

Week #7 Labs

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7.1a: Terraform AWS Guestbook

4. Launching configuration

```
us-east-1 | +  
  
+ private_dns_name_options (known after apply)  
+ root_block_device (known after apply)  
}  
  
Plan: 1 to add, 0 to change, 0 to destroy.  
  
Changes to Outputs:  
+ ec2instance = (known after apply)  
  
Do you want to perform these actions?  
Terraform will perform the actions described above.  
Only 'yes' will be accepted to approve.  
  
Enter a value: yes  
  
aws_instance.guestbook: Creating...  
aws_instance.guestbook: Still creating... [10s elapsed]  
aws_instance.guestbook: Still creating... [20s elapsed]  
aws_instance.guestbook: Still creating... [30s elapsed]  
aws_instance.guestbook: Creation complete after 32s [id=i-0445136f5a67]  
  
Apply complete! Resources: 1 added, 0 changed, 0 destroyed.  
  
Outputs:  
ec2instance = "54.152.51.2"  
[cloudshell-user@ip-10-136-32-95 tf]$
```

| | | |
|---|--|--|
| Instance ID | Public IPv4 address | Private IPv4 addresses |
| i-0445136f5a6767f45 | 54.152.51.2 open address | 172.31.24.148 |
| IPv6 address | Instance state | Public IPv4 DNS |
| - | Running | ec2-54-152-51-2.compute-1.amazonaws.com open address |
| Hostname type | Private IP DNS name (IPv4 only) | |
| IP name: ip-172-31-24-148.ec2.internal | ip-172-31-24-148.ec2.internal | |
| Answer private resource DNS name | Instance type | Elastic IP addresses |
| - | t2.micro | - |
| Auto-assigned IP address | VPC ID | AWS Compute Optimizer finding |
| 54.152.51.2 [Public IP] | vpc-0a69d8c4861c0e6ec | Opt-in to AWS Compute Optimizer for recommendations. Learn more |

CloudShell
Actions ▾

us-east-1
+
metens
Aa
Actions

```
ec2instance = "54.152.51.2"
[cloudshell-user@ip-10-136-32-95 tf]$
```

CloudShell
Feedback
Privacy
Terms
Cookie

6. Adding ssh access

CloudShell

us-east-1 +

```
System load: 0.21      Processes: 107
Usage of /: 20.4% of 7.57GB  Users logged in: 0
Memory usage: 23%          IPv4 address for eth0: 172.31.18.238
Swap usage: 0%           

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

The list of available updates is more than a week old.
To check for new updates run: sudo apt update

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

ubuntu@ip-172-31-18-238:~$ ls
ubuntu@ip-172-31-18-238:~$ 
```

metens Aa
October 18, 2024 at 4:11PM
metens

7. Adding the guestbook application

```
CloudShell
us-east-1 + 

+ tags_all          = (known after apply)
+ vpc_id            = (known after apply)
}

Plan: 3 to add, 0 to change, 0 to destroy.

Changes to Outputs:
+ ec2instance = (known after apply)

Do you want to perform these actions?
Terraform will perform the actions described above.
Only 'yes' will be accepted to approve.

Enter a value: yes

aws_key_pair.kp: Creating...
aws_security_group.sg-guestbook: Creating...
aws_key_pair.kp: Creation complete after 0s [id=guestbook-key]
aws_security_group.sg-guestbook: Creation complete after 2s [id=sg-00bce4495fe0c900f]
aws_instance.guestbook: Creating...
aws_instance.guestbook: Still creating... [10s elapsed]
aws_instance.guestbook: Creation complete after 12s [id=i-05168e84060f2e9d3]

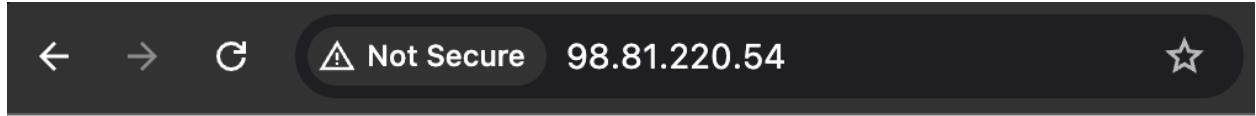
Apply complete! Resources: 3 added, 0 changed, 0 destroyed.

Outputs:

ec2instance = "98.81.220.54"
[cloudshell-user@ip-10-136-32-95 tf]$ 
```

The screenshot shows a CloudShell terminal window. At the top, it says "CloudShell" and "us-east-1". Below that is the Terraform command output. It starts with "Plan: 3 to add, 0 to change, 0 to destroy.", followed by "Changes to Outputs" which includes an entry for "ec2instance". A prompt asks "Do you want to perform these actions? Terraform will perform the actions described above. Only 'yes' will be accepted to approve." The user types "yes". Then, the process of creating resources is shown: "aws_key_pair.kp: Creating...", "aws_security_group.sg-guestbook: Creating...", and "aws_instance.guestbook: Creating...". The output ends with "Apply complete! Resources: 3 added, 0 changed, 0 destroyed." and an "Outputs:" section showing "ec2instance = \"98.81.220.54\"". The terminal prompt "[cloudshell-user@ip-10-136-32-95 tf]\$ " is at the bottom. To the right of the terminal, there is a dark sidebar with the name "metens", a timestamp "October 18, 2024 at 4:11 PM", and some small icons.

8. View the guestbook



Guestbook

Sign here

Entries

Nathan Metens <metens@pdx.edu>
signed on 2024-11-17
Hello Terraform on AWS!

7.1g: Terraform GCP Guestbook

4. Launching configuration

A screenshot of the Google Cloud Platform Cloud Shell interface. At the top, there's a navigation bar with 'Release Notes', a checkbox for 'tf-lab-vm' which is checked, the location 'us-west1-c', the IP address '10.138.0.23 (nic0)', and buttons for 'default' and 'SSH'. Below the navigation bar, there's a toolbar with icons for Cloud Shell, Terminal, and Open Editor, along with a rows per page selector set to 30 and a page number of 1 - 16 of 16. The main area is a terminal window titled '(cloud-metens)'. It contains the following text:

```
Enter a value: yes
google compute instance.default: Creating...
google compute instance.default: Still creating... [10s elapsed]
google compute instance.default: Still creating... [20s elapsed]
google_compute_instance.default: Creation complete after 30s [id=projects/cloud-metens/zones/us-west1-c/instances/tf-lab-vm]

Apply complete! Resources: 1 added, 0 changed, 0 destroyed.
metens@cloudshell:~/tf (cloud-metens)$
```

5. Adding and external IP address

```
Do you want to perform these actions?
Terraform will perform the actions described above.
Only 'yes' will be accepted to approve.

Enter a value: yes

google_compute_address.static: Creating...
google_compute_address.static: Still creating... [10s elapsed]
google_compute_address.static: Creation complete after 10s [id=projects/cloud-metens/regions/us-west1/addresses/ipv4-address]
google_compute_instance.default: Modifying... [id=projects/cloud-metens/zones/us-west1-c/instances/tf-lab-vm]
google_compute_instance.default: Still modifying... [id=projects/cloud-metens/zones/us-west1-c/instances/tf-lab-vm, 10s elapsed]
google_compute_instance.default: Modifications complete after 11s [id=projects/cloud-metens/zones/us-west1-c/instances/tf-lab-vm]

Apply complete! Resources: 1 added, 1 changed, 0 destroyed.

Outputs:

ip = "34.169.131.255"
metens@cloudshell:~/tf (cloud-metens)$
```



6. Adding ssh access

```
Apply complete! Resources: 1 added, 0 changed, 1 destroyed.

Outputs:

ip = "34.82.43.248"
metens@cloudshell:~/tf (cloud-metens)$ ssh metens@34.82.43.248
The authenticity of host '34.82.43.248 (34.82.43.248)' can't be established.
ED25519 key fingerprint is SHA256:wQrDWKsUDFFOnqr/m48Pay0ki3pvgiNXyqXtVzWWNn0.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '34.82.43.248' (ED25519) to the list of known hosts.
Welcome to Ubuntu 22.04.5 LTS (GNU/Linux 6.8.0-1017-gcp x86_64)

 * Documentation: https://help.ubuntu.com
 * Management: https://landscape.canonical.com
 * Support: https://ubuntu.com/pro

System information as of Mon Nov 18 21:29:15 UTC 2024

 System load: 0.07          Processes:           111
 Usage of /: 20.2% of 9.51GB  Users logged in:      0
 Memory usage: 5%            IPv4 address for ens4: 10.138.0.25
 Swap usage:  0%

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/*copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

metens@tf-lab-vm:~$ █
```

7. Adding the guestbook application

The resources being added, changed, or destroyed:

The metadata_startup_script which is our install.sh file is being added. The http-server tag is being added. Both ipv6_access_type and ipv6_address are being added. Scheduling and shielded_instance_config are being destroyed.

The “google_compute_instance.default must be replaced” forces a replacement on the metadata_startup_script which holds the data inside the install.sh file.

8. View the guestbook



Guestbook

[**Sign here**](#)

Entries

Nathan Metens <metens@pdx.edu>
signed on 2024-11-18
Hello Terraform on GCP!

7.2g: Kubernetes Guestbook

4. Create Kubernetes cluster

The name of the instance template dynamically generated to create the two nodes is “**gke-guestbook-default-pool-4f79fe89**”.

The name of the instance group dynamically generated that the two nodes belong to is “**gke-guestbook-default-pool-4f79fe89-grp**”

The names of the two nodes are: “**gke-guestbook-default-pool-4f79fe89-81nz**” and “**gke-guestbook-default-pool-4f79fe89-c2ht**”

5. Prepare a container image

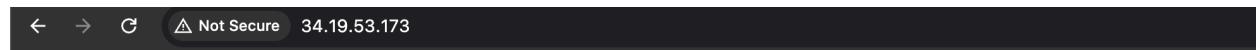
The screenshot shows the Google Cloud Artifact Registry interface. On the left, there's a sidebar with 'Artifact Registry' selected. The main area displays a Docker image named '9eeb71d059f99'. The 'OVERVIEW' tab is active, showing details like Format (Docker), Media type (application/vnd.docker.distribution.manifest.v2+json), Project (cloud-metens), Location (us), Repository (gcr.io), Image (gcp_gb), Digest (sha256:9eeb71d059f99797464a5051610fee4dbb704cdf9d19d90df0f8212944c8ba1f), Virtual size (1.2 GB), Built (Nov 18, 2024, 2:39:37 PM), and Created (Nov 18, 2024, 2:40:01 PM). There are also 'DELETE', 'SETUP INSTRUCTIONS', 'DEPLOY', and 'REFRESH' buttons at the top right.

7. Deploy the configuration

```
metens@cloudshell:~/cs430-src/05_gcp_datastore (cloud-metens)$ kubectl get pods
NAME           READY   STATUS    RESTARTS   AGE
guestbook-replicas-6lqn... 1/1     Running   0          109s
guestbook-replicas-7zs5r  1/1     Running   0          109s
guestbook-replicas-96fdh 1/1     Running   0          109s
metens@cloudshell:~/cs430-src/05_gcp_datastore (cloud-metens)$

metens@cloudshell:~/cs430-src/05_gcp_datastore (cloud-metens)$ kubectl get services
NAME      TYPE      CLUSTER-IP      EXTERNAL-IP      PORT(S)      AGE
guestbook-lb  LoadBalancer  34.118.227.209  34.19.53.173  80:31892/TCP  2m39s
kubernetes  ClusterIP  34.118.224.1    <none>        443/TCP     36m
metens@cloudshell:~/cs430-src/05_gcp_datastore (cloud-metens)$
```

8. View the guestbook



I restarted the lab a bunch of times and I keep getting the same results.

12. Deploy and view the application

```
Step #2: #####
Step #2: > Deployed Objects
Step #2:
Step #2: NAMESPACE      KIND          NAME        READY
Step #2: default        ReplicationController guestbook-replicas  Yes
Step #2: default        Service        guestbook-lb       Yes     http://34.19.53.173
Step #2:
Step #2: #####
Step #2: > GKE
Step #2:
Step #2: Workloads:      https://console.cloud.google.com/kubernetes/workload?project=cloud-metens
Step #2: Services & Ingress: https://console.cloud.google.com/kubernetes/discovery?project=cloud-metens
Step #2: Applications:   https://console.cloud.google.com/kubernetes/application?project=cloud-metens
Step #2: Configuration:  https://console.cloud.google.com/kubernetes/config?project=cloud-metens
Step #2: Storage:        https://console.cloud.google.com/kubernetes/storage?project=cloud-metens
Step #2:
Finished Step #2
PUSH
DONE
-----
ID: a3b94188-bc04-4d0f-bd5e-3167158f0d9b
CREATE_TIME: 2024-11-19T07:43:48+00:00
DURATION: 1M55S
SOURCE: gs://cloud-metens_cloudbuild/source/1732002227.605875-2729ffa83d1e4f82a8ca625bb3d0f08c.tgz
IMAGES: -
STATUS: SUCCESS
```

← → ⌂ Not Secure 34.19.53.173

Internal Server Error

The server encountered an internal error and was unable to complete your request. Either the server is overloaded or there is an error in the application.

Once again, I can't figure out how to fix this, I've tried everything.

7.3g: APIs (Slack, Knowledge Graph)

2. Code

Yes, google has a python package “**google-api-python-client**” that allows you to access the Knowledge Graph Search API.

3. Code

Constructing the query to send to Knowledge graph API:

```
90. req = kgsearch.entities().search(query=query, limit=1)
```

Executing the query to Knowledge Graph API:

```
91. res = req.execute()
```

“**make_search_request**” is the name of the method that sends the query to Knowledge Graph API.

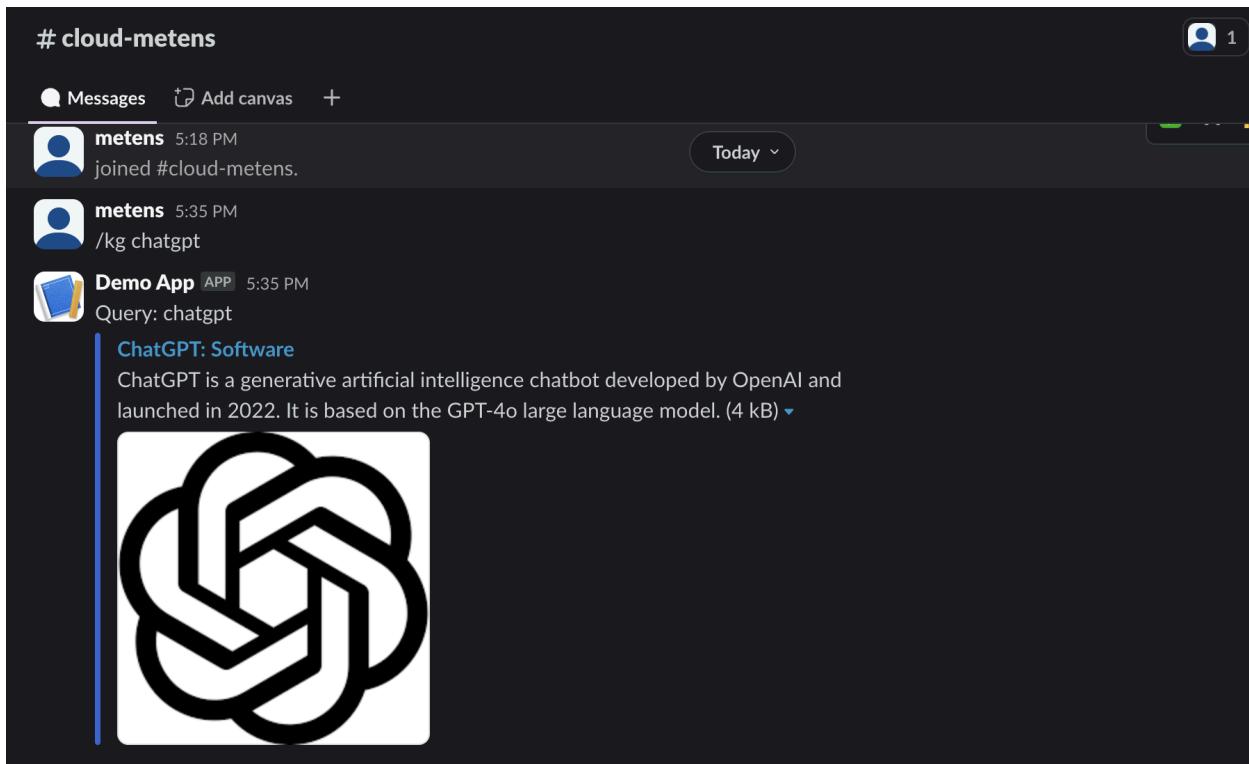
The data type of the message is a dictionary:

```
message = {
```

```
        "response_type": "in_channel",
        "text": f"Query: {query}",
        "attachments": [],
    }
```

The three main attributes of the message sent back to Slack are: “**response_type**”, “**text**”, and “**attachments**”.

8. Test the command



7.4g: ML APIs

3. Vision

```
(env) metens@cloudshell:~ (cloud-metens)$ cd ~/python-docs-samples/vision/snippets/detect
(env) metens@cloudshell:~/python-docs-samples/vision/snippets/detect (cloud-metens)$ python detect.py labels-uri gs://cloud-samples-data/ml-api-codelab/birds.jpg
Labels:
Bird
Ratite
Cloud
Sky
Beak
Plant
Green
Neck
Ostrich
Casuarinae
(env) metens@cloudshell:~/python-docs-samples/vision/snippets/detect (cloud-metens)$
```

The name of the function is: “**detect_labels_uri**”

The vision client: `client = vision.ImageAnnotatorClient()` which comes from the `google.cloud.vision` module.

The method called on the client is “**label_detection(image=image)**” to perform the detection.

The “**label_annotations**” attribute in the response object holds the results we seek.

```
(env) metens@cloudshell:~/python-docs-samples/vision/snippets/detect (cloud-metens)$ wget https://scarc.library.oregonstate.edu/omeka/files/original/79b0b89396d78364db1c561c7a32011f.jpg -O psulogo
--2024-11-19 02:58:11-- https://scarc.library.oregonstate.edu/omeka/files/original/79b0b89396d78364db1c561c7a32011f.jpg
Resolving scarc.library.oregonstate.edu (scarc.library.oregonstate.edu)... 128.193.164.143
Connecting to scarc.library.oregonstate.edu (scarc.library.oregonstate.edu)|128.193.164.143|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 26594 (26K) [image/jpeg]
Saving to: 'psulogo'

psulogo          100%[=====] 25.97K --.-KB/s   in 0.01s

2024-11-19 02:58:12 (1.84 MB/s) - 'psulogo' saved [26594/26594]

(env) metens@cloudshell:~/python-docs-samples/vision/snippets/detect (cloud-metens)$ python detect.py detect_logos psulogo
usage: detect.py [-h]
                  {faces,faces-uri,labels,labels-uri,landmarks,landmarks-uri,text,text-uri,logos,logos-uri,safe-search,safe-search-uri,properties,properties-uri,web,web-uri,web-geo,web-geo-uri,crophtints,crophtints-uri,document,document-uri,ocr-uri,object-localization,object-localization-uri}
...
detect.py: error: argument command: invalid choice: 'detect_logos' (choose from 'faces', 'faces-uri', 'labels', 'labels-uri', 'landmarks', 'landmarks-uri', 'text', 'text-uri', 'logos', 'logos-uri', 'safe-search', 'safe-search-uri', 'properties', 'properties-uri', 'web', 'web-uri', 'web-geo', 'web-geo-uri', 'crophtints', 'crophtints-uri', 'document', 'document-uri', 'ocr-uri', 'object-localization', 'object-localization-uri')
(env) metens@cloudshell:~/python-docs-samples/vision/snippets/detect (cloud-metens)$ python detect.py logos psulogo
Logos:
Portland State University
(env) metens@cloudshell:~/python-docs-samples/vision/snippets/detect (cloud-metens)$ 
```

The “**client.logo_detection(image=image)**” method is invoked.

4. Speech

```
[notice] A new release of pip is available: 24.2 -> 24.3.1
[notice] To update, run: pip install --upgrade pip
(env) metens@cloudshell:~/python-docs-samples/vision/snippets/detect (cloud-metens)$ cd ~/python-docs-samples/speech/snippets
(env) metens@cloudshell:~/python-docs-samples/speech/snippets (cloud-metens)$ python transcribe.py resources/audio.raw
Transcript: how old is the Brooklyn Bridge
(env) metens@cloudshell:~/python-docs-samples/speech/snippets (cloud-metens)$ 
```

The name of the function is: “**transcribe_file(audio_file: str)**”

The method invoked by the speech client to perform the detection is:

client.recognize(config=config, audio=audio)

The name of the attribute that contains the results we seek is called: **results**. (`response.results`)

5. Translate

```
[notice] A new release of pip is available: 24.2 -> 24.3.1
[notice] To update, run: pip install --upgrade pip
(env) metens@cloudshell:~/python-docs-samples/speech/snippets (cloud-metens)$ cd ~/python-docs-samples/translate/samples/snippets
(env) metens@cloudshell:~/python-docs-samples/translate/samples/snippets (cloud-metens)$ vim snippets.py
[1]+  Stopped                  vim snippets.py
(env) metens@cloudshell:~/python-docs-samples/translate/samples/snippets (cloud-metens)$ python snippets.py translate-text en '你有沒有帶外套'
Text: 你有沒有帶外套
Translation: did you bring a coat
Detected source language: zh-TW
(env) metens@cloudshell:~/python-docs-samples/translate/samples/snippets (cloud-metens)$ 
```

The name of the function is: **translate_text(target: str, text: str)**

The method invoked on the Translate client to perform the detection is **translate(text, target_language=target)**.

The name of the attribute that contains the results is: **result["translatedText"]**

6. Natural language

```
(env) metens@cloudshell:~/python-docs-samples/translate/samples/snippets (cloud-metens)$ python language.py 'homework is awful!'
"homework is awful!" has sentiment=-0.8000000119209296

Entities are:
name: homework
(env) metens@cloudshell:~/python-docs-samples/translate/samples/snippets (cloud-metens)$ python language.py 'homework is ok'
"homework is ok" has sentiment=0.30000001192092896

Entities are:
name: homework
(env) metens@cloudshell:~/python-docs-samples/translate/samples/snippets (cloud-metens)$ python language.py 'homework is awesome?'
"homework is awesome?" has sentiment=-0.4000000059604645

Entities are:
name: homework
(env) metens@cloudshell:~/python-docs-samples/translate/samples/snippets (cloud-metens)$ python language.py 'homework is awesome!'
"homework is awesome!" has sentiment=0.8999999761581421

Entities are:
name: homework
(env) metens@cloudshell:~/python-docs-samples/translate/samples/snippets (cloud-metens)$ python language.py 'The protestors in Oregon put on gas masks and wore yellow t-shirts'
"The protestors in Oregon put on gas masks and wore yellow t-shirts" has sentiment=-0.6000000238418579

Entities are:
name: protestors
name: gas masks
name: Oregon
name: t-shirts
(env) metens@cloudshell:~/python-docs-samples/translate/samples/snippets (cloud-metens)$
```

8. Code

The name of the function that performs the transcription is: **transcribe_gcs**

The name of the function that performs the translation is: **translate_text**

The name of the function that performs the entity on the translation: **entities_text**

The function that performs the entity analysis on the image: **detect_labels_uri**

9. Test integration

```
(env) metens@cloudshell:~/python-docs-samples/translate/samples/snippets (cloud-metens)$ python solution.py de-DE gs://cloud-samples-data/ml-api-codelab/de-ball.wav gs://cloud-samples-data/ml-api-codelab/football.jpg
Transcription: willst du mit uns Fußball spielen
Translation: do you want to play football with us
Entities: ['football']
Image labels: ['Sports equipment', 'Soccer', 'Football', 'Plant', 'Ball', 'Player', 'Playing sports', 'Soccer ball', 'Ball game', 'Team sport']
The audio and image do not appear to be related.
```

As we can see in the image above, the entity is “football” and the labels have “Football”. These won’t be matched when compared because of case sensitivity. To address this problem the solutions.py should bring the label and the entity to lowercase before comparison.

```
(env) metens@cloudshell:~/python-docs-samples/translate/samples/snippets (cloud-metens)$ python solution.py tr-TR gs://cloud-samples-data/ml-api-codelab/tr-bike.wav gs://cloud-samples-data/ml-api-codelab/bicycle.jpg
Transcription: bisikletimi sokakta birak
Translation: leave my bike on the street
Entities: ['bike', 'street']
Image labels: ['Bicycle', 'Clothing', 'Footwear', 'Tire', 'Wheel', 'Bicycles---Equipment and supplies', 'Land vehicle', 'Shoe', 'Bicycle frame', 'Bicycle wheel']
The audio and image do not appear to be related.
```

For the second test, we see that the entities are ‘bike’ and ‘street’. The image labels have ‘Bicycle’, ‘Bicycle frame’, and ‘Bicycle wheel’. The problem is that the labels aren’t matching because they don’t have a wide enough range of synonyms. If the image labels had ‘Bike’ and ‘Bicycle’, there would have been a match.

```
(env) metens@cloudshell:~/python-docs-samples/translate/samples/snippets (cloud-metens)$ python solution.py tr-TR gs://cloud-samples-data/ml-api-codelab/tr-ostrich.wav gs://cloud-samples-data/ml-api-codelab/birds.jpg
Transcription: cok fazla deve kusu var
Translation: There are too many ostriches
Entities: ['ostriches']
Image labels: ['Bird', 'Ratite', 'Cloud', 'Sky', 'Beak', 'Plant', 'Green', 'Neck', 'Ostrich', 'Casuariiformes']
The audio and image do not appear to be related.
```

The problem in this test is that the labels don’t have plurals for each word. If the labels had the plural of Ostrich, the match would have been possible.

13. Video Intelligence

The three highest confidence labels with their confidences are:

1. Label: sports, Confidence: 0.9218811392784119
2. Label: basketball, Confidence: 0.9137870669364929
3. Label: player, Confidence: 0.8446521162986755

The name of the client class is **videointelligence.VideoIntelligenceServiceClient()**. The method “**annotate_video(input_uri=path, features=features)**” is used to perform the annotation.

16. Application

← → ⌂ 8080-CS-292029700782-default.cs-us-west1-ijlt.cloudshell.dev

Google Cloud Platform - Face Detection Sample

This Python Flask application demonstrates App Engine Flexible, Google Cloud Storage, Datastore, and the Cloud Vision API.

Upload File: No file chosen



IMG_2761.jpeg was uploaded 2024-11-19 06:00:05.749954+00:00.
Joy Likelihood for Face: Very Unlikely



IMG_5481.PNG was uploaded 2024-11-19 06:00:20.888866+00:00.
Joy Likelihood for Face: Verv Likely



metens
October 18, 2024 at 4:11PM
metens

17. Code

Lines 39 and 40 create the query for previous detections and send the query to Cloud datastore:

```
39     query = datastore_client.query(kind="Faces")
40     image_entities = list(query.fetch())
```

The line that retrieves the storage bucket to use:

```
26 CLOUD_STORAGE_BUCKET = os.environ.get("CLOUD_STORAGE_BUCKET")
```

The form field used to specify the uploaded photo is “file”:

```
48     photo = request.files["file"]
```

The line that copies the photo’s content to the storage bucket:

```
58 blob.upload_from_string(photo.read(), content_type=photo.content_type)
```

The line to perform the analysis is:

```
69     faces = vision_client.face_detection(image=image).face_annotations
```

And the method in Vision’s annotation is “**face_detection()**”.

The fields stored in Cloud datastore for each image are:

“**blob_name**”
“**image_public_url**”
“**timestamp**”
“**joy**”

At the end of the upload_photo route, the method redirects to the home page “/”.