dams for progeny testing and breeding programs.

**ATC Project Workflow:**

**1. Image Capture**

* Farmer/field personnel uses a mobile app to take multi-angle photos of cattle or buffalo.
* Each animal has a unique ID and location is recorded.

**2. Image Preprocessing**

* Remove background and noise.
* Resize and normalize images.
* Enhance quality for better landmark detection.

**3. Animal Detection & Landmark Identification**

* Detect the animal in the image (YOLOv8).
* Identify key body landmarks:
* Height at withers
* Body length
* Chest width
* Rump width/angle
* Body depth

**4. Body Parameter Extraction**

* Measure physical traits using AI/ML and image processing.
* Convert measurements into standardized numeric values for scoring.

**5. ATC Scoring**

* Use the extracted parameters to compute Animal Type Classification (ATC) score.
* Predict:
* Longevity (how long the animal will stay productive)
* Productivity (milk yield potential)
* Reproductive efficiency (ease of breeding)
* Use ML models (e.g., regression or deep learning) for scoring.

**6. Reporting & Recommendations**

* Generate automated report per animal:
* Trait-wise measurements
* ATC score
* Suggestions for improvement
* Display results in mobile app for farmers.

**7. Data Storage & Dashboard**

* Auto-save all data to database / BPA integration.
* Admins can view:
* Total animals evaluated
* Average ATC per region
* Trends in productivity/longevity
* Map-based drill-down (India → State → District → Local)

**IMPACT:**

* Eliminates human error and subjectivity.
* Scales evaluation across large herds efficiently.
* Supports Rashtriya Gokul Mission objectives of conserving and improving indigenous breeds.
* Provides farmers and policymakers actionable insights for improving livestock productivity.