

Case Study Rubric

Due: TBD

Submission format: Upload PDF and link to GitHub repo to Canvas

General Description:

Submit to Canvas both your final case study PDF and a link to your fully organized GitHub repository.

Why am I doing this?

This case study gives you the opportunity to demonstrate your technical and conceptual abilities in a cohesive, realistic project. You will work with image data and classification techniques in a scenario modeling the types of challenges faced in animal shelters, veterinary clinics, or pet adoption centers. This assignment mirrors real-world situations where analysts and practitioners rely on visual recognition systems to make informed, time-sensitive decisions. Completing this study will help you practice structuring a project, applying methods you have learned, and communicating insights clearly and professionally.

What am I going to do?

Throughout this course, you have developed skills in data handling, modeling, evaluation, and interpretation. Now, you will apply these skills independently in a case study centered on dog-breed visual recognition. You will recreate a simplified workflow using dog-image data, explore patterns in the dataset, build and justify a baseline model, evaluate its performance, and reflect on uncertainty and bias. Your final deliverables will include:

- **Written portion PDF** – containing background, methods, results, analysis, and references
- **GitHub repository** – containing all scripts, materials, and instructions needed to reproduce your work

How will I know I have succeeded?

You will have met expectations when you follow the criteria outlined in the rubric below and produce a coherent, reproducible analysis that a 2nd-year student could pick up and complete using only your materials.

Category	Details
Formatting	<p>Submit each component listed in this rubric according to the guidelines below.</p> <ul style="list-style-type: none">• Written Portion: Submit as a clean, well-formatted PDF.• Data & Code: Submit all scripts, figures, and reproducibility materials in

	<p>a GitHub repository titled CS-[YourFirstNameLastName]. Include instructions for how to run your code.</p> <ul style="list-style-type: none"> References: Include a separate References section at the end of your PDF using IEEE citation style. The PDF must include a working link to your GitHub repository.
Written Portion	<p>Your PDF should clearly communicate your understanding, decision-making, and results. Include the components below:</p> <ul style="list-style-type: none"> Problem Summary: Describe the dog-breed image classification problem, why it matters (shelters, veterinary clinics, identification needs), and what your model aims to accomplish. (Small paragraph) Methods & Analysis Plan: Explain your workflow for preparing data, training the CNN, selecting hyperparameters, and evaluating performance. Include a simple graphic outlining your analysis plan. (Small paragraph + figure) Results: Present your model performance (accuracy), interpret the outcomes, and explain their significance in the context of your scenario. Discuss breed-specific challenges, misclassifications, or strengths. Reflection: <ul style="list-style-type: none"> Describe any challenges encountered (preprocessing, training time, variance in images) and how you addressed them. Explain what you might have done differently and any improvements you would make in future work.
Code	<p>Your GitHub repository should include all of the following:</p> <ul style="list-style-type: none"> Exploratory Data Analysis: Visualizations of class distribution, sample images, image dimensions, or other relevant characteristics from your eight selected dog breeds.

	<ul style="list-style-type: none"> • Modeling Workflow: A complete, reproducible pipeline using transfer learning with a CNN (ResNet-18). This should include: <ul style="list-style-type: none"> ○ Scripts for preprocessing and loading images. ○ A training script implementing your CNN with an 80/20 train-test split. ○ Evaluation code producing your final accuracy and additional metrics if used. • Reproducibility Materials: Instructions for running the model, environment dependencies, folder structure, and any required setup steps. • Code should be commented clearly so readers can follow your decision-making and process.
References	<p>At the end of the written portion, include a complete section of references in IEEE format. Cite all sources that were not previously provided, CNN resources, software libraries, and any external materials used.</p>