**Final Project for STAT5171/6071(2021SP)**

**Deadline**: April 26th, Monday

**Project Objective**: Build a convolutional neural network for ‘deers\_frogs\_trucks.Rdata’ dataset and apply GradCAM and two uncertainty quantification methods to interpret the results.

* Please build a convolutional neural network to accurately predict the labels: deer (0), frog (1), and truck (2).
* To get the full credit for model performance, the prediction accuracy should be greater than 90% for test data (see Grading Criteria below).
* After fitting a CNN, students should apply GradCAM to some cases. Please report at least three interesting cases with interpretable results other cases as well).
* Students should also apply two different uncertainty quantification methods. Please apply them to both correctly and incorrectly classified test cases and see if the distributions of the predicted probabilities provide any useful information.

**Grading Criteria**: Here is the common rule for how the project will be graded for both options:

* Model performance (40 points): The model should achieve accuracy of 90% on the test data set. The score will be calculated as 100×(test accuracy-0.5).
* Overall quality of report (30 points): Data preparation, model fitting process, and analysis results should be clearly described in detail, along with proper reasoning.
* Overall quality of programing code (30 points): Students need to submit their R or python code (or any language) that is organized in a clear manner with proper comments.

NOTE: The R or Python outputs included in the report need to be properly tailored – Copying and pasting unedited raw outputs or screen shots with too much redundant information will lead to 30 points reduction from the final score.

**Submission Instruction**:

Students need to submit their report (.docx or .pdf) and code (as a separate .R or .py file). The report should include properly edited R output or screenshots to summarize and visualize the analysis results.

DO NOT submit .Rmd file without knitting it. Under any circumstances the instructor will not knit the file and the assignment will get zero score.