

Course Project

EDUCATOR GUIDE

Title: Animal Recognition (object detection) with DeepLens

There is no shortage of challenges and issues that can arise on the job. Having the necessary knowledge and skills to identify solutions to complex problems is one of the top skills employers look for in employees especially in cloud roles. This course project simulates real-world tasks encountered by cloud professionals and challenges students to apply their AWS knowledge and technical skills to evaluate and recommend an efficient, secure and scalable solution.

Purpose:

To simulate real-world practice by providing a complex, authentic task designed to challenge students to apply their AWS and technical knowledge, critical thinking and problem solving skills in a real-world context.

Objectives:

The objective(s) of the course project are:

- Identify the most efficient solution to address the challenge;
- Compare and contrast alternative AWS solutions and services;
- Determine and apply the appropriate AWS architecture to create a stable, fault tolerant environment; and
- Summarize in writing the strengths and challenges of proposed solution(s).

Instructional Use Case(s):

- In-class Discussion
- Individual Student Assignment
- Group Project
- Self-paced learning with AWS Educate

Project Scenario:

Below is the course project information to be shared with the student. Determine how students will submit their responses based on your instructional use case. The project identifies assessed skills to support your planning efforts as you determine how to best use this content in your course(s). Additionally, you will find a “Guidance to Students” section and a “Resources” section to further support you as you assist your students. A separate “Student

Version” of the project is located at the end of this guide. You may share the student version with your students.

STUDENT INSTRUCTIONS: *You will be using the information provided in this scenario to design and build a solution, with the goals of utilizing edge processing as much as possible.*

SKILLS ASSESSED: *AWS DeepLens, SageMaker, Lambda, Greengrass, DynamoDB, ElasticBeanstalk, Critical Thinking*

PROJECT TITLE: *Animal Recognition project (object detection) with DeepLens*

SCENARIO:

Squirrels are curious and devious animals. They are often found ransacking bird feeders to get the food inside. You’ve been asked to track how many birds visit a bird feeder each day. And during that time, how many squirrels also visited the feeder.

Guidance for Students:

To assist students in drafting their response, encourage students to use the following guiding questions to formulate their written response:

Guiding Questions:	Cite Evidence from the Scenario/AWS Resource(s)
What problem are you trying to solve?	
Brainstorm possible solutions to address the identified problem.	
What are the strengths and challenges of each solution?	
Which solution is most efficient? Stable? Fault Tolerant? Secure?	
What AWS resources can you use to help address this problem?	
How must you present your response?	

Suggested steps (reference: <https://docs.aws.amazon.com/deeplens/latest/dg/deeplens-train-model.html>)

1. Define the solution architecture and any other services utilized in your solution
2. [Create an Amazon S3 Bucket](#)
3. [Create an Amazon SageMaker Notebook Instance](#)
4. [Edit the Model in Amazon SageMaker](#)
5. [Optimize the Model](#)
6. [Import the Model](#)
7. [Create a Lambda Function](#)

8. [Create a New AWS DeepLens Project](#)
9. [Review and Deploy the Project](#)
10. [View Your Model's Output](#)

Recommended Resources:

DeepLens Portal	https://aws.amazon.com/deeplens/
DeepLens Developer Guide: Getting Started	https://docs.aws.amazon.com/deeplens/latest/dg/deeplens-prerequisites.html
Project example	https://aws.amazon.com/deeplens/community-projects/Backyard_Birder/

STUDENT VERSION

Project Title: Animal Recognition project (object detection)
Skills Assessed: AWS DeepLens, SageMaker, Lambda, Greengrass, DynamoDB, ElasticBeanstalk, Critical Thinking

You will be using the information provided in this scenario to design and build a solution, with the goals of utilizing edge processing as much as possible.

Scenario:

Squirrels are curious and devious animals. They are often found ransacking bird feeders to get the food inside. You've been asked to track how many birds visit a bird feeder each day, and during that time, how many squirrels also visited the feeder, using an AWS DeepLens product.

The AWS DeepLens hardware allows locally running image processing to occur using trained models from a variety of machine learning methodologies. The graphics processing hardware allows for low latency video stream processing at the edge (i.e. disconnected from the cloud).

This project uses an included sample MXNet trained model (deeplens-object-detection), to identify the bird feeder visitors. The sample model is able to identify birds with reasonable accuracy. There is no classification for squirrels in this model but they score relatively likely against the "cat" and "dog" classifier. Upon a high identification probability score of recognizing a bird or a squirrel, a message is published to a message topic (MQTT) where a listener process will tally the counts and store them in a database where a daily squirrel vs. bird scorecard can be accessed via the web.

If a bird feeder, squirrels and birds are not within reach or possible to utilize, this project can be modified to identify any two objects of your choice.