# Classifying Vegetarian and Non-Vegetarian Food at Social 704

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## 1. Overview

Determining whether a dish is vegetarian or non-vegetarian is a difficult problem that affects many students at UNC Charlotte. Through this project, we aim to solve the problem of classifying dishes at Social 704 as either vegetarian or non-vegetarian. The problem will be solved using input images exclusively of dishes at Social 704. Once the data set has been assembled, key features of the images will be used to classify images as vegetarian or non-vegetarian, after which machine learning techniques will be applied to create a model, which will then be tested and refined. During the final technology demo, a brief overview of the creation process will be presented, and an example of the working model will be demonstrated.

## 2. Problem

The problem we are aiming to solve is to use an image data source and a computer vision application in order to classify a given dish at Social 704 as vegetarian or non-vegetarian, and so help those with dietary restrictions identify the dish they are eating. For this project, a vegetarian dish is one that excludes meat and may or may not include animal by-products such as dairy and eggs, and is also non-vegan. A non-vegetarian dish is defined as all other dishes present. The input images will be limited by exclusively being from the Social 704 restaurant menu in order to prevent potential false positives and false negatives that may arise from different preparations and ingredients present of a similarly classed dish.

## 3. Solution

The proposed solution for categorizing vegetarian and non-vegetarian dishes from Social 704 using computer vision with the aid of machine learning has multiple steps. The solution will be developed in Python 3. First, multiple images of both vegetarian and non-vegetarian foods from Social 704 will be taken. This is done in order to create a data set for which a machine learning model can learn from, as a machine learning model cannot learn if it does not have its data to learn from. These images will be scanned for features using OpenCV's SIFT features which will create a bag of words which will then be manually classified as being for vegetarian or non-vegetarian foods. The criteria for whether or not a food is considered vegetarian will be based off of Social 704's own menu classifications.

After labeling each image in the data set, the model for the food classification will be created. The data collected will first be split into training, test, and validation sets using scikit-learn's built in test_train_split function. Afterwards, the proposed model will utilize scikit-learn's SVM module in order to classify whether or not a given image of food is vegetarian or non-vegetarian. The accuracy of the model will then be evaluated and tweaked in order to create a model that can categorize foods at Social 704.

## 4. Proposed Final Technology Demo

After developing a model that can accurately classify food from Social 704 as being either vegetarian or non-vegetarian, the model will be demonstrated live in front of the class. First, a process of how the model was created over time will be shown which will illustrate the change in accuracy over time and how the model was developed. After providing the history of how the model was developed over time, the model will then be demonstrated live. A picture of food recently taken from Social 704 and classified which is completely foreign to the model will be provided on the day of demonstration, and additionally, food will be brought into class which will also be taken and categorized live. After capturing these images, they will be fed into them model, processed, and classified accordingly.