

## **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.

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

	<p>a GitHub repository titled CS-[YourFirstNameLastName]. Include instructions for how to run your code.</p> <ul style="list-style-type: none"> <li>• 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.</li> </ul>
<b>Written Portion</b>	<p>Your PDF should clearly communicate your understanding, decision-making, and results. Include the components below:</p> <ul style="list-style-type: none"> <li>• 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)</li> <li>• Methods &amp; 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)</li> <li>• 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:</li> <li>• Describe any challenges encountered (preprocessing, training time, variance in images) and how you addressed them.</li> <li>• Explain what you might have done differently and any improvements you would make in future work.</li> </ul>
<b>Code</b>	<p>Your GitHub repository should include all of the following:</p> <ul style="list-style-type: none"> <li>• Exploratory Data Analysis: Visualizations of class distribution, sample images, image dimensions, or other relevant characteristics from your eight selected dog breeds.</li> </ul>

	<ul style="list-style-type: none"> <li>• Modeling Workflow: A complete, reproducible pipeline using transfer learning with a CNN (ResNet-18). This should include:           <ul style="list-style-type: none"> <li>◦ Scripts for preprocessing and loading images.</li> <li>◦ A training script implementing your CNN with an 80/20 train-test split.</li> <li>◦ Evaluation code producing your final accuracy and additional metrics if used.</li> </ul> </li> <li>• Reproducibility Materials: Instructions for running the model, environment dependencies, folder structure, and any required setup steps.</li> <li>• Code should be commented clearly so readers can follow your decision-making and process.</li> </ul>
<b>References</b>	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.