

IDEATION PHASE: BRAINSTORM & IDEA PRIORITIZATION

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Project Name: AI-Powered Dog Breed Identification using Transfer Learning

STEP-1: TEAM GATHERING AND PROBLEM SELECTION

Brainstorming provides an open environment for creative thinking to lead to effective problem-solving. For this project, the team focused on identifying 120 different dog breeds with high accuracy.

- **Identified Problem Area:** Manual dog breed identification is time-consuming, requires expert knowledge, and is prone to human error due to fine-grained visual similarities between breeds.
- **Finalized Problem Statement:** Current manual methods are inefficient for large-scale classification. There is a need for an automated AI system capable of identifying 120 breeds from single images (JPG/PNG) using deep learning techniques.

STEP-2: BRAINSTORMING, IDEA LISTING AND GROUPING

During this phase, we prioritized volume over value to generate diverse ideas for the classification system.

Generated Ideas	Idea Grouping
• Manual Feature Extraction (SIFT/ORB)	• Traditional Computer Vision: Using hand-crafted features and classical algorithms.
• Support Vector Machines (SVM)	• Machine Learning: Classification using traditional ML algorithms.
• Building a Custom CNN from scratch	• Deep Learning: End-to-end CNN-based classification.

<ul style="list-style-type: none"> • MobileNetV2 Transfer Learning 	<ul style="list-style-type: none"> • Transfer Learning: Leveraging pre-trained CNN architectures.
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STEP-3: IDEA PRIORITIZATION

To determine the best path forward, the team evaluated the ideas based on specific criteria to ensure the solution was both important and feasible.

Evaluation Criteria:

- **Accuracy Potential:** Ability to reach >60% validation accuracy.
- **Computational Efficiency:** Fast inference speed (<100ms) on standard hardware.
- **Implementation Complexity:** Ease of building a production-ready system.
- **Scalability:** Capability to handle 120 distinct classes.

Selected Approach (Chosen Solution):

The team selected **Transfer Learning using MobileNetV2**.

- **Why:** It provides higher classification accuracy, faster convergence (training in ~30-60 minutes), and efficient feature extraction while reducing overall training complexity compared to building a model from scratch.
- **Outcome:** Achieved a validation accuracy of **67.26%** with a lightweight model size suitable for web deployment.