SEOUL

19.09.26

DEV DAY

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모두를 위한 컴퓨터 비전 딥러닝 툴킷, GluonCV 따라하기

1. Overall Lab Guide / Amazon SageMaker Ground Truth

김무현 데이터 사이언티스트
Amazon Machine Learning Solutions Lab

aws

Our mission at AWS

Put machine learning in the hands of every developer

The Amazon ML stack: 가장 넓고 깊은 기능

AI SERVICES

App 개발자용

Vision
- REKOGNITION IMAGE
- REKOGNITION VIDEO
- TEXTRACT NEW

Speech
- POLLY
- TRANSCRIBE

Language
- TRANSLATE
- COMPREHEND

Chatbots
- LEX

Forecasting
- FORECAST NEW

Recommendations
- PERSONALIZE NEW

ML SERVICES

ML 개발자 및 데이타 과학자용

AMAZON SAGEMAKER

BUILD
- Pre-built algorithms & notebooks
- Data labeling (GROUND TRUTH) NEW
- Algorithms & models (AWS MARKETPLACE FOR MACHINE LEARNING) NEW

TRAIN
- One-click model training & tuning
- Optimization (NEO) NEW
- Reinforcement learning NEW

DEPLOY
- One-click deployment & hosting

ML FRAMEWORKS & INFRASTRUCTURE

ML 연구자 및 학계용

Frameworks
- TensorFlow NEW
- mxnet
- PYTORCH

Interfaces
- GLUON
- Keras

Infrastructure
- EC2 P3 & P3DN NEW
- EC2 C5
- FPGAs
- GREENGRASS
- ELASTIC INFERENCE NEW
- INFERENTIA NEW

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Amazon SageMaker

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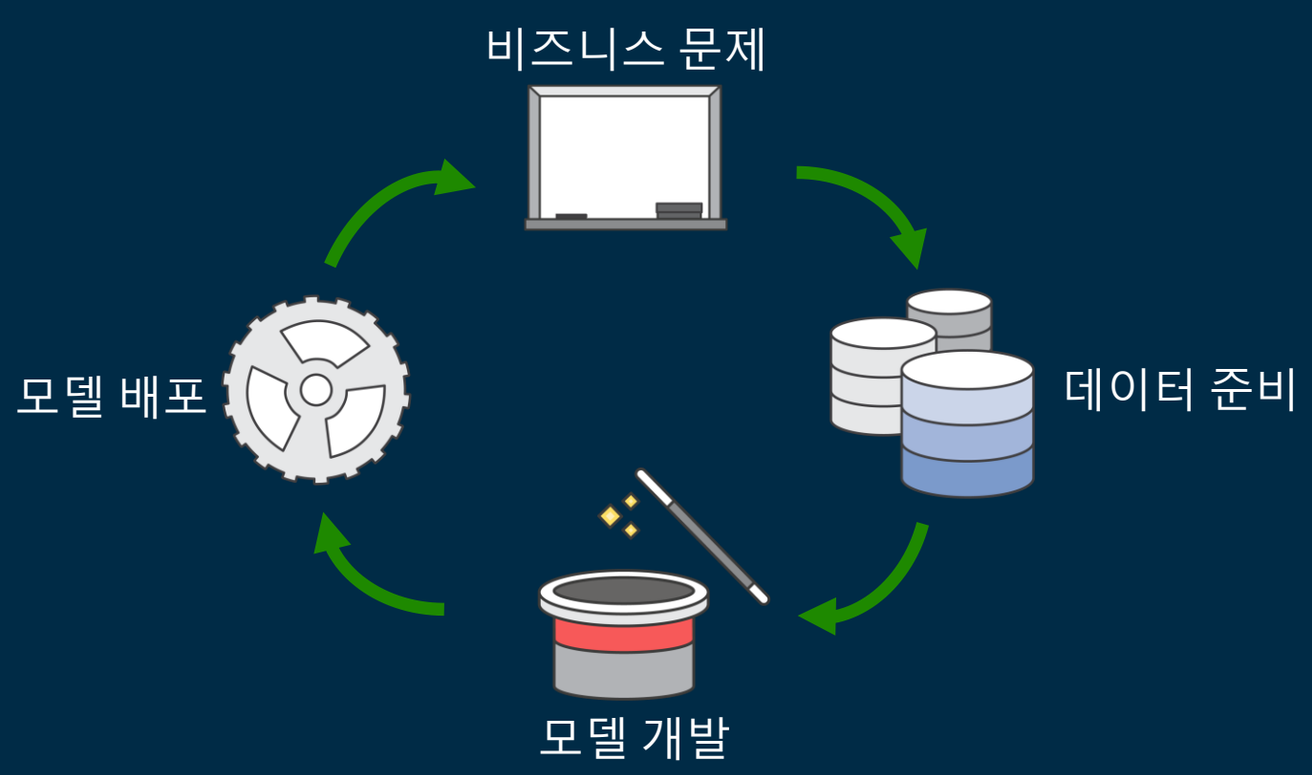
머신러닝 사이클



Amazon SageMaker: Build, train, and de ploy ML

Pre-built notebooks for common problems	Built-in, high performance algorithms	One-click training	Optimization	One-click deployment	Fully managed with auto-scaling
Collect and prepare training data	Choose and optimize your ML algorithm	Set up and manage environments for training	Train and tune model (trial and error)	Deploy model in production	Scale and manage the production environment

Amazon Mechanical Turk

Introduction to Amazon Mechanical Turk

https://www.youtube.com/watch?v=Pjm1uYbuyk4

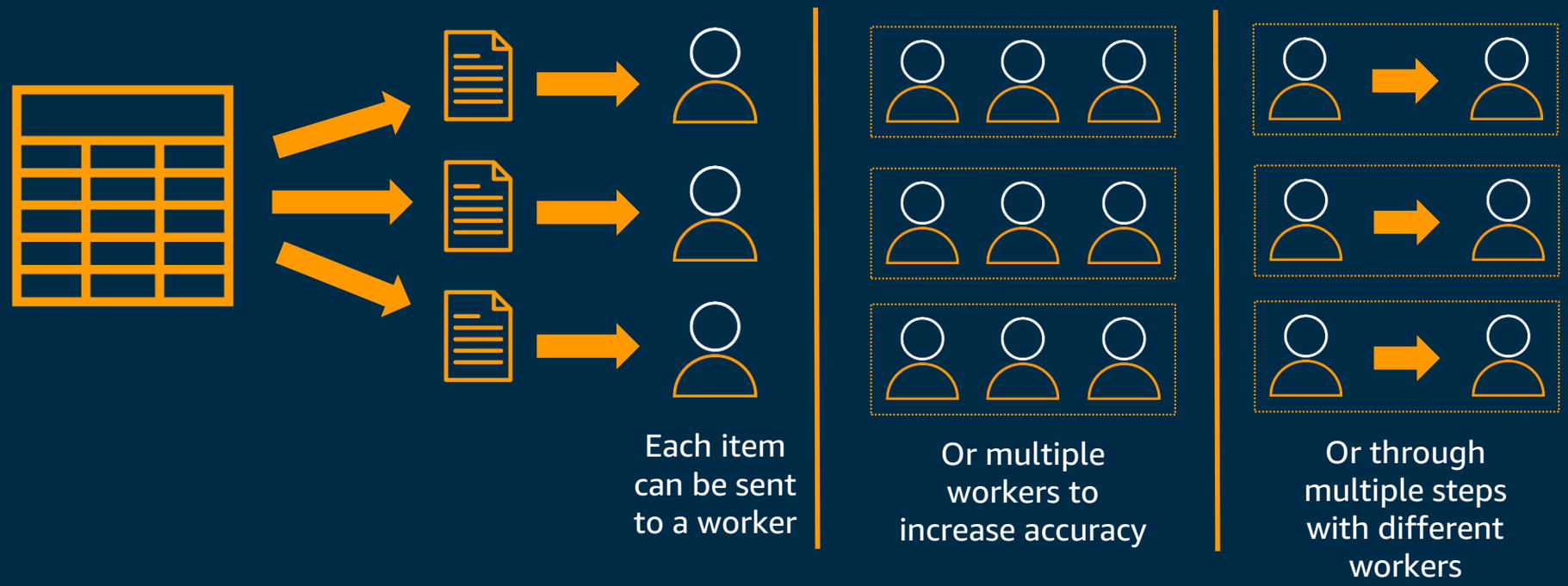
What is crowdsourcing?

Harnessing the collective power of many individuals

What is Amazon Mechanical Turk?

Amazon Mechanical Turk operates an online crowdsourcing marketplace for work that requires human intelligence

What kind of work is on Mechanical Turk?



Microwork: Typically small, repeatable tasks that give workers variety and flexibility

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NEW

Amazon SageMaker Ground Truth

레이블링 작업에 ML을 적용하여 정밀한 훈련 데이터셋
구축을 도와 드리고 작업 비용을 70%까지 줄입니다

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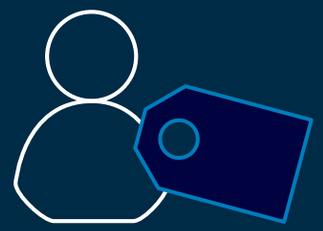
Amazon SageMaker Ground Truth

ML 훈련용 데이터를 쉽고 정확하게 레이블링

빠른 훈련 데이터 레이블링



손쉽게 레이블 인력 지원

정확한 결과 획득

KEY FEATURES

머신 러닝을 통한 자동 레이블링

Ready-made and custom workflows for image bounding box, segmentation, and text

Private and public human workforce

레이블 관리

Key Features

1. Worker Selection

2. Annotation Consolidation

combines the results of multiple worker's annotations into one high-fidelity label.

https://docs.aws.amazon.com/sagemaker/latest/dg/sms-annotation-consolidation.html

3. Automated Data Labeling

uses machine learning to label portions of your data automatically without having to send them to human workers.

https://docs.aws.amazon.com/sagemaker/latest/dg/sms-automated-labeling.html

1. Workforce Selection

Public

An on-demand 24 x7 workforce of over 500,000 independent Contractors worldwide, powered by Amazon Mechanical Turk

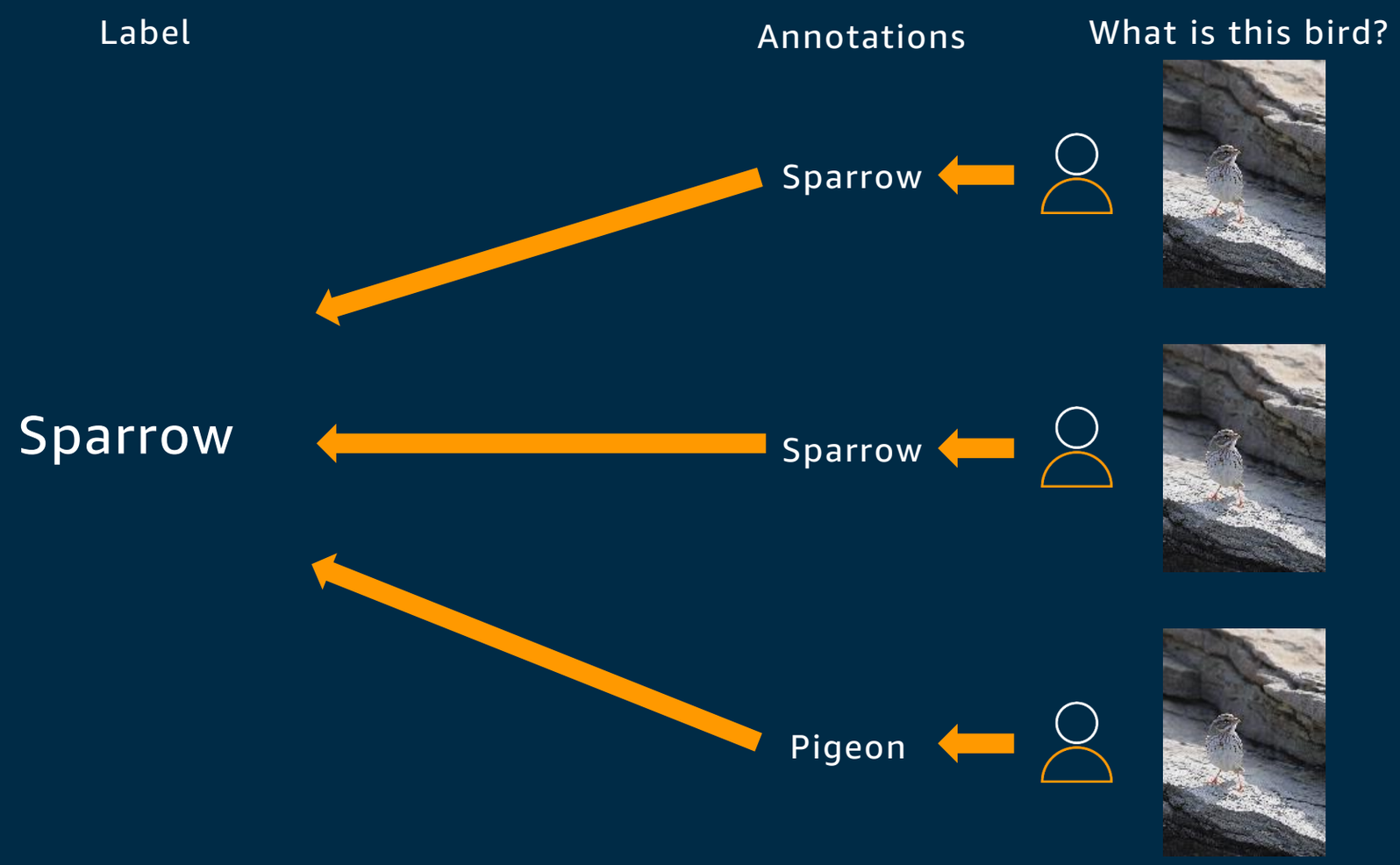
Private

A team of workers that you have sourced yourself, including your own employees or contractors for handling data that needs to stay within your organization

Vendors

A curated list of third party vendors that specialize in providing data labeling services, available via the AWS Marketplace

2. Annotation Consolidation - Why consolidate?



2. Annotation Consolidation - Why consolidate?

- The annotators are imperfect:
  - Hard / ambiguous examples
  - Cultural differences (e.g. golf course vs park)
  - Varying worker capabilities
- Solution: requesting redundant labels for each example, and combining them to improve quality
- Annotation Consolidation (AC): a suite of algorithms that enable this combination

Voting-based Label Consolidation

- Common solution: Majority Voting (MV) - baseline
- Improvement: some workers are better at certain tasks than the others => give their votes a higher preference

Probability-based Label Consolidation

0.7	0.9	0.5	0.3
bulldog	sharpei	bulldog	bulldog

Probabilities of correct labels

→ bulldog 0.1
sharpei 0.9

$$P(x_1, x_2, x_3, x_4|B) = \prod_i P(x_i|B) = 0.7 * 0.1 * 0.5 * 0.3 \approx 0.01$$

$$P(x_1, x_2, x_3, x_4|S) = \prod_i P(x_i|S) = 0.3 * 0.9 * 0.5 * 0.7 \approx 0.1$$

$$\frac{P(S|x_1, \ldots x_4)}{P(B|x_1, \ldots x_4)} = \frac{P(x_1, \ldots x_4|S)}{P(x_1, \ldots x_4|B)} \approx 10$$

Annotation Consolidation

- Technical challenge: how do we infer worker quality?

- Our approach: an improvement of the well-known Dawid Skene algorithm*, doesn't require a test dataset

* Dawid AP, Skene AM. Maximum likelihood estimation of observer error-rates using the EM algorithm. Applied statistics. 1979 Jan 1:20-8.

Annotation Consolidation

Algorithm: modified Dawid-Skene (MDS) model

Estimate individual worker accuracies AND the final label at the same time

The exact algorithms are slight different per each task

Resources

Paper: Dawid, A. P., & Skene, A. M. (1979). Maximum likelihood estimation of observer error-rates using the EM algorithm. Journal of the Royal Statistical Society: Series C (Applied Statistics), 28(1), 20-28 (pdf)

Blog: https://aws.amazon.com/ko/blogs/machine-learning/use-the-wisdom-of-crowds-with-amazon-sagemaker-ground-truth-to-annotate-data-more-accurately/

Implementation Code (Jupyter notebook): https://github.com/awslabs/amazon-sagemaker-examples/blob/master/ground_truth_labeling_jobs/annotation_consolidation/ACSBlogPost.ipynb

3. Automated Data Labeling

Optional - you don't have to

Supported task (now)

Image classification, Object detection, Text classification

Guides & Tips

Strongly suggest a minimum with 5,000 objects

Higher accuracy requirements = less number of auto-labeled data

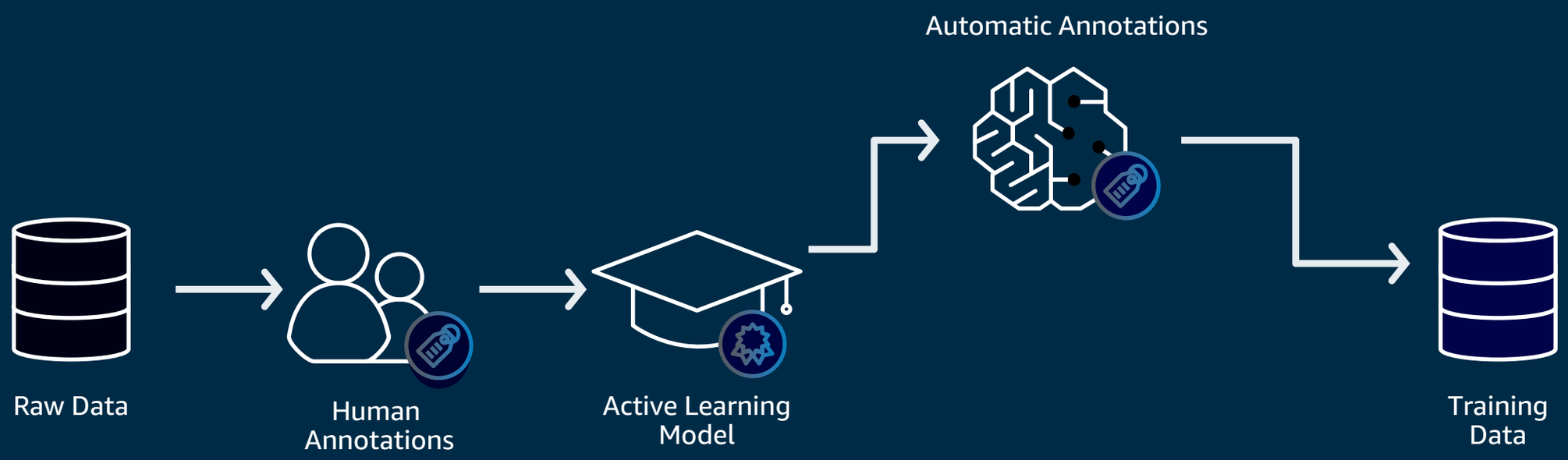
https://docs.aws.amazon.com/sagemaker/latest/dg/sms-automated-labeling.html

Active Learning Loop

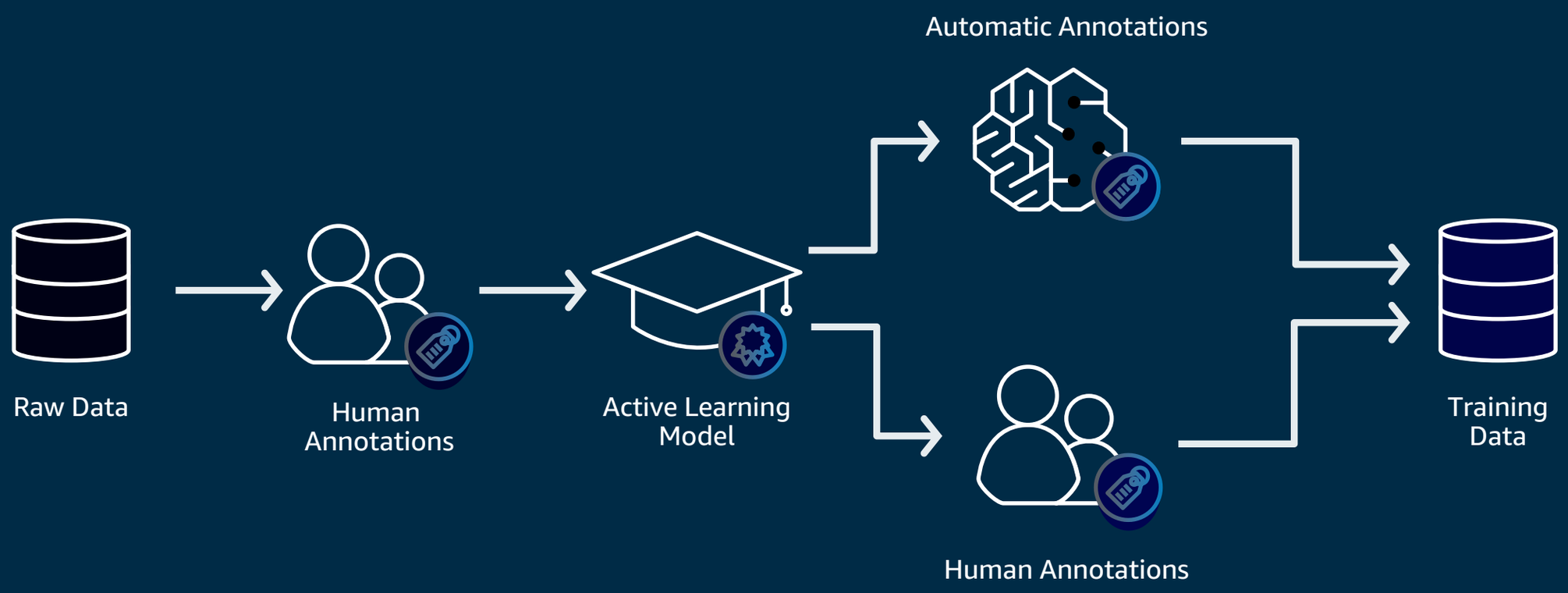
Raw Data

Active Learning Loop

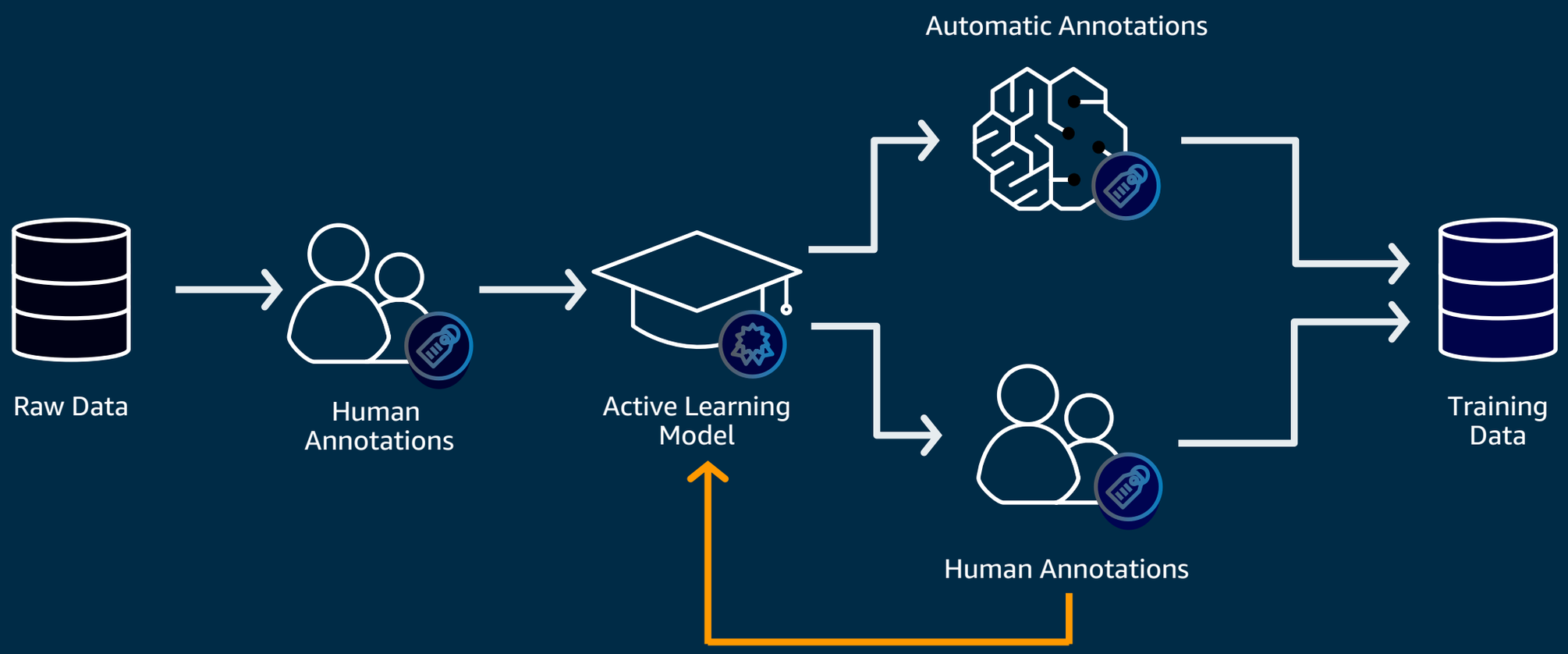
Active Learning Loop



Active Learning Loop



Active Learning Loop

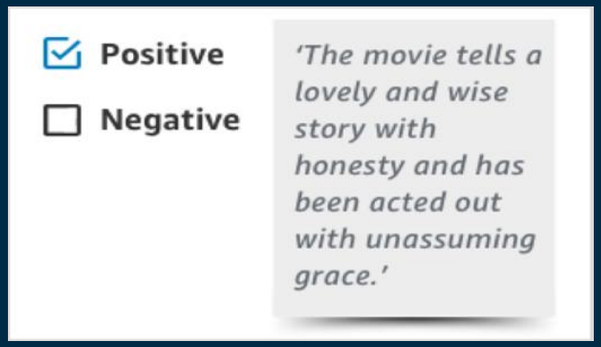


Use Pre-built Labeling Workflows or Set Up Your Own

Bounding boxes

Image classification

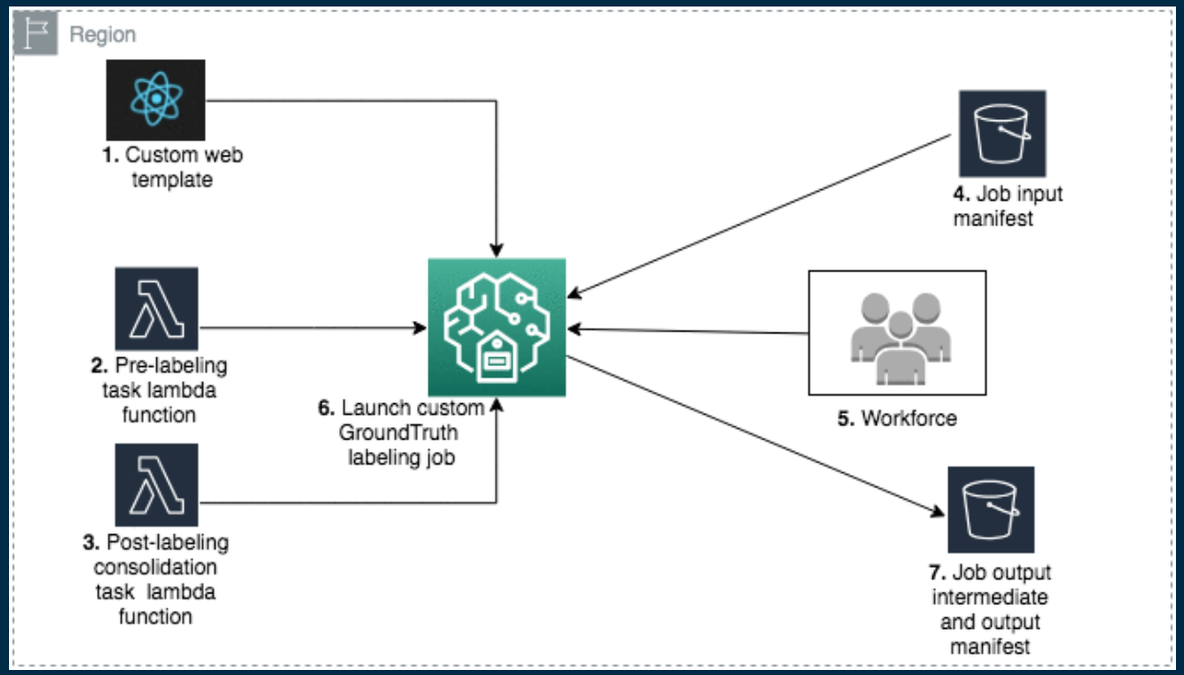
Semantic segmentation

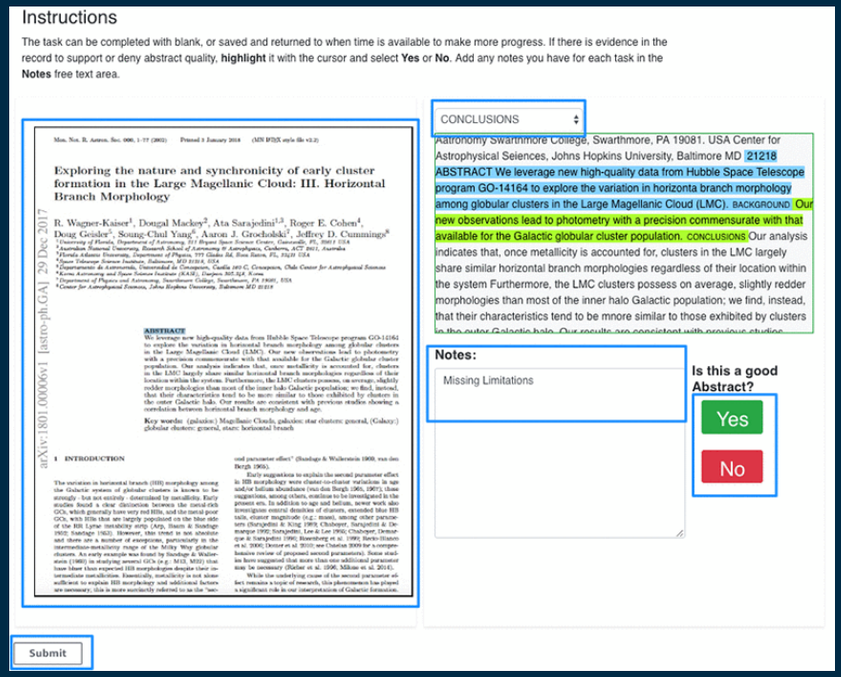


Text classification

Custom

How to Set Up Your Own Custom Labeling Workflow

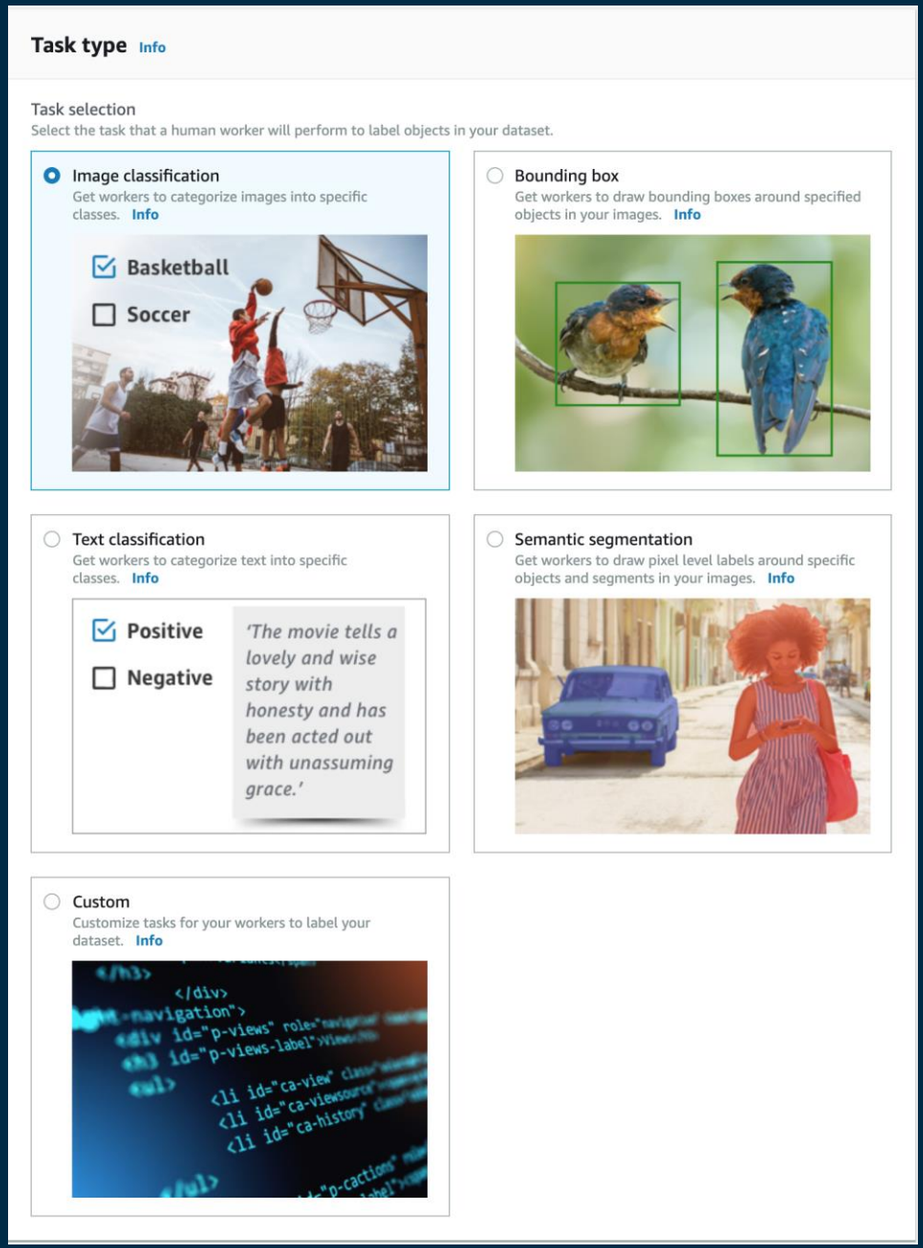




https://aws.amazon.com/blogs/machine-learning/build-a-custom-data-labeling-workflow-with-amazon-sagemaker-ground-truth/

https://github.com/nitinaws/gt-custom-workflow

Demo



Amazon SageMaker > Labeling jobs > Create labeling job

Step 1
Specify job details

Step 2
Select workers and configure tool

Select workers and configure tool

Workers Info

Worker types

- (●) **Public**
  An on-demand 24/7 workforce of over 500,000 independent contractors worldwide powered by Amazon Mechanical Turk.
- ( ) **Private**
  A team of workers that you have sourced yourself, including you own employees or contractors for handling data that needs to stay within your organization.
- ( ) **Vendor managed**
  A curated list of third party vendors that specialize in providing data labeling services, available via the AWS Marketplace.

Price per task
We recommend you choose a price consistent with the approximate time it takes to complete a task. We have provided time estimates for each price as guideline to help you decide how you want to price your task.

$0.840
Time estimate: 3 mins - 3.5 mins

☐ The dataset does not contain adult content. Info

☐ I understand that my dataset will be viewed by the Amazon Mechanical Turk public workforce and I acknowledge that my dataset does not contain personally identifiable information (PII). Info

▼ **Additional configuration - *optional***
Automated data labeling, workers per dataset object

Number of workers per dataset object
The number of distinct workers you want to perform the same task on a dataset object. This can help increase the accuracy of the data labels.

3 workers

Semantic segmentation

Use semantic segmentation to identify the contents of an image to the pixel level. Workers choose a class and then use the tool to surround portions of the image with a polygon. Workers can apply a different class to each polygon that they draw in the image. You define one or more classes when you create the labeling job. Use the instructions to guide your users to make the correct choices.

Learn more

- Amazon SageMaker Ground Truth

Amazon SageMaker > Labeling jobs > Create labeling job

Step 1
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number of workers on the SAME data

▼ **Additional configuration** - *optional*
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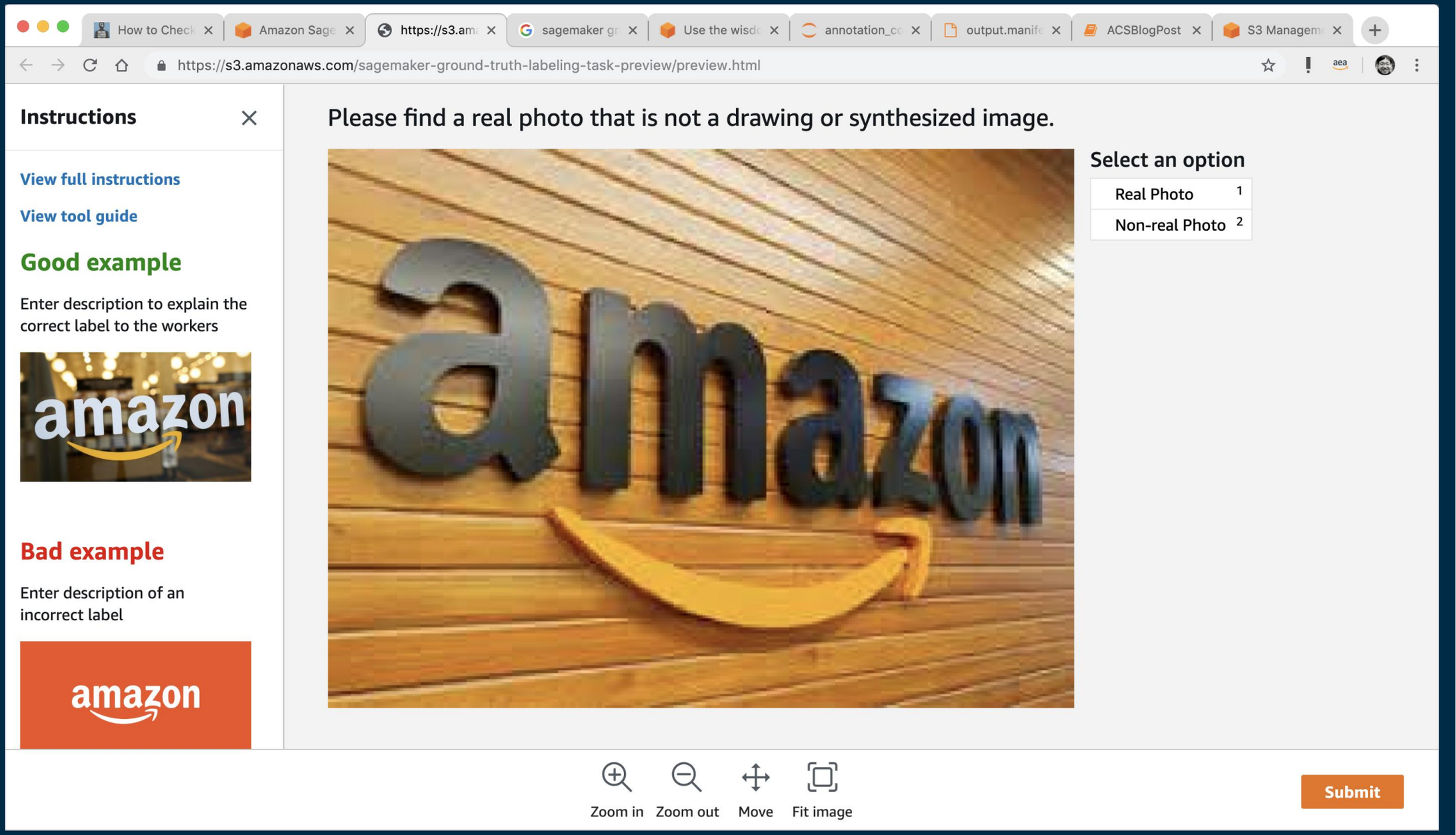
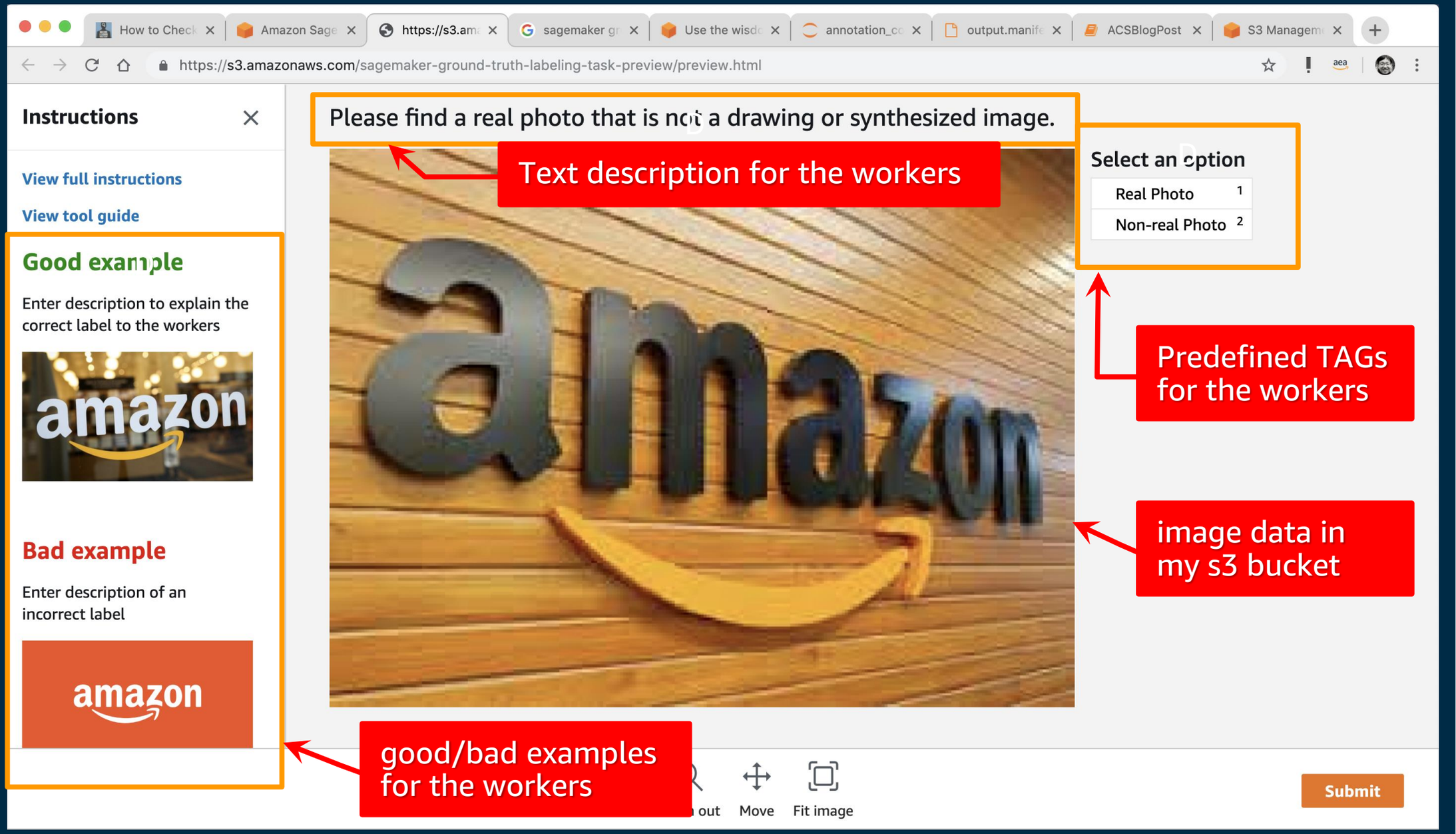




Hello Julia

https://aws.amazon.com/sagemaker/groundtruth/features/

Log out

Instructions

View full instructions

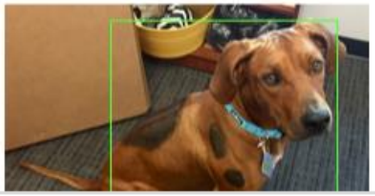
View tool guide

GOOD EXAMPLE

Only draw bounding boxes on dogs. The sides of the box should touch the top, bottom, left, and right boundaries of the dog.

BAD EXAMPLE

The box drawn below does not cover all sides of the dog.



Draw a bounding box on any dog that you see in the image.

Label

Dog 1

Example: Object Detection

Box | Undo | Redo | Zoom | Fit image | Move

Nothing to label

Submit

Hello Julia

https://aws.amazon.com/sagemaker/groundtruth/features/

Log out

Instructions

View full instructions

View tool guide

In this task, you will need to select the category that best describes the image.

Basketball

Swimming

Football

Which sport is played in the image?

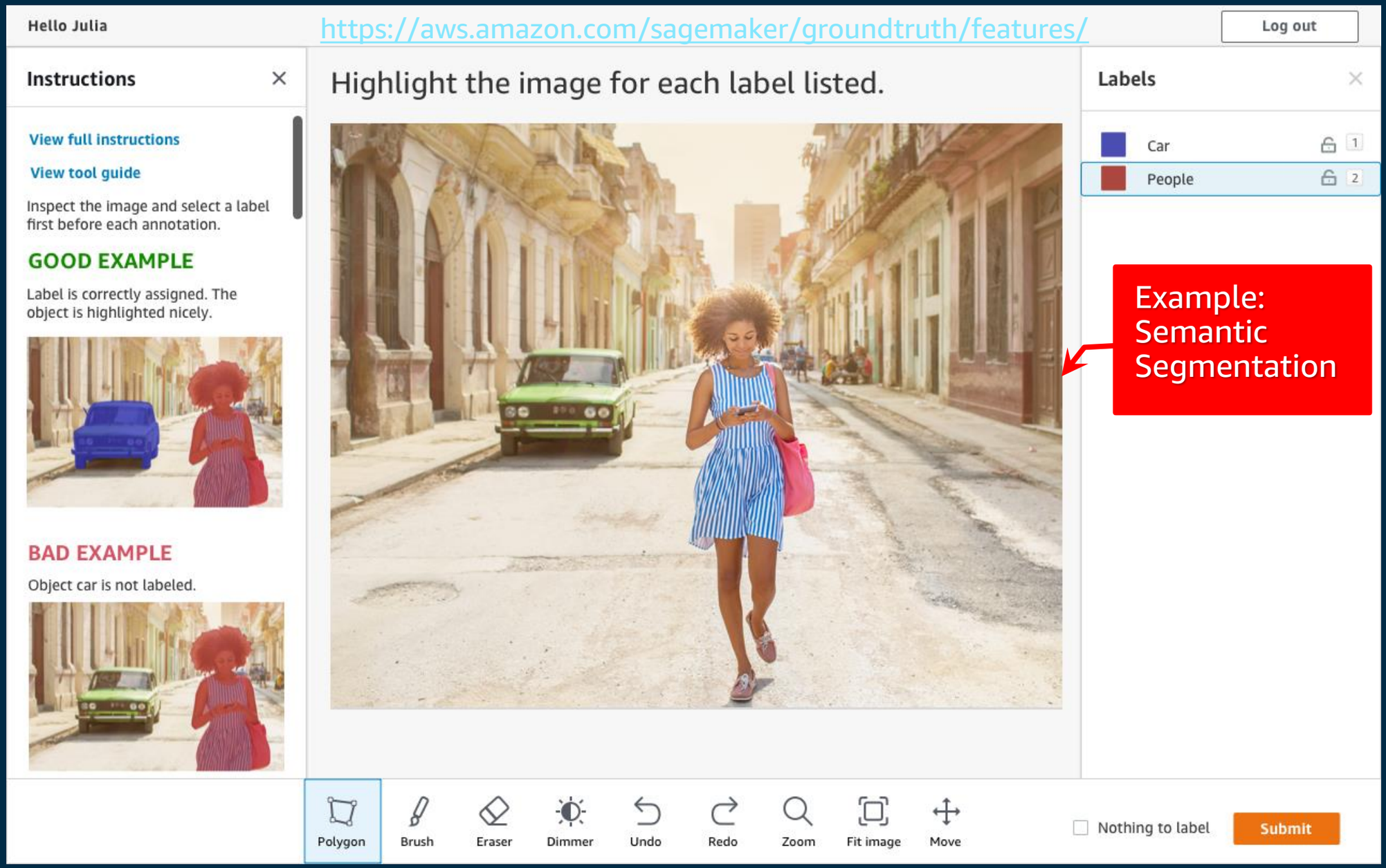
Select an option

- Basketball 1
- Swimming 2
- Football 3
- Soccer 4

Example: Image Classification

Zoom Fit image Move

Submit



Hello Julia

https://aws.amazon.com/sagemaker/groundtruth/features/

Log out

Instructions

View full instructions

View tool guide

Positive

Positive means some aspects of the text uncover a positive mood, such as praise, pleasure, recommendation or a favorable comparison.

Example: This view is amazing.

Negative

Negative means some aspects of the text uncover a negative mood, such as criticism, insults or a negative comparison.

Example: I dislike old cabin cruisers.

Neutral

Neutral means no emotions are implied.

Example: It's going to rain tomorrow.

Unsure

Select this option when you are not sure what sentiment the content is implied.

What is the overall sentiment in the text?

My boyfriend and I went to watch The Guardian. At first I didn't want to watch it, but I loved the movie- It was definitely the best movie I have seen in sometime. They portrayed the USCG very well, it really showed me what they do and I think they should really be appreciated more. Not only did it teach but it was a really good movie. The movie shows what the really do and how hard the job is. I think being a USCG would be challenging and very scary. It was a great movie all around. I would suggest this movie for anyone to see. The ending broke my heart but I know why

Select an option

- Positive 1
- Negative 2
- Neutral 3
- Unsure 4

Example: Text Classification

Submit

Thank you!

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19.09.26

여러분의 피드백을 기다립니다!

강연 평가 및 설문 조사
QR 코드를 통해 AWS DEV DAY SEOUL에 대한 여러분의 의견을 공유해주세요.
강연 평가 및 설문 조사에 참여해 주신 분께는 등록데스크에서 특별한 기념품을 드립니다.

강연 영상
AWS DEV DAY SEOUL 강연 영상은 행사 종료 후 메일로 공유드릴 예정입니다.

#AWSDEVDAYSEOUL
소셜미디어에 행사 참여 소감을 공유해주세요!

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