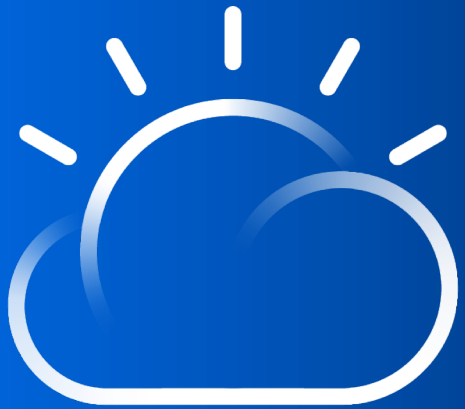
LAB: Rede Neural com Watson Studio



Jorge Chagas

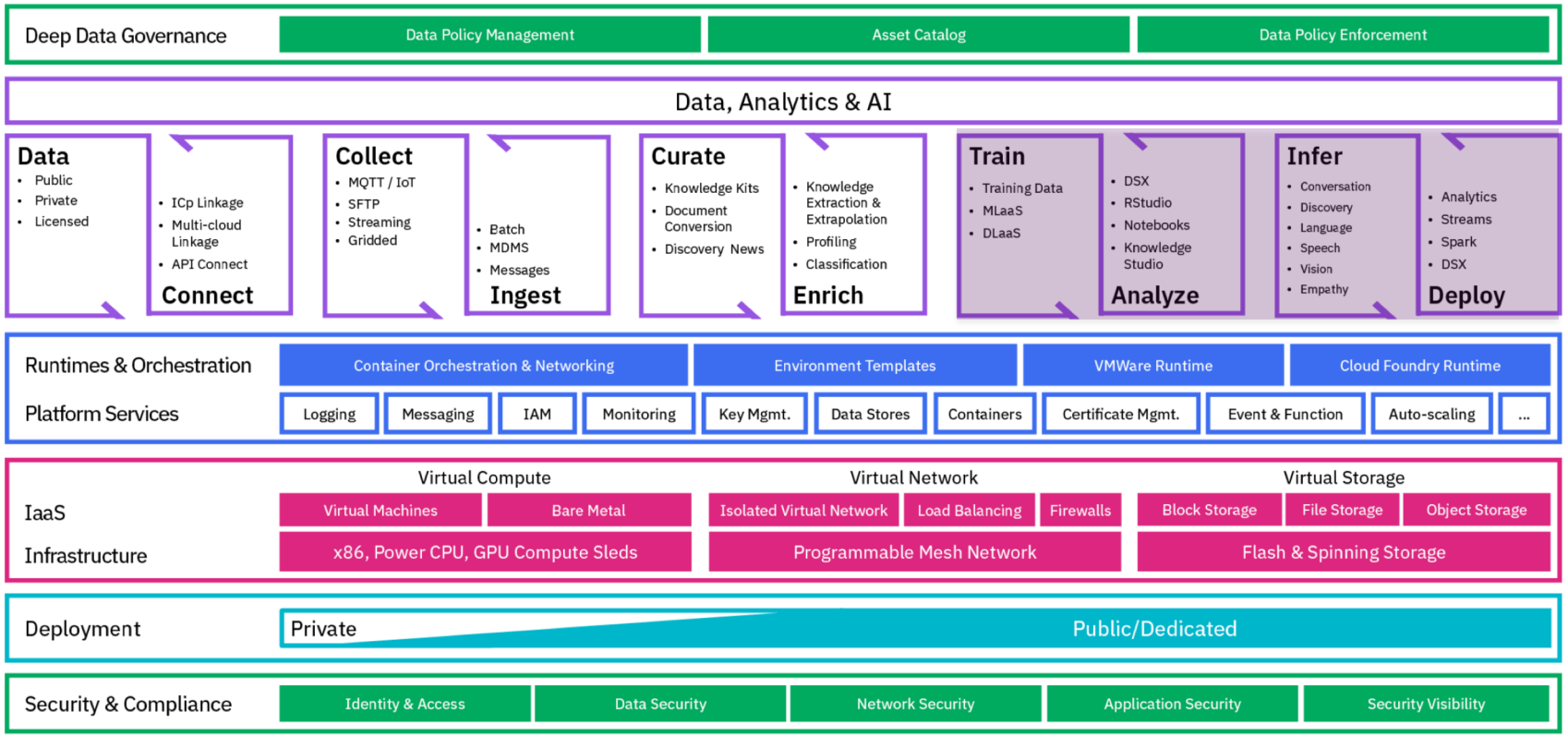
IBM Cloud

Demo

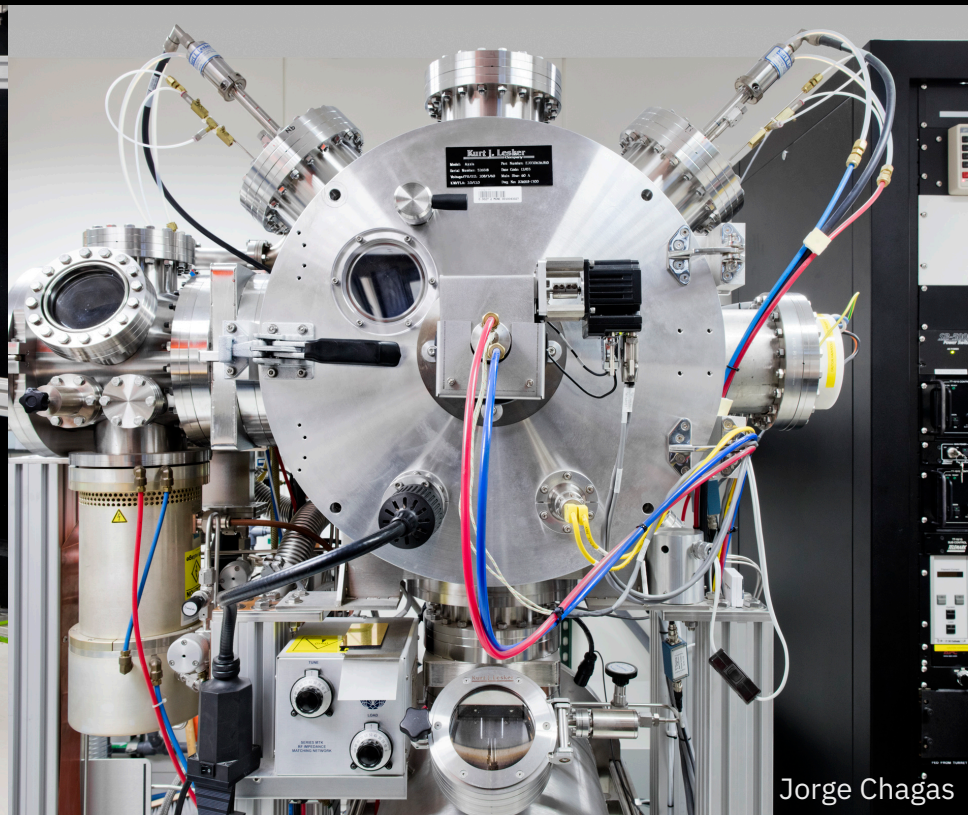
Rede Neural para reconhecimento
de objetos em Imagens

http://ibmdiscolab.mybluemix.net/

IBM CLOUD: AI


Deep Data Governance
Data Policy Management
Asset Catalog
Data Policy Enforcement
Data, Analytics & AI
Data
Public
Private
Licensed
ICp Linkage
Multi-cloud Linkage
API Connect
Connect
Collect
MQTT / IoT
SFTP
Streaming
Gridded
Batch
MDMS
Messages
Ingest
Curate
Knowledge Kits
Document Conversion
Discovery News
Knowledge Extraction & Extrapolation
Profiling
Classification
Enrich
Train
Training Data
MLaaS
DLaaS
DSX
RStudio
Notebooks
Knowledge Studio
Analyze
Infer
Conversation
Discovery
Language
Speech
Vision
Empathy
Analytics
Streams
Spark
DSX
Deploy
Runtimes & Orchestration
Container Orchestration & Networking
Environment Templates
VMWare Runtime
Cloud Foundry Runtime
Platform Services
Logging
Messaging
IAM
Monitoring
Key Mgmt.
Data Stores
Containers
Certificate Mgmt.
Event & Function
Auto-scaling
...
Virtual Compute
Virtual Network
Virtual Storage
IaaS
Virtual Machines
Bare Metal
Isolated Virtual Network
Load Balancing
Firewalls
Block Storage
File Storage
Object Storage
Infrastructure
x86, Power CPU, GPU Compute Sleds
Programmable Mesh Network
Flash & Spinning Storage
Deployment
Private
Public/Dedicated
Security & Compliance
Identity & Access
Data Security
Network Security
Application Security
Security Visibility

TUTORIAL



Jorge Chagas

Serviços necessários para esse LAB

https://console.bluemix.net/catalog/

Object Storage
Lite • IBM

Provides flexible, cost-effective, and scalable cloud storage for unstructured data.

Apache Spark
Lite • IBM

IBM Analytics for Apache Spark for IBM Cloud.

Python Web App with Flask
IBM

A starter that provides a basic web serving application using the Flask framework.

Watson Studio
Lite • IBM

Embed AI and machine learning into your business. Create custom models using your own data.

Python
Lite • Community

Develop, deploy, and scale Python web apps with ease.

Machine Learning
Lite • IBM

IBM Watson Machine Learning - make smarter decisions, solve tough problems, and improve user outcomes.

Configure e Crie os Serviços

← View all

Cloud Object Storage

Lite • IBM

Looking for our infrastructure offerings? Compare Versions

IBM Cloud Object Storage is a highly scalable cloud storage service, designed for high durability, resiliency and security. Store, manage and access your data via our self-service portal and RESTful APIs. Connect applications directly to Cloud Object Storage use other IBM Cloud Services with your data.

View Docs Terms

AUTHOR	IBM
PUBLISHED	10/01/2018
TYPE	Service

Service name:

Cloud Object Storage-disco

Select a resource group:

Default

Features

- **Storage for the IBM Cloud**
  IBM Cloud Object Storage provides unstructured data storage for cloud applications. Libraries and SDKs support a common set of S3 API functions for connecting new applications to scalable cloud storage and integrating your data into other services on the IBM Watson and Cloud Platform.
- **IAM Policies - Bucket level access management**
  IBM Identity and Access Management (IAM) integration allows for granular access control at the bucket level using role-based policies.
- **Encryption management**
- **Regional and Cross Region resiliency options**

Need Help?
Contact IBM Cloud Support

Estimate Monthly Cost
Cost Calculator

Create

Configure e Crie os Serviços

← View all

Apache Spark

Lite • IBM

Apache Spark is an open source cluster computing framework optimized for extremely fast and large scale data processing, which you can access via the newly integrated notebook interface IBM Analytics for Apache Spark. You can connect to your existing data sources or take advantage of the on-demand big data optimization of Object Storage. Spark plans are based on the maximum number of executors available to process your analytic jobs. Executors exist only as long as they're needed for processing, so you're charged only for processing done.

View Docs Terms

AUTHOR	IBM
PUBLISHED	09/18/2018
TYPE	Service
LOCATION	United Kingdom, US South

Service name:

Apache Spark-disco

Choose a region/location to deploy in:

US South

Choose an organization:

jdchagasbkp6@gmail.com

Choose a space:

dev

Features

- **Incredibly Fast**

  Apache Spark delivers 100x the performance of Apache Hadoop for certain workloads because of its advanced in-memory computing engine.

- **Easy to Use and Powerful**

  Apache Spark's Streaming and SQL programming models backed by MLlib and GraphX make it incredibly easy for developers and data scientists to build apps that exploit machine learning and graph analytics. Because the service is 100% compatible with Apache Spark, developers can build their apps and run them against the IBM managed service to benefit from operational, maintenance, and hardware excellence.

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Configure e Crie os Serviços

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Machine Learning

Lite • IBM

IBM Watson Machine Learning is a full-service IBM Cloud offering that makes it easy for developers and data scientists to work together to integrate predictive capabilities with their applications. The Machine Learning service is a set of REST APIs that you can call from any programming language to develop applications that make smarter decisions, solve tough problems, and improve user outcomes.

View Docs Terms

AUTHOR	IBM
PUBLISHED	09/12/2018
TYPE	Service

Service name:

Machine Learning-d2

Choose a region/location to deploy in:

US South

Select a resource group:

Default

Features

- **Machine Learning features**

  Take advantage of machine learning models management (continuous learning system) and deployment (online, batch, streaming). Select any of widely supported machine learning frameworks: Tensorflow, Keras, Caffee, Pytorch, Spark MLlib, scikit learn, xgboost and SPSS.

- **Integration with Watson Studio**

  Create and train machine learning models with the best

- **Wide choice of interfaces**

  Use the command line interface and Python client to manage you artifacts. Extend your application with artificial intelligence through the Watson Machine Learning REST API.

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Cost Calculator

Create

Configure e Crie os Serviços

← View all

.py Create a Cloud Foundry App

Lite • Community

Python

Develop, deploy, and scale Python web apps with ease.

View Docs Terms

VERSION	1.5.15
TYPE	Application
LOCATION	Sydney, Germany, United Kingdom, US East, US South

App name: disco

Host name: disco

Domain: mybluemix.net

Choose a region/location to deploy in: US South

Choose an organization: jdchagasbkp5@gmail.com

Choose a space: dev

Pricing Plans

Monthly prices shown are for country or region: Brazil

	PLAN	FEATURES	PRICING
✓	Lite	**Lite apps are free** You get up to 256 MB of memory while you work on your apps.	Free

FEEDBACK

Need Help?
Contact IBM Cloud Support

Estimate Monthly Cost
Cost Calculator

Free Create

Configure e Crie os Serviços

← View all

Watson Studio

Lite • IBM

Watson Studio democratizes machine learning and deep learning to accelerate infusion of AI in your business to drive innovation. Watson Studio provides a suite of tools and a collaborative environment for data scientists, developers and domain experts.

View Docs Terms

AUTHOR	IBM
PUBLISHED	09/18/2018
TYPE	Service

Service name:

Watson Studio-disco

Choose a region/location to deploy in:

US South

Select a resource group:

Default

Features

- **Use what you know, learn what you don't**

  Start from a tutorial, start from a sample, or start from scratch. Tap into the power of the best of open source (RStudio, Jupyter Notebooks) and Watson services for flexible model creation. Use Python, R, or Scala. Stop downloading and configuring analysis environments and start getting insights.

- **Power on demand**

  Enterprise-scale features on demand. From data exploration and preparation, to enterprise-scale performance. Manage your data, your analytical assets, and your projects in a secured cloud environment.

- **Be a founding member**

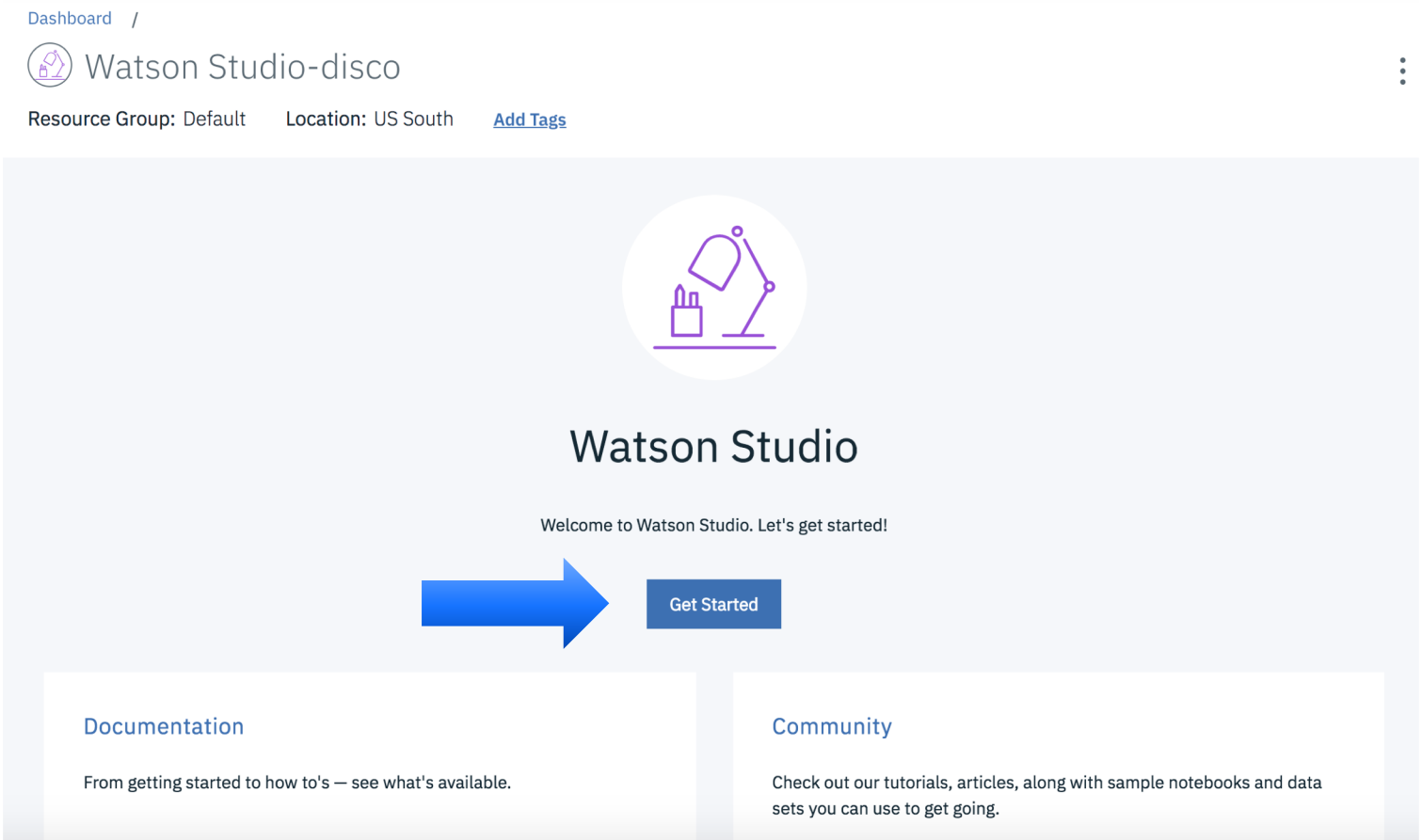
- **Collaborate for better outcomes**

Need Help?
Contact IBM Cloud Support

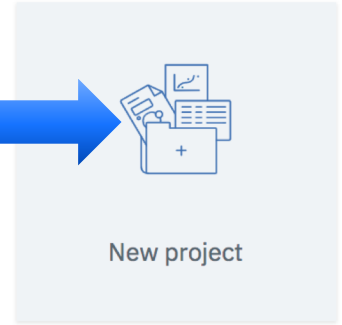
Estimate Monthly Cost
Cost Calculator

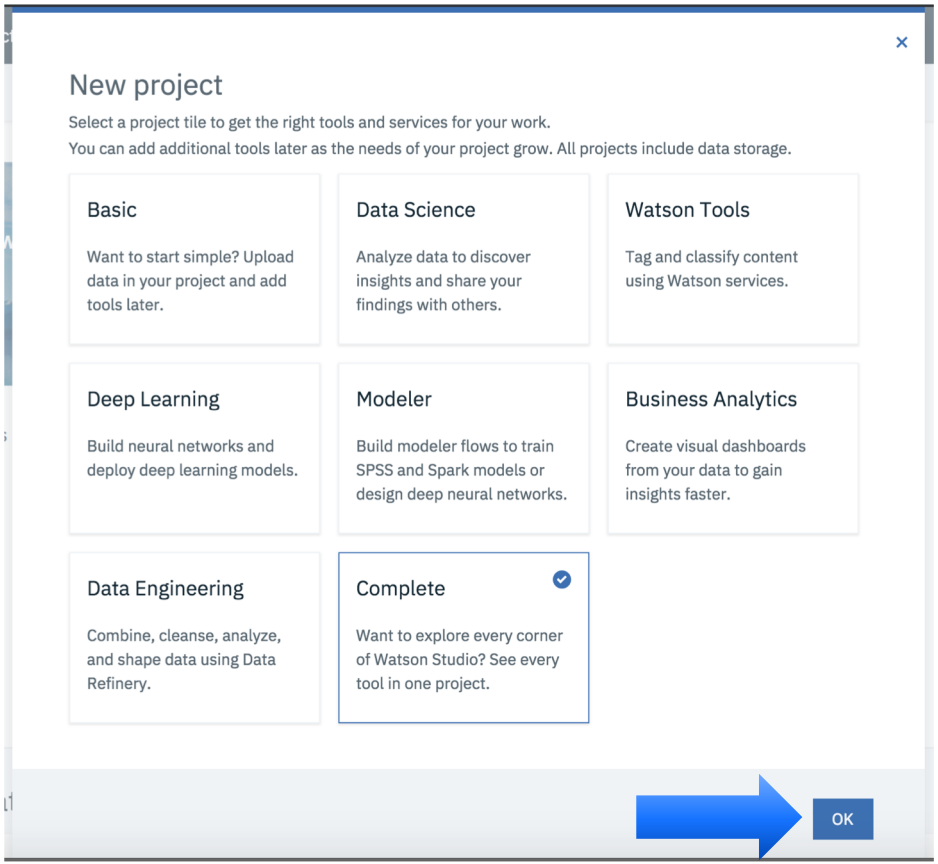
Create

Primeiros Passos: Watson Studio

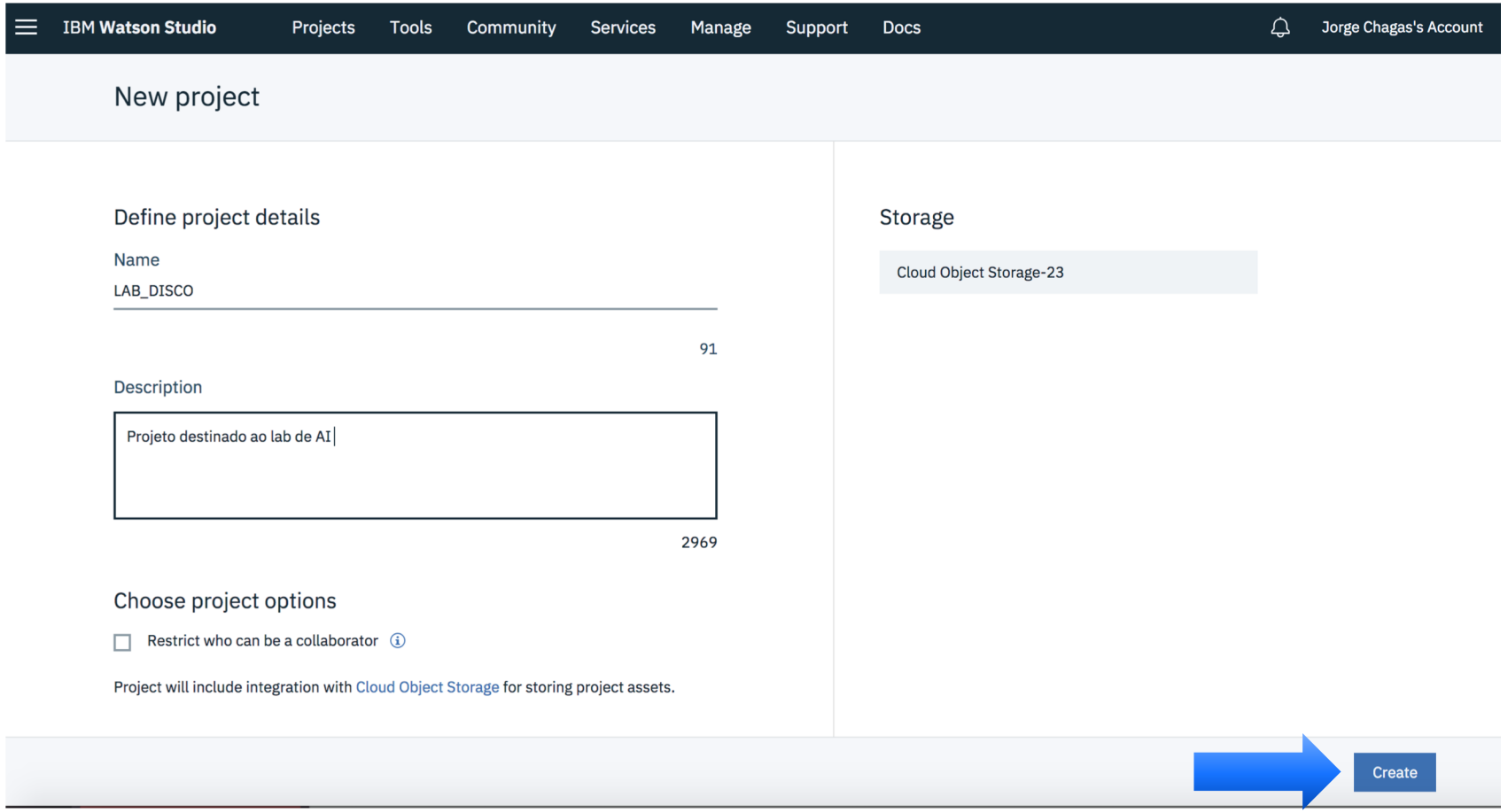


Criando um projeto

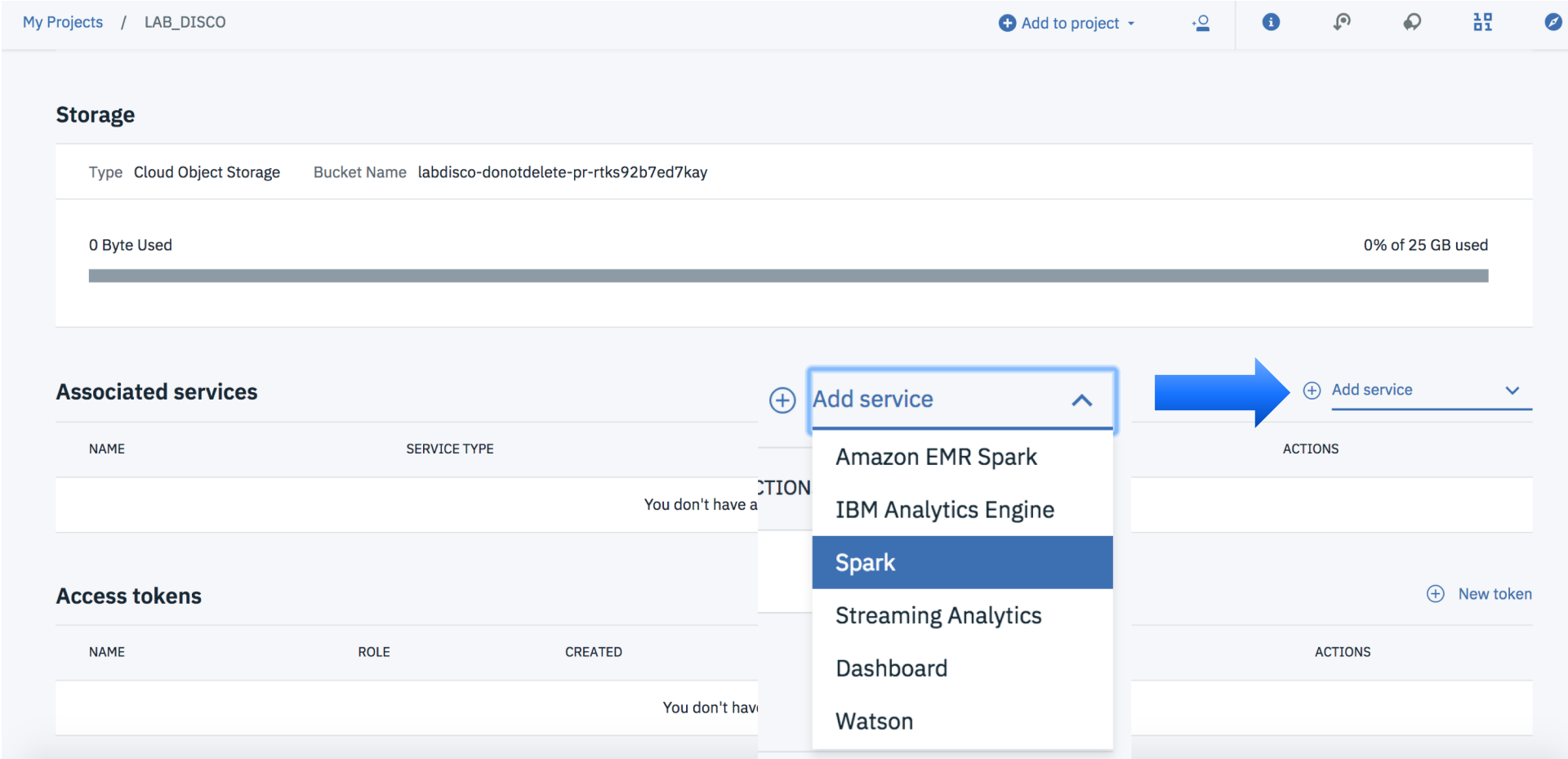




Criando um projeto



Em configurações, vamos integrar os serviços necessários



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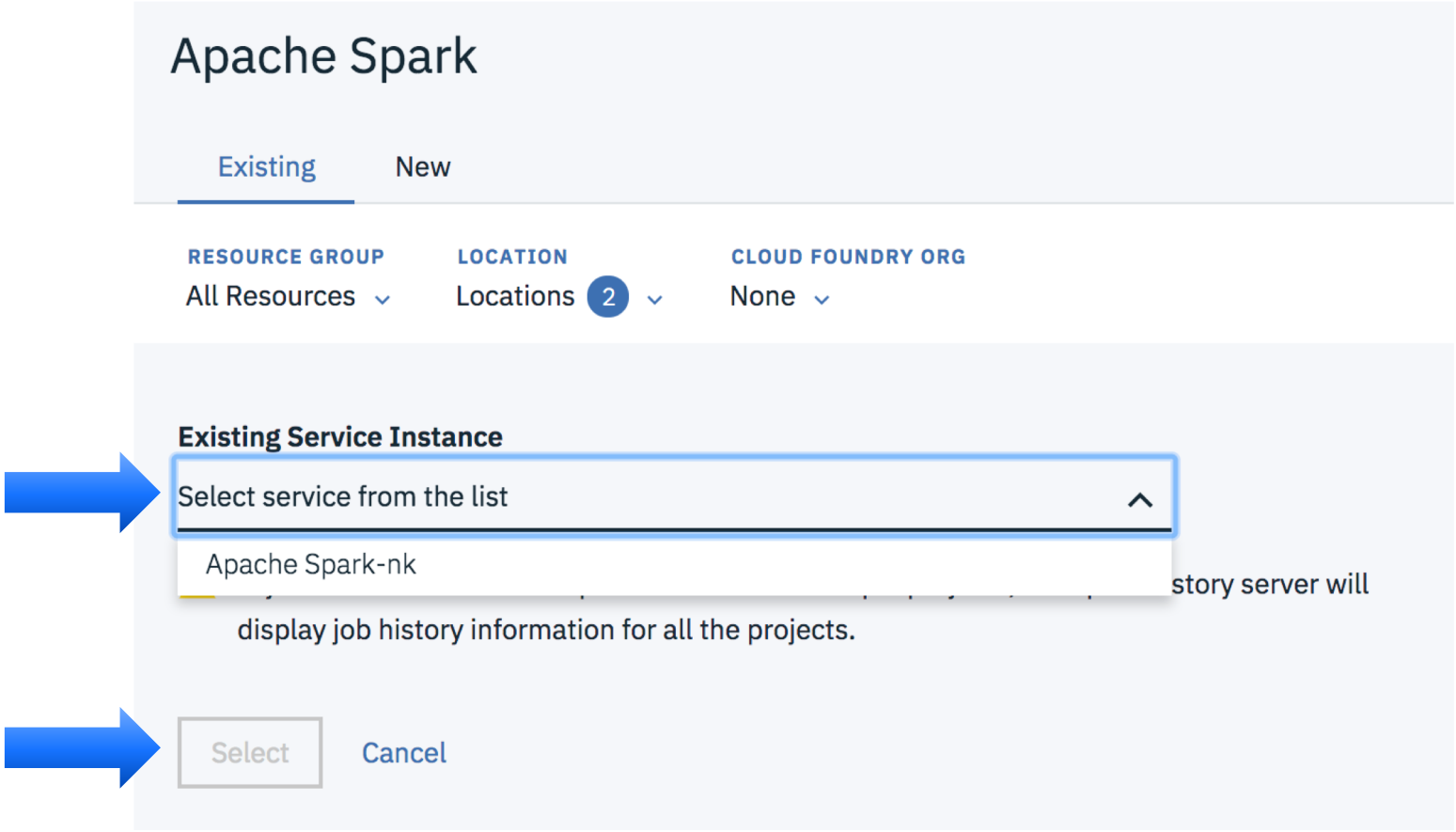

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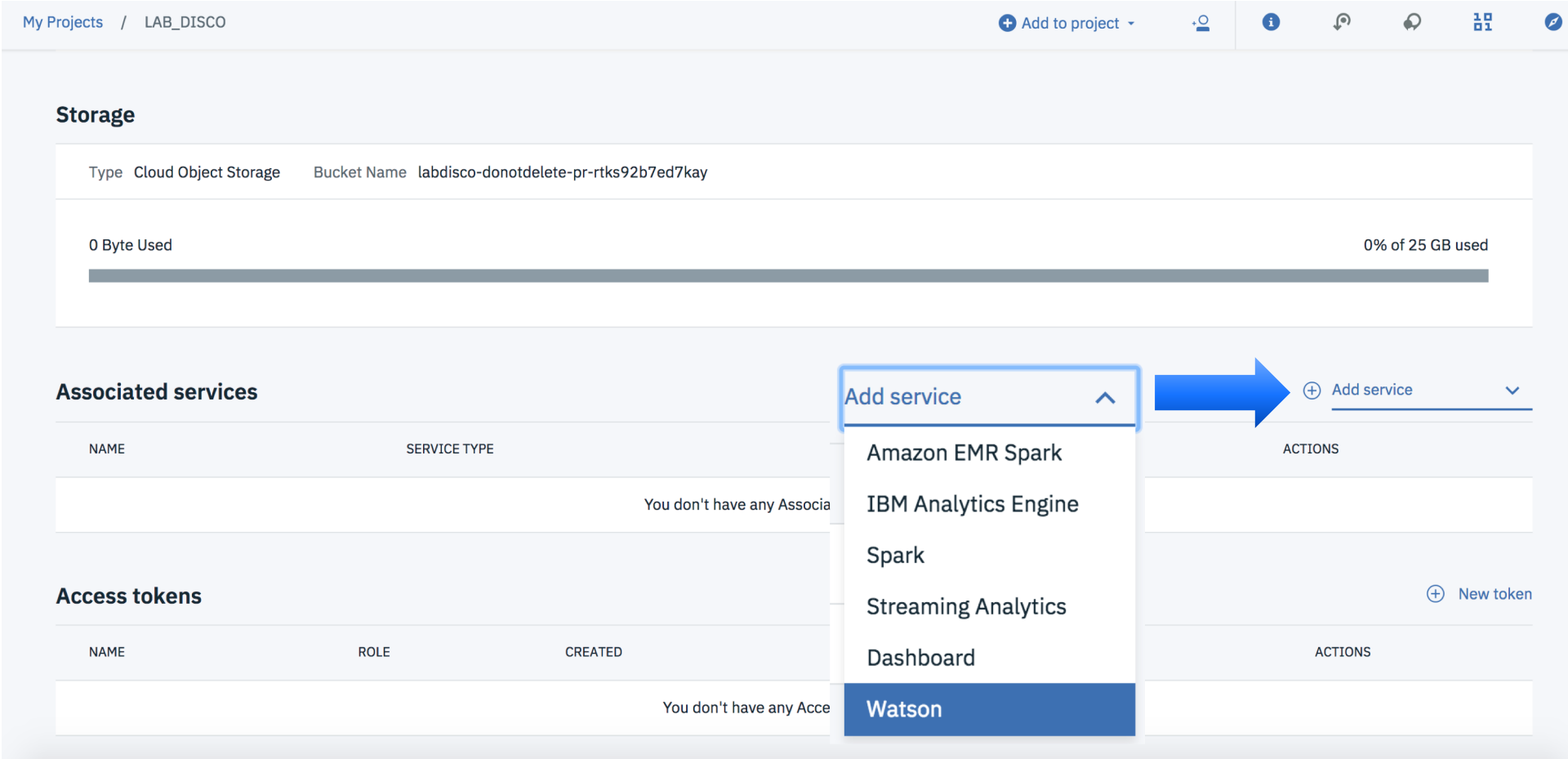

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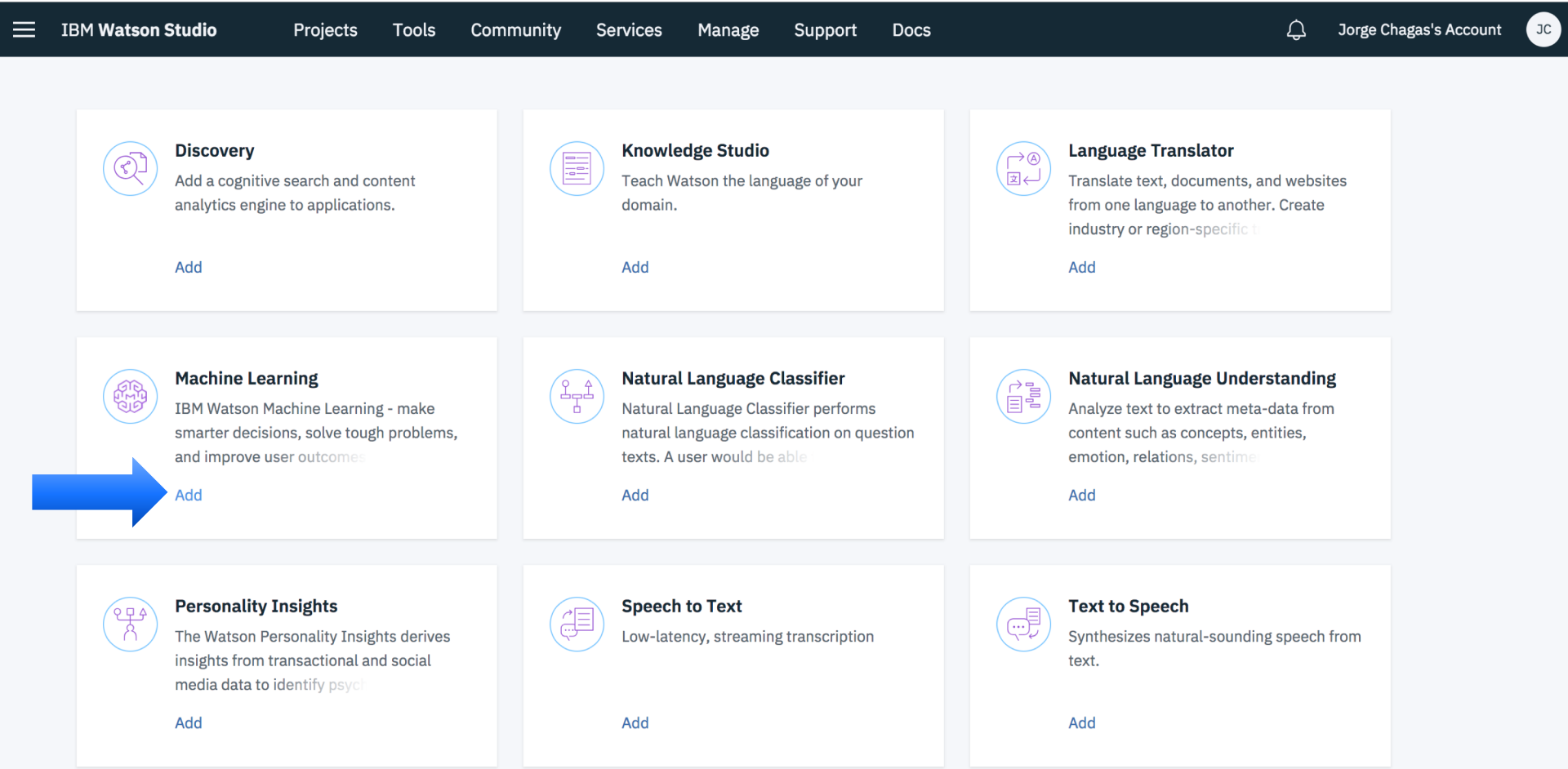

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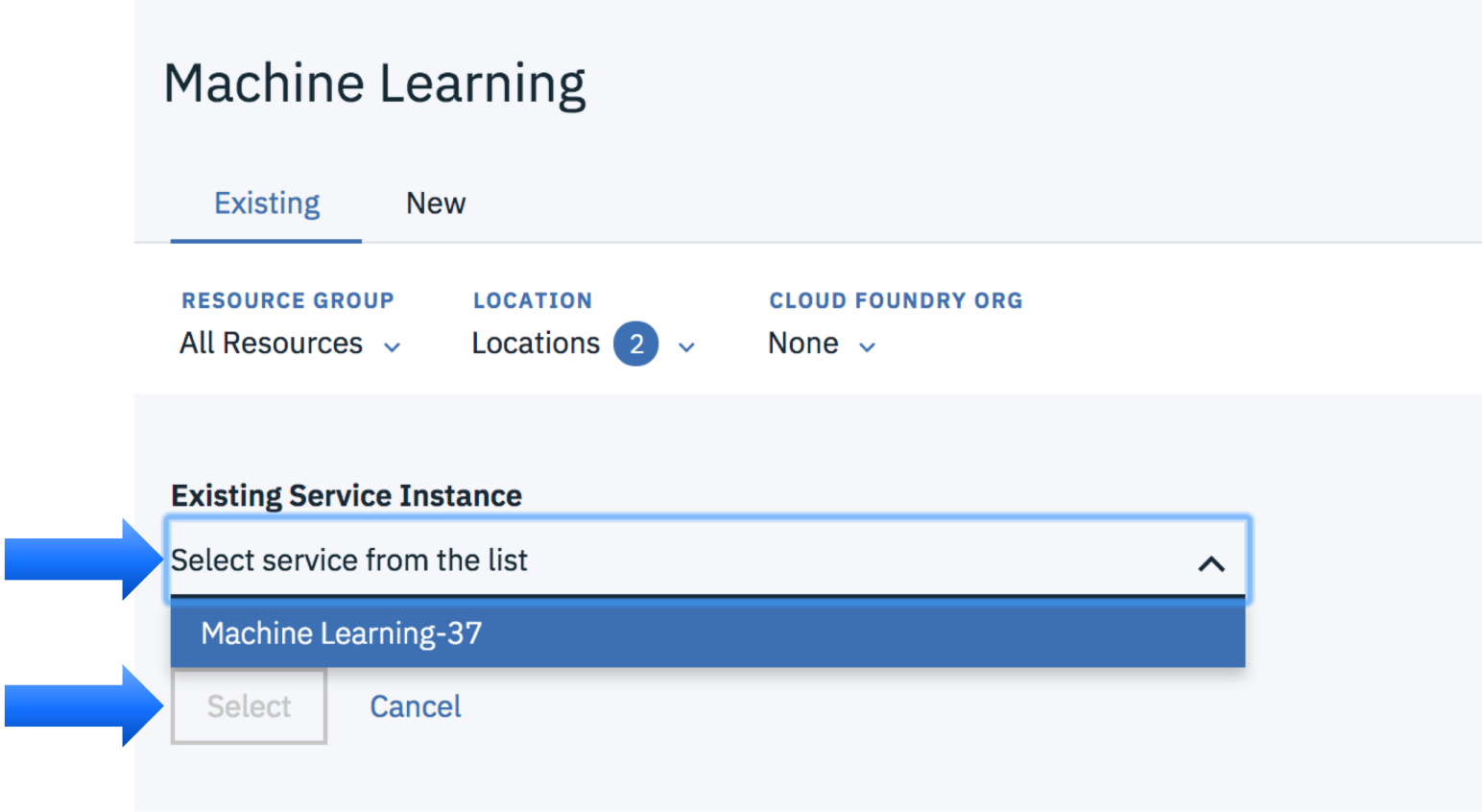
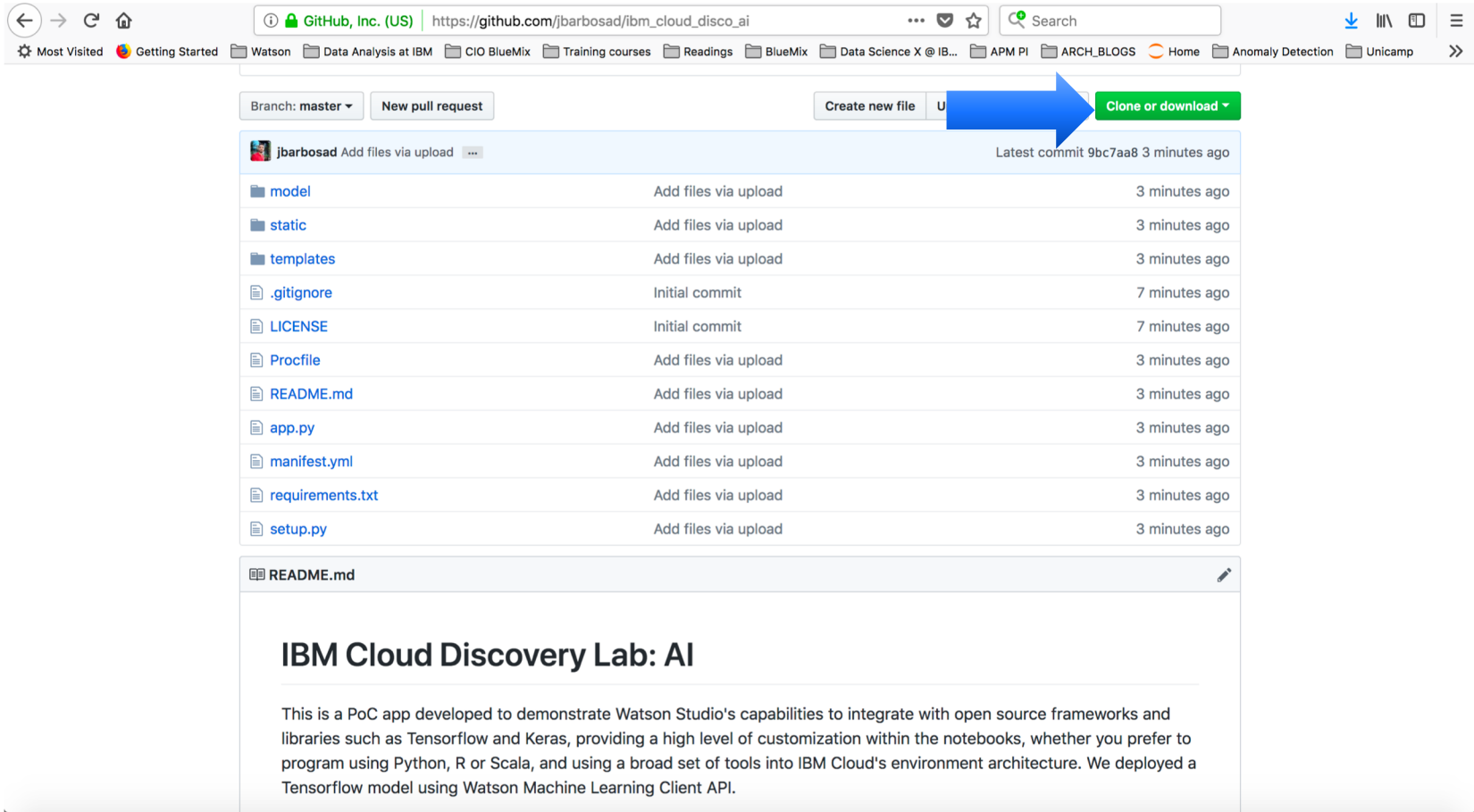


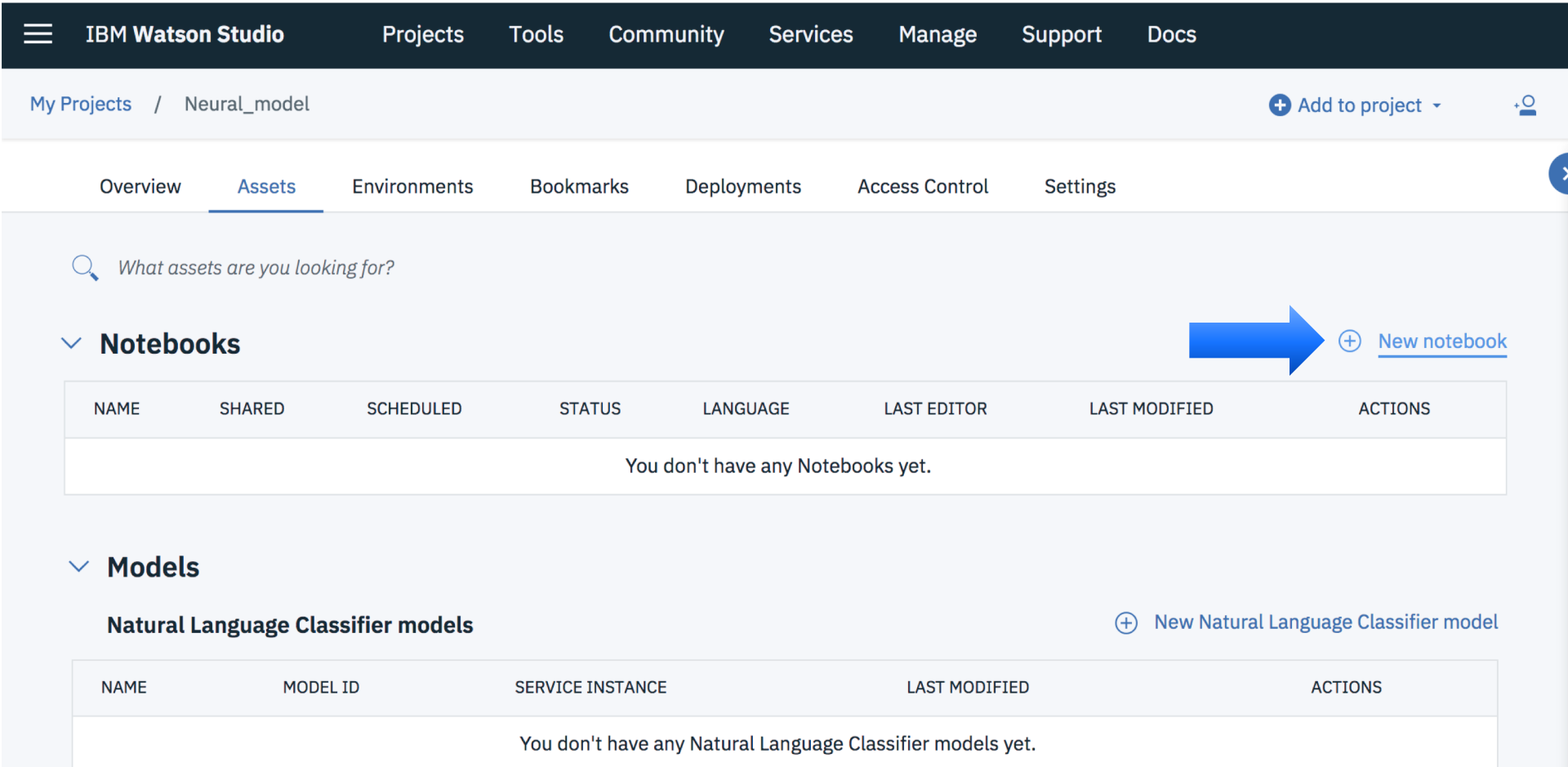

Let’s do it!

Faça o clone ou download do repositório no Github

https://github.com/jbarbosad/ibm_cloud_disco_ai



Crie seu primeiro “notebook”



Importe o arquivo “IBM_DISCO_LAB.ipynb”e crie o notebook

My Projects / LAB_DISCO / Add Notebook

New notebook

Blank | From file | From URL

Name*

LAB_DISCO

41 Characters Remaining

Description

Notebook lab

488 Characters Remaining

Notebook file*

Choose File No file chosen

Import a Python, Scala, or R notebook file (.ipynb) from your local device.

Select runtime* Includes notebook environments

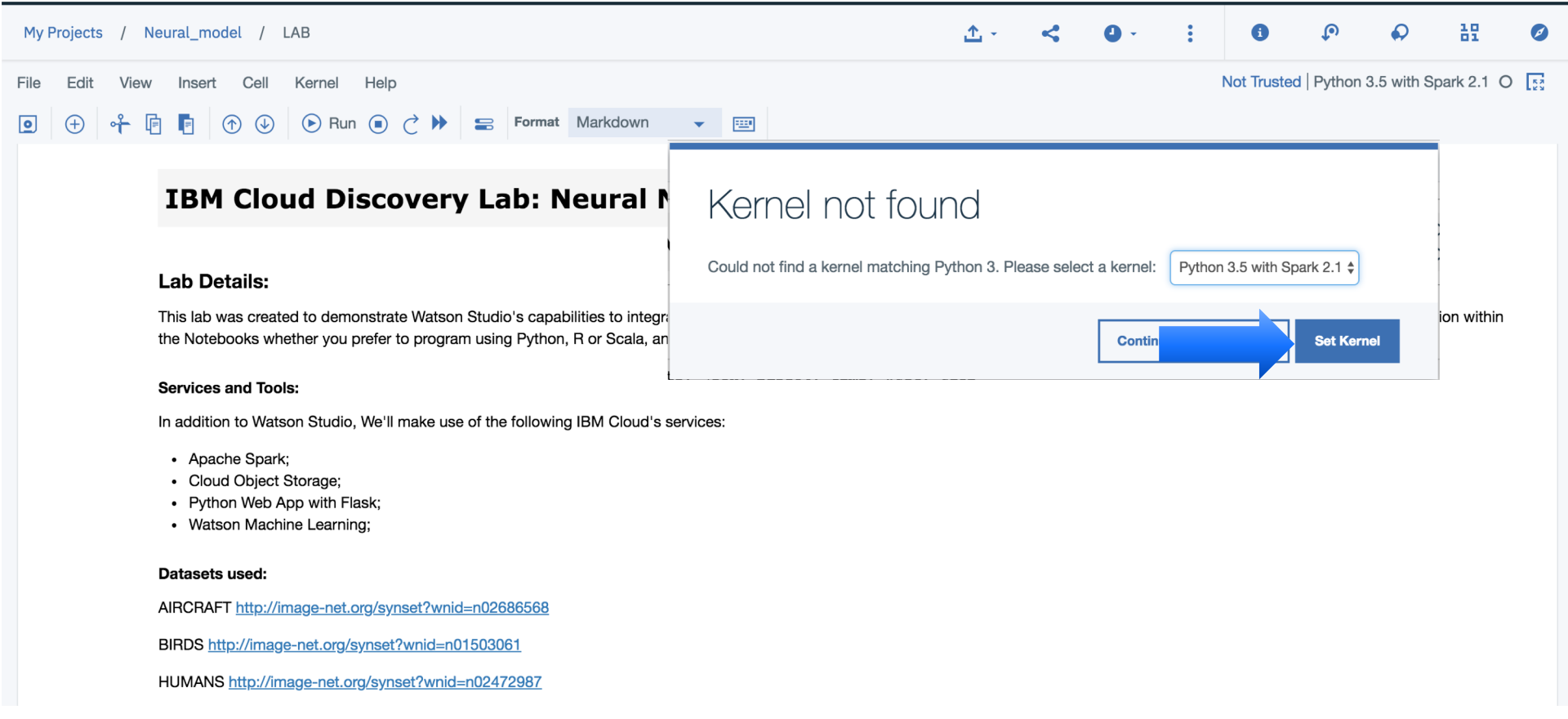
Apache Spark-disco

Associate this notebook with the runtime service of your choice.

O arquivo IBM_DISCO_LAB.ipynb está dentro do diretório ‘model’. Utilize-o para esse lab.

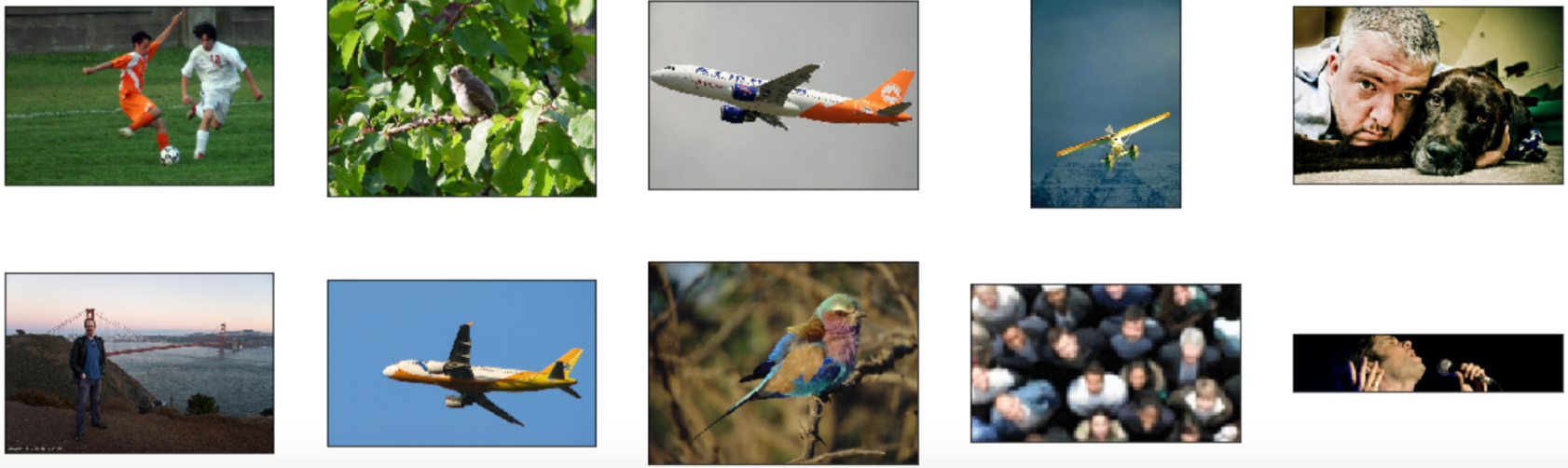
Create Notebook

Configure o Kernel para iniciar o ambiente



Execução do modelo: SHIFT + Enter para cada célula

```
    images.extend([os.path.join(path, f) for f in os.listdir(path)])

# Plot some sample images in the dataset.
plt.figure(figsize=(20,10))
for i in range(15):
    img = mpimg.imread(random.choice(images))
    plt.subplot(3, 5, i+1)
    plt.imshow(img)
    frame = plt.gca()
    frame.axes.get_xaxis().set_visible(False)
    frame.axes.get_yaxis().set_visible(False)
```



Célula de Treinamento da Rede Neural aplicando *"transfer learning"*

http://cs231n.github.io/transfer-learning/

My Projects / Neural_model / LAB

File Edit View Insert Cell Kernel Help

Trusted | Python 3.5 with Spark 2.1

Run Format Code

Lastly, we use the ***image_dir*** argument to pass in the directory containing the labeled class folders containing our images.

In [17]:
```
!python retrain.py \
    --bottleneck_dir=./ml-model/bottlenecks \
    --how_many_training_steps 1000 \
    --learning_rate 0.01 \
    --train_batch_size 200 \
    --model_dir=./ml-model/pretrained_model \
    --summaries_dir=./retrain-logs \
    --output_graph=./ml-model/retrained_graph.pb \
    --output_labels=./ml-model/retrained_labels.txt \
    --image_dir=./training_images/ \
    --saved_model_dir =./saved-model/
```

Leva cerca de 15 min para executar com o dataset que vamos utilizar

```
INFO:tensorflow:2018-10-02 04:10:06.432100: Step 950: Train accuracy = 99.5%
INFO:tensorflow:2018-10-02 04:10:06.432430: Step 950: Cross entropy = 0.052394
INFO:tensorflow:2018-10-02 04:10:06.536270: Step 950: Validation accuracy = 99.0% (N=100)
INFO:tensorflow:2018-10-02 04:10:08.622708: Step 960: Train accuracy = 100.0%
INFO:tensorflow:2018-10-02 04:10:08.622921: Step 960: Cross entropy = 0.046097
INFO:tensorflow:2018-10-02 04:10:08.715050: Step 960: Validation accuracy = 97.0% (N=100)
INFO:tensorflow:2018-10-02 04:10:10.840282: Step 970: Train accuracy = 100.0%
INFO:tensorflow:2018-10-02 04:10:10.840540: Step 970: Cross entropy = 0.043023
INFO:tensorflow:2018-10-02 04:10:10.939237: Step 970: Validation accuracy = 99.0% (N=100)
INFO:tensorflow:2018-10-02 04:10:13.103423: Step 980: Train accuracy = 100.0%
INFO:tensorflow:2018-10-02 04:10:13.103697: Step 980: Cross entropy = 0.041070
INFO:tensorflow:2018-10-02 04:10:13.243076: Step 980: Validation accuracy = 100.0% (N=100)
INFO:tensorflow:2018-10-02 04:10:15.567676: Step 990: Train accuracy = 99.5%
INFO:tensorflow:2018-10-02 04:10:15.568236: Step 990: Cross entropy = 0.056701
INFO:tensorflow:2018-10-02 04:10:15.676230: Step 990: Validation accuracy = 99.0% (N=100)
INFO:tensorflow:2018-10-02 04:10:17.715947: Step 999: Train accuracy = 99.5%
INFO:tensorflow:2018-10-02 04:10:17.716152: Step 999: Cross entropy = 0.070229
INFO:tensorflow:2018-10-02 04:10:17.821286: Step 999: Validation accuracy = 99.0% (N=100)
```

Célula de Teste da Rede Neural aplicando “transfer learning”

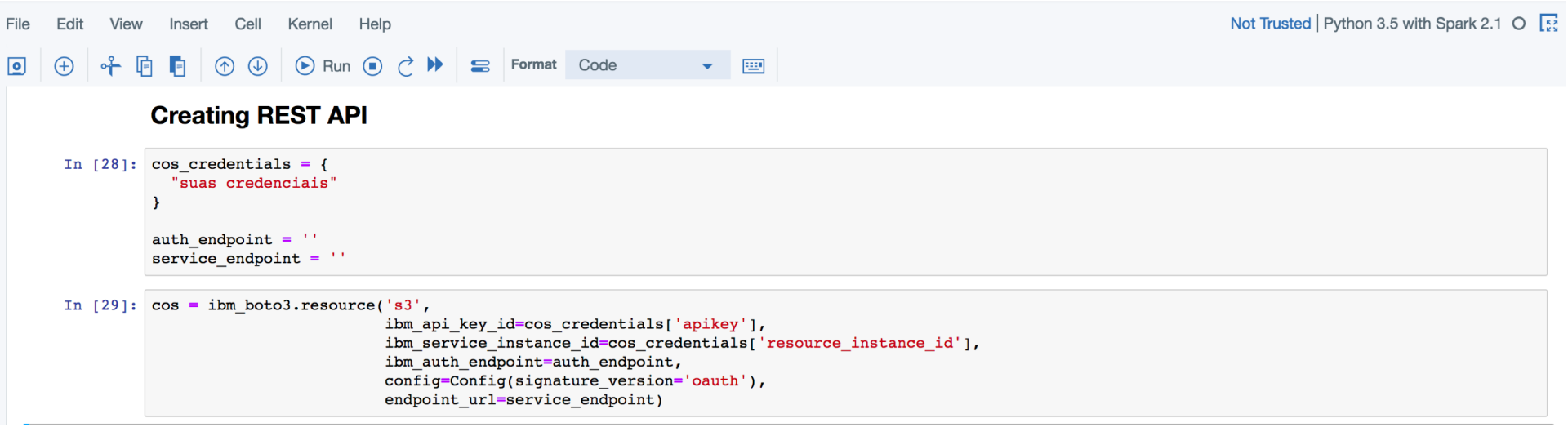
Running the scripts and getting the results of the Image Recognition tests

```
img = mpimg.imread(test_image)
plt.figure(figsize=(8,8))
plt.imshow(img)
frame = plt.gca()
frame.axes.get_xaxis().set_visible(False)
frame.axes.get_yaxis().set_visible(False)

!python ./label_image.py \
    --graph=$MODEL_DIR/retrained_graph.pb --labels=$MODEL_DIR/retrained_labels.txt \
    --input_layer=$INPUT_LAYER \
    --output_layer=final_result \
    --input_height=$INPUT_HEIGHT --input_width=$INPUT_WIDTH \
    --image=$TEST_IMAGE
```

```
aircrafts 0.99746144
birds 0.0019319953
humans 0.0006065576
```

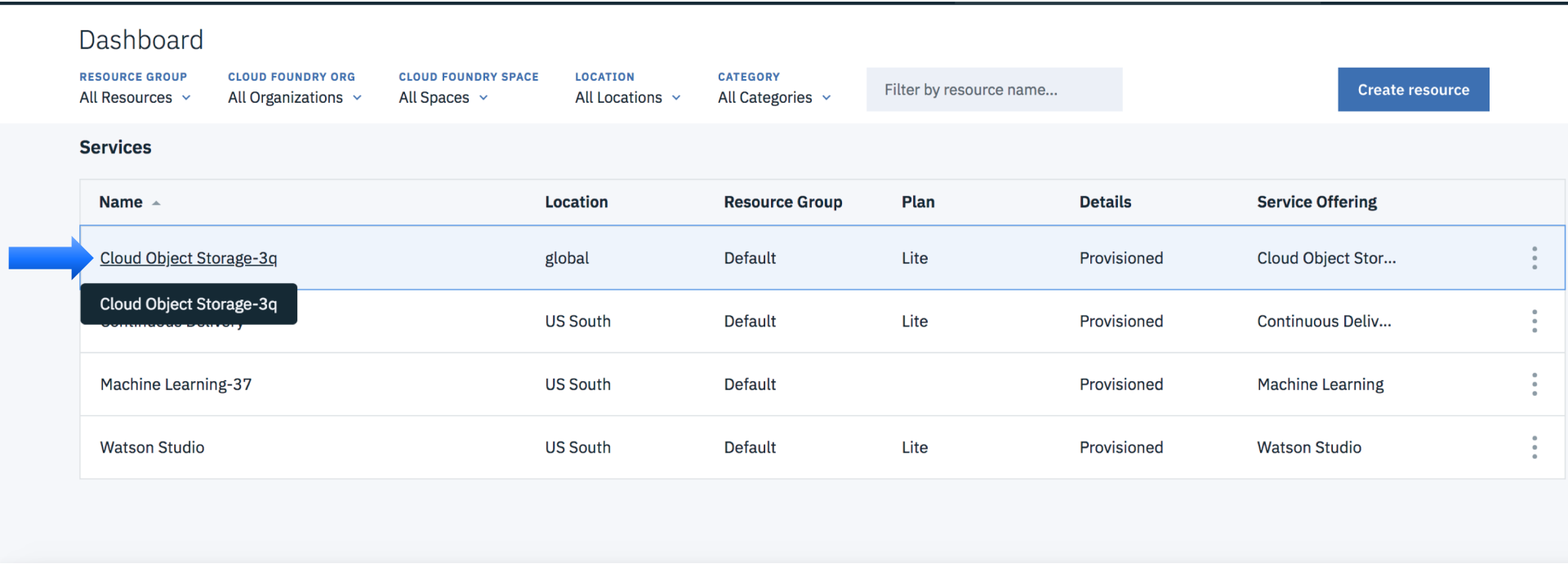
Caso tenha executado corretamente, nessa célula o resultado deve ser similar a esse!

Criando a REST API para integração do modelo treinado

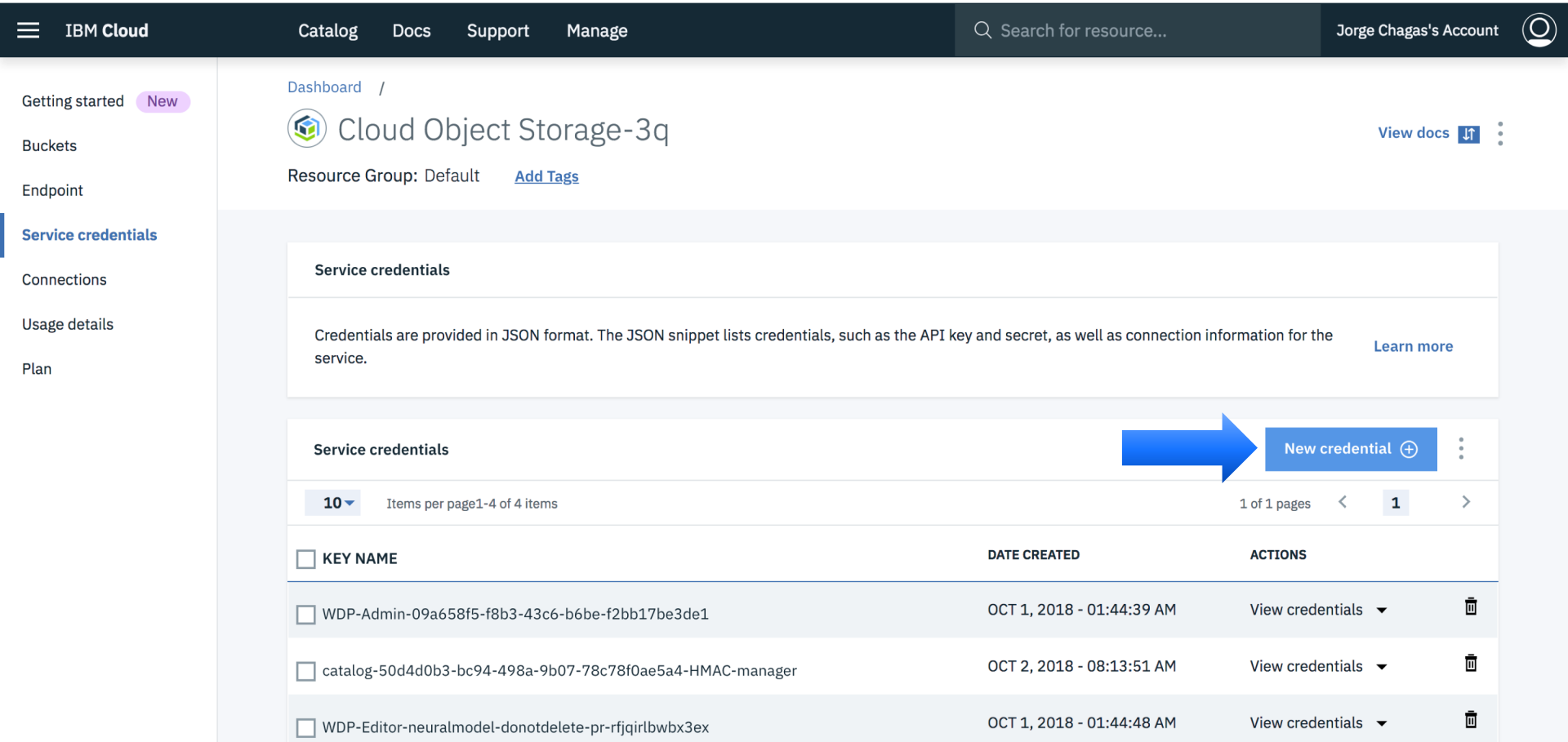


É necessário inserir suas credenciais de acesso do Cloud Object Storage

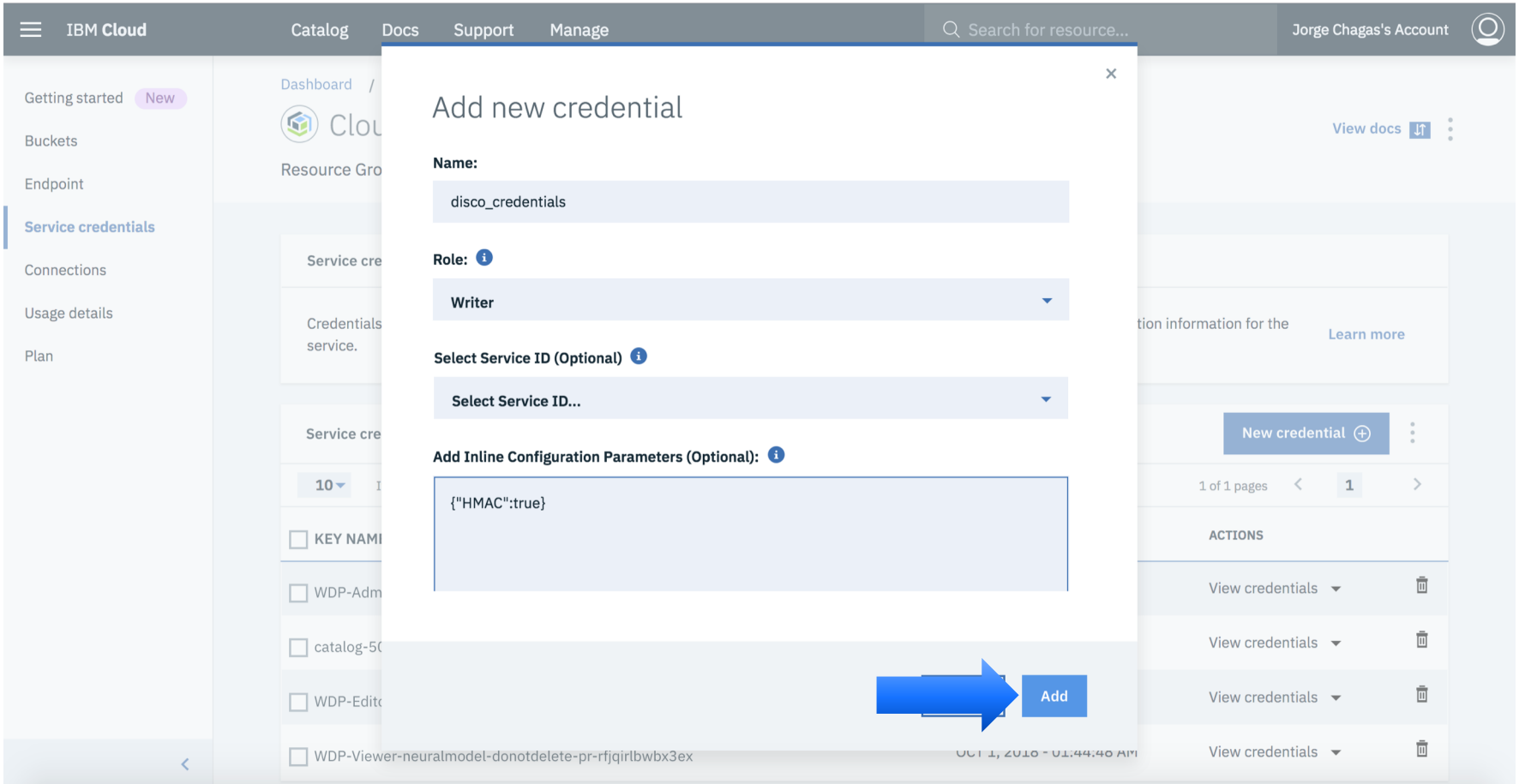
No Dashboard da IBM Cloud
(https://console.bluemix.net/dashboard/apps)



Cloud Object Storage Service Credentials



Cloud Object Storage Service Credentials

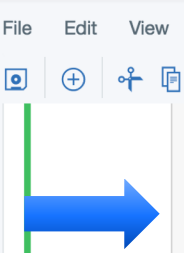


Cloud Object Storage Service Credentials

catalog-50d4d0b3-bc94-498a-9b07-78c78f0ae5a4-HMAC-manager	OCT 2, 2018 - 08:13:51 AM	View credentials	
WDP-Editor-neuralmodel-donotdelete-pr-rfjqirlbwbx3ex	OCT 1, 2018 - 01:44:48 AM	View credentials	
WDP-Viewer-neuralmodel-donotdelete-pr-rfjqirlbwbx3ex	OCT 1, 2018 - 01:44:48 AM	View credentials	
disco_credentials	OCT 2, 2018 - 09:03:31 AM	View credentials	


```
  "iam_apikey_description": "Auto generated apikey during resource-key operation for Instan
n:v1:bluemix:public:cloud-object-storage:global:a/0a26841f6a904815ba5f06a963c1b7e6:09a658f5-f8b3-43
c6-b6be-f2bb17be3de1::",
  "iam_apikey_name": "auto-generated-apikey-3d80d831-8237-4ea9-8b27-5ea3cc39eb1d",
  "iam_role_crn": "crn:v1:bluemix:public:iam::::serviceRole:Writer",
  "iam_serviceid_crn": "crn:v1:bluemix:public:iam-identity::a/0a26841f6a904815ba5f06a963c1b7e6::ser
viceid:ServiceId-ecb1eeda-cf6c-4b89-b14e-36eb239d569a",
  "resource_instance_id": "crn:v1:bluemix:public:cloud-object-storage:global:a/0a26841f6a904815ba5f
```

Substitua com suas credenciais e execute as demais células



```
},
"endpoints": "https://cos-service.bluemix.net/endpoints",
"iam_apikey_description": "Auto generated apikey during resource-key operation for Instance - crn:v1:bluemix:public:cloud-object-storage:global:a/045
"iam_apikey_name": "auto-generated-apikey-5fe034e2-621b-4d8f-87f3-4e727e52c261",
"iam_role_crn": "crn:v1:bluemix:public:iam::::serviceRole:Writer",
"iam_serviceid_crn": "crn:v1:bluemix:public:iam-identity::a/04543316c305b0e77c0d3d83f5e3584c::serviceid:ServiceId-30d5d11e-4de3-4d97-90df-6e6a3d63eb7
"resource_instance_id": "crn:v1:bluemix:public:cloud-object-storage:global:a/04543316c305b0e77c0d3d83f5e3584c:c2c53560-a65c-4e18-af7a-279d1cc17547::"


uth_endpoint = 'https://iam.bluemix.net/oidc/token'
ervice_endpoint = 'https://s3-api.us-geo.objectstorage.softlayer.net'
```

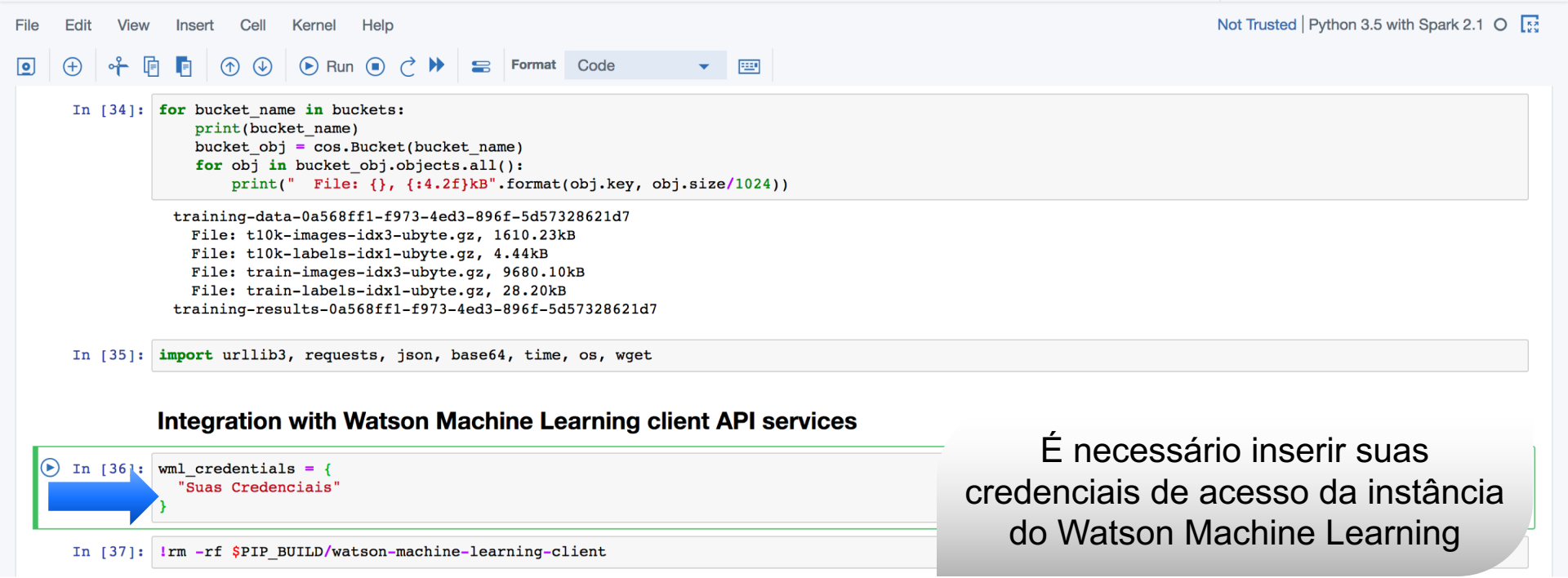
In [29]:

```
cos = ibm_boto3.resource('s3',
                         ibm_api_key_id=cos_credentials['apikey'],
                         ibm_service_instance_id=cos_credentials['resource_instance_id'],
                         ibm_auth_endpoint=auth_endpoint,
                         config=Config(signature_version='oauth'),
                         endpoint_url=service_endpoint)
```

In [31]:

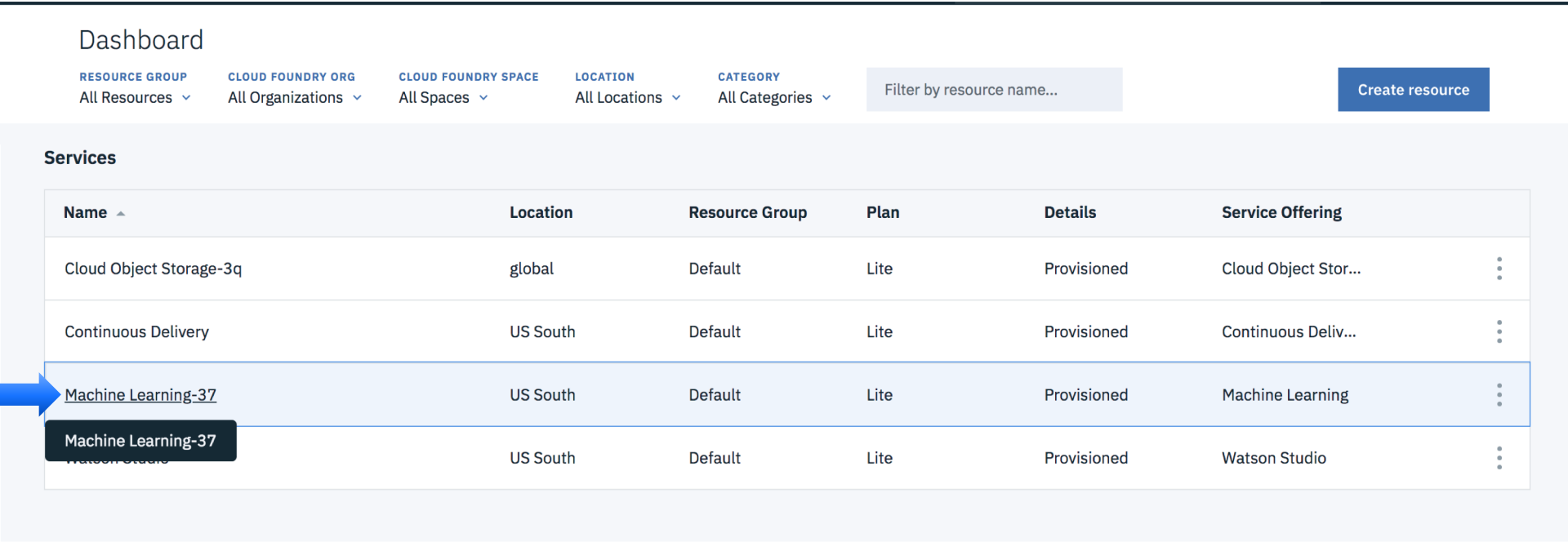
```
from uuid import uuid4

bucket_uid = str(uuid4())
buckets = ['training-data-' + bucket_uid, 'training-results-' + bucket_uid]

for bucket in buckets:
    if not cos.Bucket(bucket) in cos.buckets.all():
        print('Creating bucket "{}"...'.format(bucket))
        try:
            cos.create_bucket(Bucket=bucket)
        except ibm_boto3.exceptions.ibm_botocore.client.ClientError as e:
            print('Error: {}.'.format(e.response['Error']['Message']))
```

Watson Machine Learning Client API

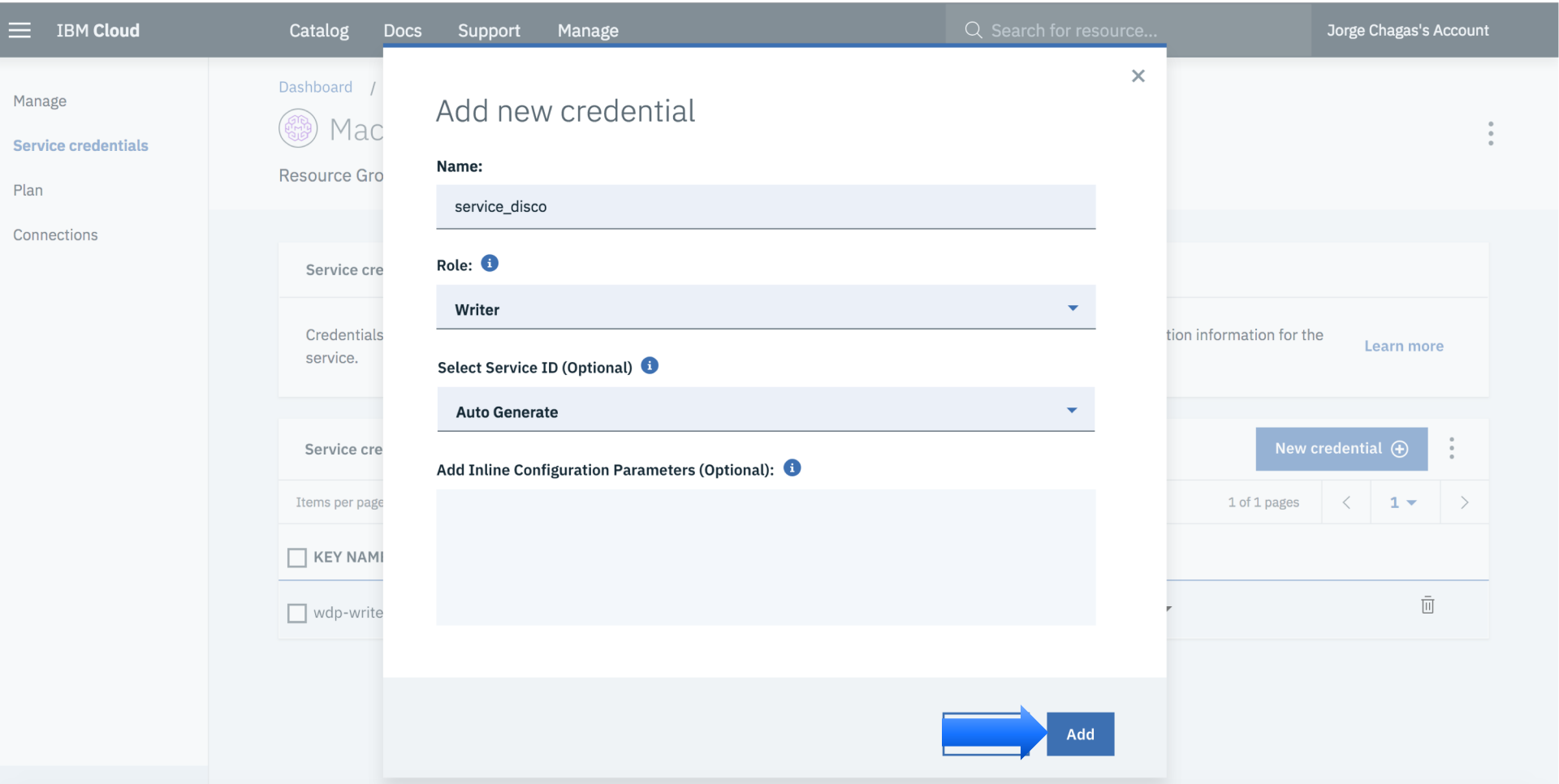


É necessário inserir suas credenciais de acesso da instância do Watson Machine Learning

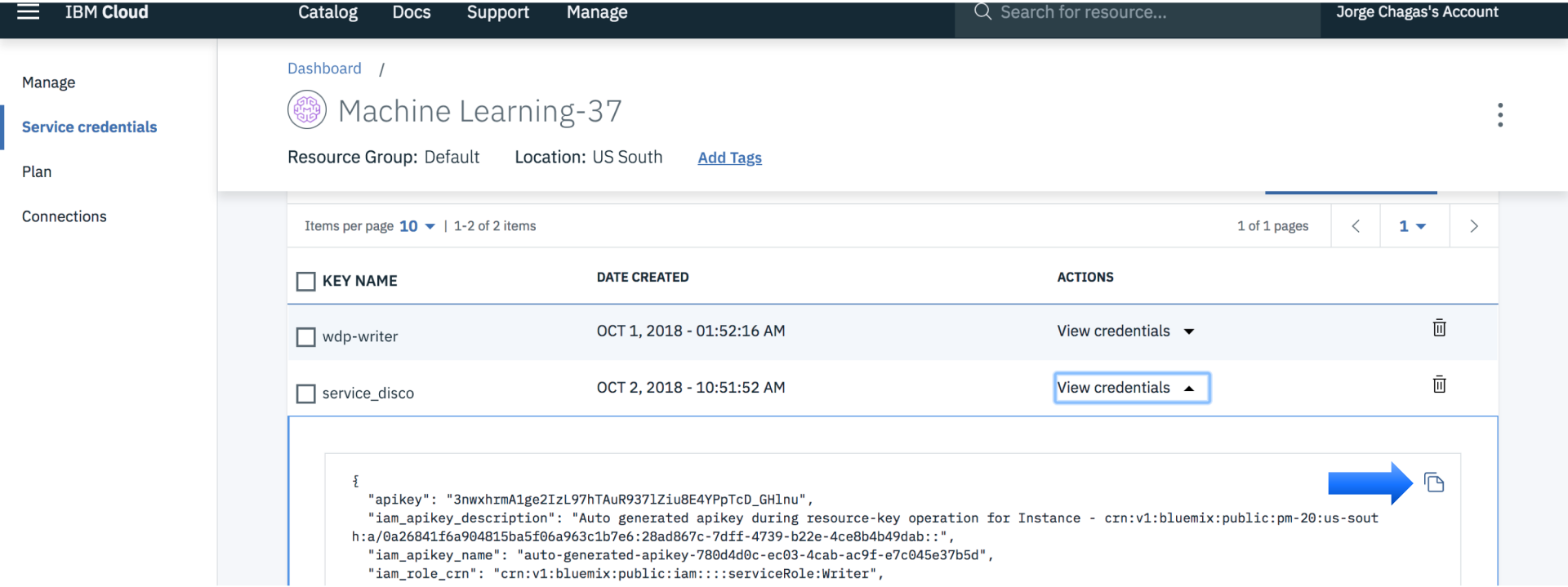
No Dashboard da IBM Cloud
(https://console.bluemix.net/dashboard/apps)



Watson Machine Learning Client API credentials



Watson Machine Learning Client API credentials



Substitua com suas credenciais e execute as demais células

File Edit View Insert Cell Kernel Help

Not Trusted | Python 3.5 with Spark 2.1

Run Format Code

```
Uploading data t10k-labels-idx1-ubyte.gz...
t10k-labels-idx1-ubyte.gz is uploaded.
```

In [34]:
```
for bucket_name in buckets:
    print(bucket_name)
    bucket_obj = cos.Bucket(bucket_name)
    for obj in bucket_obj.objects.all():
        print("  File: {}, {:4.2f}kB".format(obj.key, obj.size/1024))
```

```
training-data-0a568ff1-f973-4ed3-896f-5d57328621d7
  File: t10k-images-idx3-ubyte.gz, 1610.23kB
  File: t10k-labels-idx1-ubyte.gz, 4.44kB
  File: train-images-idx3-ubyte.gz, 9680.10kB
  File: train-labels-idx1-ubyte.gz, 28.20kB
training-results-0a568ff1-f973-4ed3-896f-5d57328621d7
```

In [35]:
```
import urllib3, requests, json, base64, time, os, wget
```

Integration with Watson Machine Learning client API services

```
wml_credentials = {
  "Suas Credenciais"
}
```

In [37]:
```
!rm -rf $PIP_BUILD/watson-machine-learning-client
```

Gerando a URL Score para o deploy do modelo via API

File Edit View Insert Cell Kernel Help

Not Trusted | Python 3.5 with Spark 2.1

Run Format Code

Verification for the model deployment

In [54]:
```
deployment_details = client.deployments.create(model_uid, "IBM Disco")
```

```
#######################################################################################

Synchronous deployment creation for uid: '37d3fe03-0bd9-4bca-bd9a-52bca34e99eb' started

#######################################################################################


INITIALIZING
DEPLOY_IN_PROGRESS.
DEPLOY_SUCCESS


------------------------------------------------------------------------------------------------
Successfully finished deployment creation, deployment_uid='f0509b9c-131d-4b12-b7d4-6a1736bcbda5'
------------------------------------------------------------------------------------------------
```

In [55]:
```
scoring_url =  client.deployments.get_scoring_url(deployment_details)
print(scoring_url)
```

```
https://us-south.ml.cloud.ibm.com/v3/wml_instances/49d7cc1f-0cd7-4886-905b-12d786c50aee/deployments/f0509b9c-131d-4b12-b7d4-6a1736bcbda5/online
```

Se todas as execuções foram executadas corretamente, a URL de score será gerada. Copie-a!

Validação final utilizando a URL Score do Watson Machine Learning Client API

Parabéns! Seu modelo está pronto e integrado a API. Agora iremos realizer o deploy do modelo na aplicação web!

```
In [65]: input_image = image.img_to_array(img)
         input_image = np.expand_dims(input_image, axis=0)
         input_image = preprocess_input(input_image).tolist()

In [66]: scoring_data = {'values': input_image}

In [67]: predictions = client.deployments.score(scoring_url, scoring_data)
         print("Scoring result: " + str(predictions))

         Scoring result: {'values': [[0.9858685731887817, 0.006838159170001745, 0.0011627099011093378, 0.0015266451518982649, 0.0015551344258710742, 0.00304
         87235635519028]]}

In [68]: predictions.get('values')

Out[68]: [[0.9858685731887817,
```

Vamos trabalhar na web app agora!

A partir de agora, você pode utilizer a sua IDE de preferência

Abra o arquivo “app.py” e insira suas credenciais obtidas no WML e sua URL score

jupyter app.py Yesterday at 10:43 AM Logout

File Edit View Language Python

```
#Importing Tensorflow
import tensorflow as tf

#Importing the Watson Machine Learning Client API and the libraries for preprocessing the uploaded images
from watson_machine_learning_client import WatsonMachineLearningAPIClient
from keras.preprocessing import image
from keras.applications.inception_v3 import decode_predictions, preprocess_input
from io import BytesIO

# Emit Bluemix deployment event
cf_deployment_tracker.track()

app = Flask(__name__)
BASE = './assets/'

ALLOWED_EXTENSIONS = set(['png', 'jpg', 'jpeg', 'gif'])

# Inception v3 initial parameters.

INPUT_LAYER = 'Mul'
INPUT_HEIGHT = 299
INPUT_WIDTH = 299


# Load your WML Credentials here.
wml_credentials={
  "Insira suas suas credenciais"
}

#Creating an instance to run the WML API Client with the Tensorflow model
client = WatsonMachineLearningAPIClient(wml_credentials)
client._refresh_token()

#The REST API URL provided by your WML instance
scoring_url = "Insira sua URL score"
```

No diretório “templates” abra o arquivo “index.html”

jupyter index.html a few seconds ago

Logout

File Edit View Language HTML

```
16    <div class="container">
17        <h1>IBM Cloud Discovery: AI LAB</h1>
18        <p>Image Object Recognition: Airplanes, Birds and Humans!</p>
19        <div class="input-group-lg center-block tf-image-pane">
20          <ul class="nav nav-tabs">
21            <li><a data-toggle="tab" href="#upload">Upload an Image</a></li>
22          </ul>
23
24          <div class="tab-content">
25            <div id="upload" class="tab-pane fade">
26              <div class="input-group">
27                <span class="input-group-btn">
28                  <span class="btn btn-default btn-upload">
29                    <input type="file" accept="image/*" id="upload_input"
30                           onchange="onUpload(this.files[0])">
31                  </span>
32                </span>
33              </div>
```

Código HTML com a estrutura visual da página. Edite como quiser futuramente!

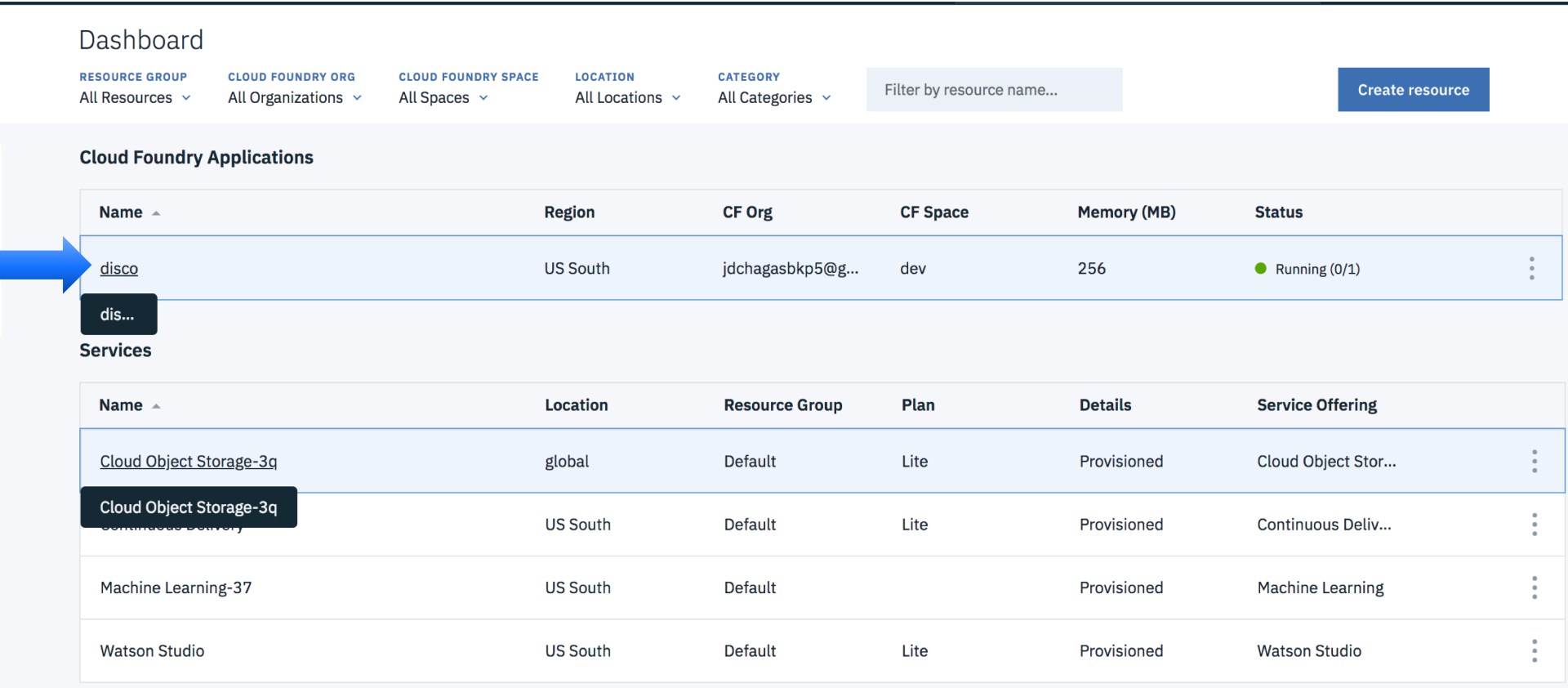
```
84          })
85          .done(function(data) {
86            $('#loading').hide();
87            confidences = data['values'][0]
88            classes = ['Airplanes', 'Birds' 'Humans']
89            for (var i = 0; i < confidences.length; i++) {
90              var label = classes[i];
91              var confidence = confidences[i].toFixed(2) ;
92              $('#results').append('<strong>' + label +
93                                   ':</strong> ' + Math.round(confidence*100) + '%'+'</br >');
94            }
95          })
96          .fail(function(data) {
97            $('#error').html(data.responseText);
```

Código JavaScript com a lógica para pré-processamento da página e de alguns efeitos visuais.

Modifique em seu diretório o arquivo “manifest.yml”

Lembre-se: o host será o endereço do seu app. Nesse caso da imagem, será publicado assim:
http://ibmdiscolab.mybluemix.net/

No Dashboard da IBM Cloud
(https://console.bluemix.net/dashboard/apps)



Faça o Download da IBM Cloud CLI e instale em sua máquina

Download, modify, and redeploy your Cloud Foundry app with the command line interface

Last Updated: 2018-05-24 | Edit in GitHub

Use IBM Cloud command line interface to download, modify, and redeploy your Cloud Foundry applications and service instances.

Before you begin, download and install the IBM Cloud CLI External link icon

Restriction: The command line tool is not supported by Cygwin. Use the tool in a command line window other than the Cygwin command line window.

After you install the command line interface, you can get started:

1. Change to the directory where your code is located.

```
$ cd your_new_directory
```

2. Make changes to your app code as you see fit. For example, if you are using a IBM® Cloud sample application and your app contains the `src/main/webapp/index.html` file, you can modify it and edit "Thanks for creating ..." to say something new. Ensure the app runs locally before you deploy it back to IBM Cloud.

`.yml` file. When deploying your app back to IBM Cloud, this file is used to determine your

Realize o deploy do seu app

```
Uploading droplet...
Exit status 0
Staging complete
Uploading droplet, build artifacts cache...
Uploaded build artifacts cache (2.7M)
Uploaded droplet (6.1M)
Uploading complete
Stopping instance 281f2e2e-1c7c-4eb6-b47a-47ffad276aa9
Destroying container
Successfully destroyed container

1 of 1 instances running

App started


OK

App TEST-APP was started using this command `$HOME/boot.sh`

Showing health and status for app TEST-APP in org jorge.barbosa@ibm.com / space dev as jorge.ba
OK

requested state: started
instances: 1/1
usage: 256M x 1 instances
urls: ibmdiscotest.mybluemix.net
last uploaded: Tue Oct 2 13:41:20 UTC 2018
stack: cflinuxfs2
buildpack: https://github.com/cloudfoundry/staticfile-buildpack.git

     state     since                  cpu    memory          disk          details
#0   running   2018-10-02 10:41:58 AM   0.0%   4.1M of 256M   11.8M of 1G
Jorges-MacBook-Pro:ibmdisco_neural jdchagas$
```

Acesse a raiz do projeto que você fez clone/download do Github

Execute os seguintes comandos:

bx login –sso

Insira suas credenciais de acesso a iBM Cloud e o código de acesso. Logo após, digite:

cf push *app_name*

Acesse seu app via Browser e teste com imagens novas

Not Secure | ibmdiscolab.mybluemix.net

IBM Cloud Discovery: AI LAB

Image Object Recognition: Airplanes, Birds and Humans!

Upload an Image

Choose File n04583620_76.JPEG

Classify

Airplanes: 99%

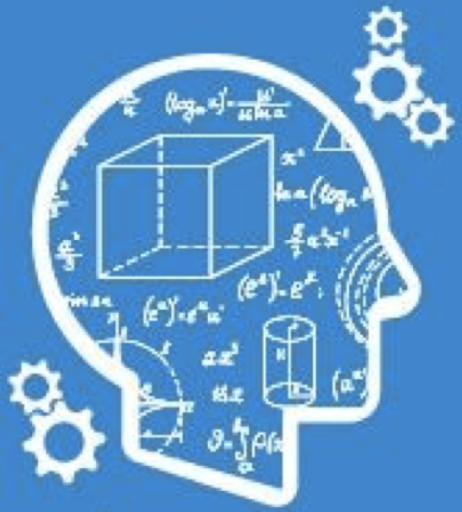
Birds: 0%

Um pouco de teoria...

IBM

ARTIFICIAL INTELLIGENCE

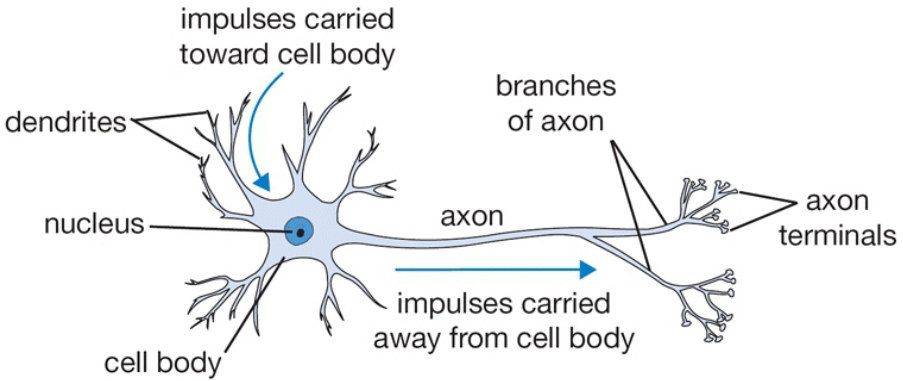
MACHINE LEARNING

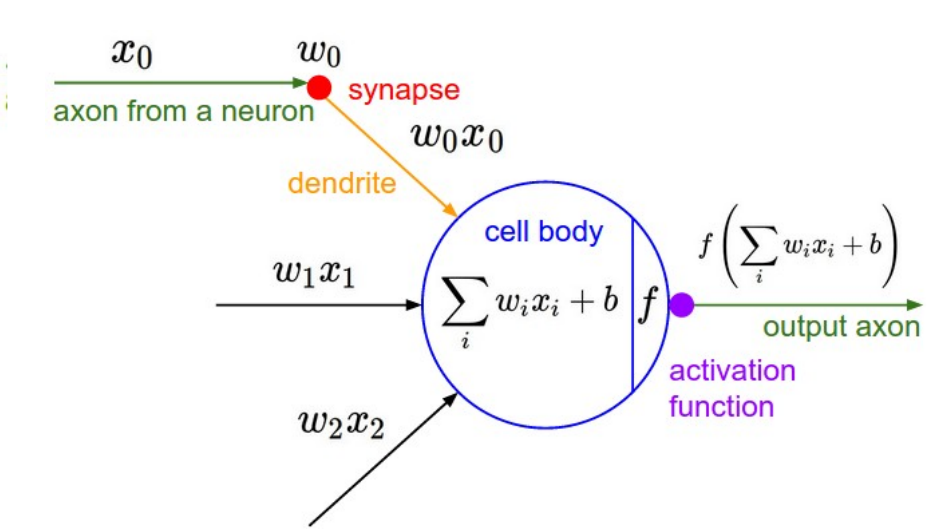


DEEP LEARNING

1950 1960 1970 1980 1990 2000 2010

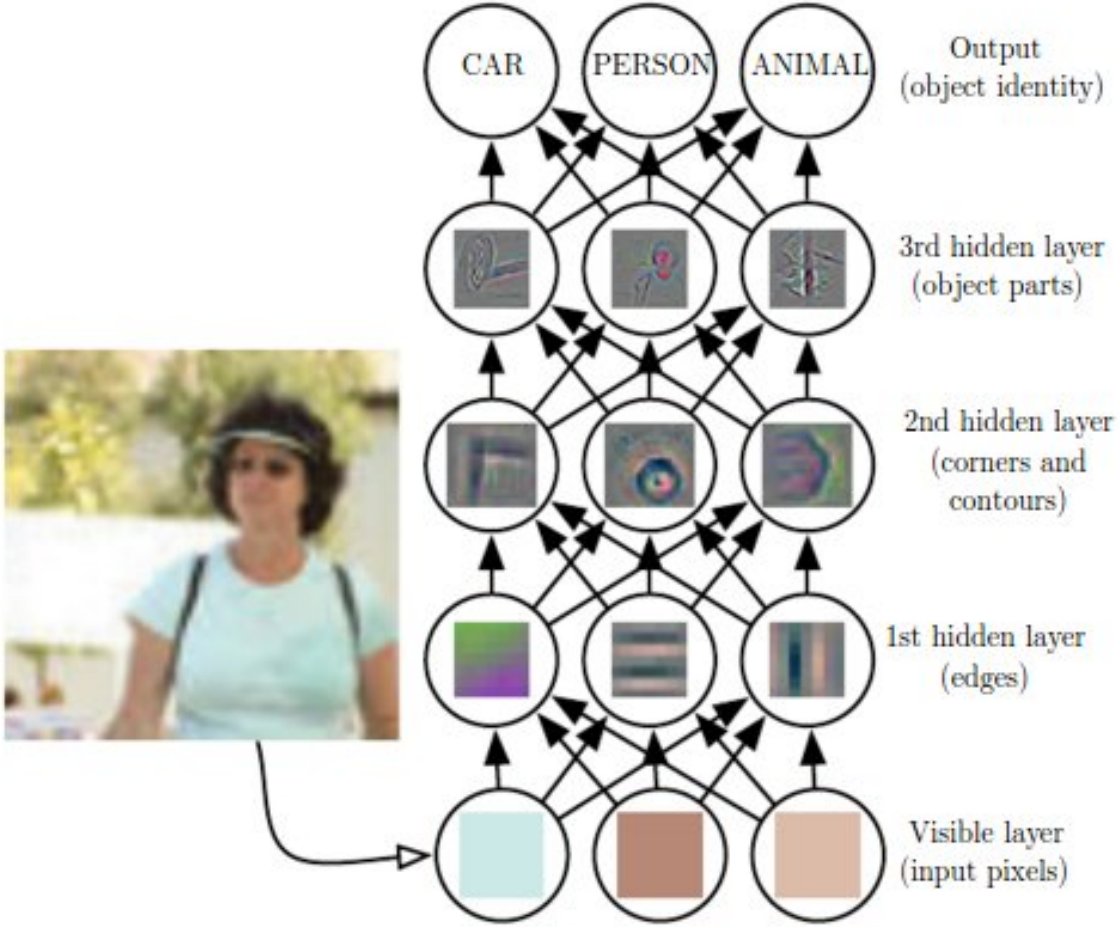
Conceitos simples de uma rede neural artificial



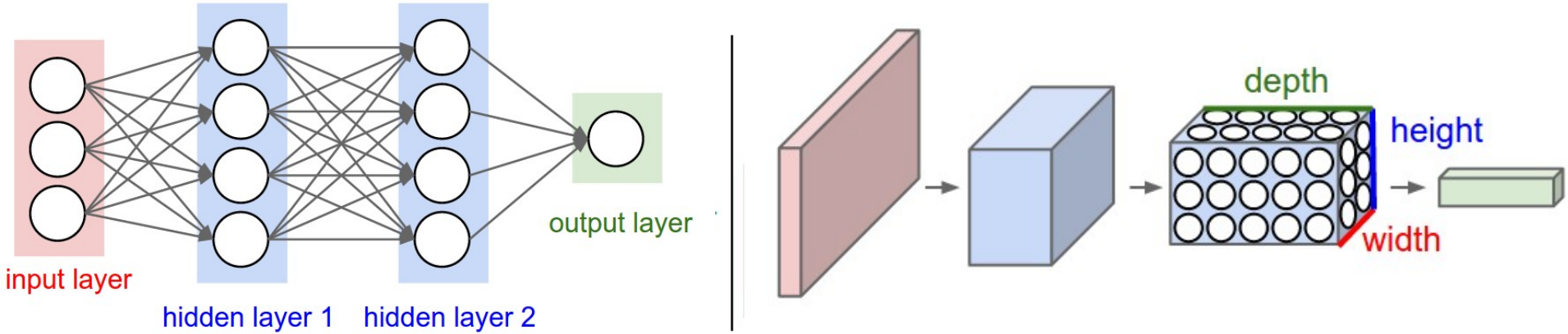


http://cs231n.github.io/convolutional-networks/

Conceitos simples de uma rede neural artificial

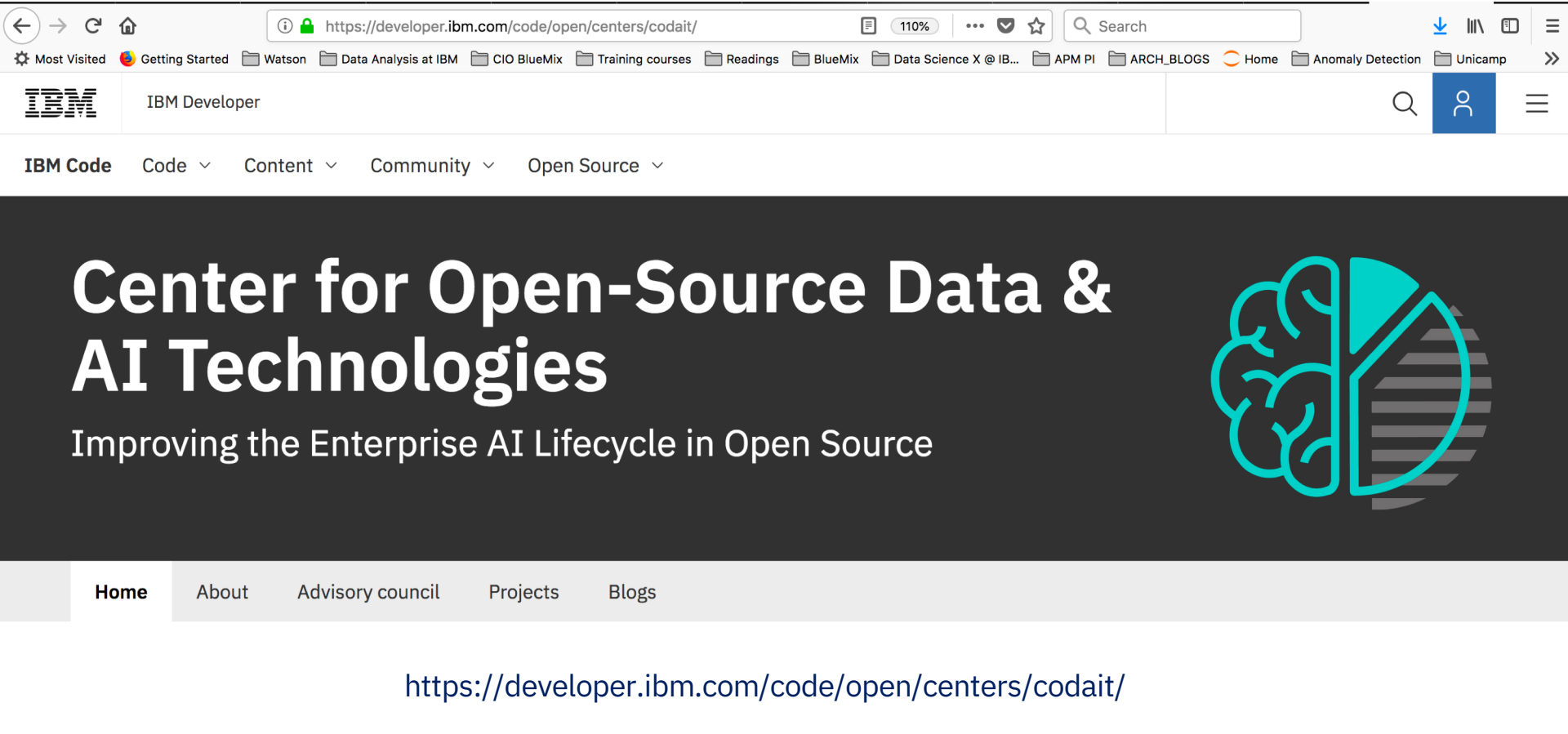


Redes Neurais Convolucionais



http://cs231n.github.io/convolutional-networks/

Referência de estudo, projetos e code patterns



https://developer.ibm.com/code/open/centers/codait/

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