

Advancements made in computer-aided research are fundamental to scientific growth by allowing researchers to gather information more efficiently. In biology, scientists aspire to classify and catalogue the millions of species that exist on Earth. Species classification is necessary to the biological community because it allows researchers to study differences between different organisms, allowing them to learn more about their effects on their environment and other species. Through machine learning, our project will allow scientists to classify species of moths through the straightforward user interface of a website and mobile application. Moths have a critical ecological role as both pollinators and as prey to a variety of other species. The classification of their species is important to understanding the role that they have in their respective environments and impact on other forms of life. A simple interface will streamline moth classification by swiftly informing researchers of a moth's species given its image. Our user-friendly application will reduce the time and manpower required for moth classification by transitioning research from the field to a virtual platform.

We aim to develop an application that allows users to submit pictures of moths from their camera or photo gallery where the image will be processed by our two machine learning models. Our first model will be used to detect moths in the users' submissions. Then, the second model will classify the species of moth to the user. Both of our machine learning platforms will initially be trained through a large dataset of moth images. We intend to add the moth images submitted to our application into our dataset, allowing our machine learning models to continuously develop and become more accurate. We plan to uphold our goal of providing quick results by performing image classification calculations on a cloud platform. The website and mobile application will simply be a vehicle for users to submit and receive data from our cloud. Cloud computing will provide more efficient processing power so that our applications can focus on giving a faster interface when returning information back to the user.

Aside from our machine learning image classification, our application will give moth researchers the option to view image submissions to personally classify them. These classifications will improve the accuracy of our image processing by validating each image that is submitted. This will benefit users by supplying them with a platform to view different species of moths from our dataset while being able to classify the moths through a snapshot of their cell phone camera. Our goal is to create a mobile platform that will remove the time needed to conduct physical field research to classify moths. Instead, researchers will be able to use machine learning to get their results in seconds.

Our project will prove to be useful on both a practical and scientific level. Users will be able to photograph and understand a moth's species to further determine the effects that they play on their environment. Users can use this information to determine the types of plants that exist in the environment from the species of moth and the plants that they pollinate. Similarly, users can also determine the animals that exist in the same environment by deriving the group of predators that feed on a certain moth. Our project will also give moth researchers a location to view pre-existing images of moths with their respective species classification to conduct research from a screen instead of in a laboratory or a moth's environment. Every user of the application will be benefiting the study of moth species by adding each of their pictures to our dataset. This will give researchers the opportunity to study moth species outside of the field. The image classification step in their research will be completely automated, leaving them to make further contributions to analyzing moth species without having to spend time observing the physical characteristics of each moth.