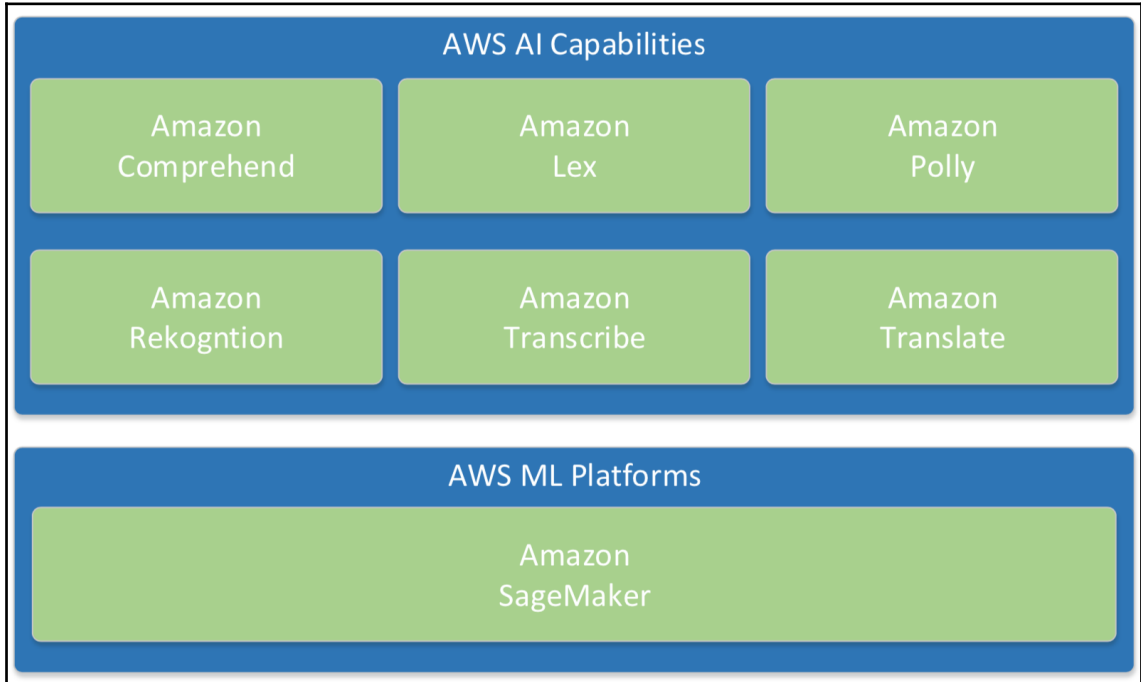


Chapter 1: Introduction to Artificial Intelligence on Amazon Web Services



AWS Accounts Include 12 Months of Free Tier Access

Including use of Amazon EC2, Amazon S3, and Amazon DynamoDB

Visit aws.amazon.com/free for full offer terms

Create an AWS account

Email address

Password

Confirm password

AWS account name ⓘ

Continue

[Sign in to an existing AWS account](#)

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Services
Resource Groups


aws_al
Ohio
Support

AWS Management Console

AWS services

Find services

You can enter names, keyword or acronyms.

▶ All services

Build a solution

Get started with simple wizards and automated workflows.

Launch a virtual machine

With EC2
~2-3 minutes



Build a web app

With Elastic Beanstalk
~6 minutes



Build using virtual servers

With Lightsail
~1-2 minutes



Connect an IoT device

With AWS IoT
~5 minutes



▶ See more

Learn to build

Learn to deploy your solutions through step-by-step guides, labs, and videos. [See all](#)

Websites and Web Apps

3 videos, 3 tutorials, 3 labs



Storage

3 videos, 3 tutorials, 3 labs



Access resources on the go



Access the Management Console using the AWS Console Mobile App. [Learn more](#)

Explore AWS

Amazon Redshift

Fast, simple, cost-effective data warehouse that can extend queries to your data lake. [Learn more](#)

Run Serverless Containers with AWS Fargate

AWS Fargate runs and scales your containers without having to manage servers or clusters. [Learn more](#)

AWS Marketplace

Find, buy, and deploy popular software products that run on AWS. [Learn more](#)

Scalable, Durable, Secure Backup & Restore with Amazon S3

Discover how customers are building backup & restore solutions on AWS that save money. [Learn more](#)

Have feedback?



[Submit feedback](#) to tell us about your experience with the AWS Management Console.

[3]

GroupA-Z

Compute EC2 Lightsail ↗ ECR ECS EKS Lambda Batch Elastic Beanstalk	Blockchain Amazon Managed Blockchain Satellite Ground Station Management & Governance CloudWatch AWS Auto Scaling CloudFormation CloudTrail Config OpsWorks Service Catalog Systems Manager Trusted Advisor Managed Services Control Tower AWS License Manager AWS Well-Architected Tool Personal Health Dashboard ↗	Analytics Athena EMR CloudSearch Elasticsearch Service Kinesis QuickSight ↗ Data Pipeline AWS Glue MSK	Customer Engagement Amazon Connect Pinpoint Simple Email Service Business Applications Alexa for Business Amazon Chime ↗ WorkDocs WorkMail
Storage S3 EFS FSx S3 Glacier Storage Gateway		Security, Identity, & Compliance IAM Resource Access Manager Cognito Secrets Manager GuardDuty Inspector Amazon Macie ↗ AWS Organizations AWS Single Sign-On Certificate Manager Key Management Service CloudHSM Directory Service WAF & Shield Artifact Security Hub	Desktop & App Streaming WorkSpaces AppStream 2.0 Internet Of Things IoT Core Amazon FreeRTOS IoT 1-Click IoT Analytics IoT Device Defender IoT Device Management IoT Events IoT Greengrass IoT SiteWise IoT Things Graph
Database RDS DynamoDB ElastiCache Neptune Amazon Redshift	Media Services Elastic Transcoder Kinesis Video Streams MediaConnect MediaConvert MediaLive MediaPackage MediaStore MediaTailor	Mobile AWS Amplify Mobile Hub AWS AppSync Device Farm	Game Development Amazon GameLift
Migration & Transfer AWS Migration Hub Application Discovery Service Database Migration Service Server Migration Service AWS Transfer for SFTP Snowball DataSync			

Region Unsupported

Amazon Lex is not available in **US East (Ohio)**. Please select another region.

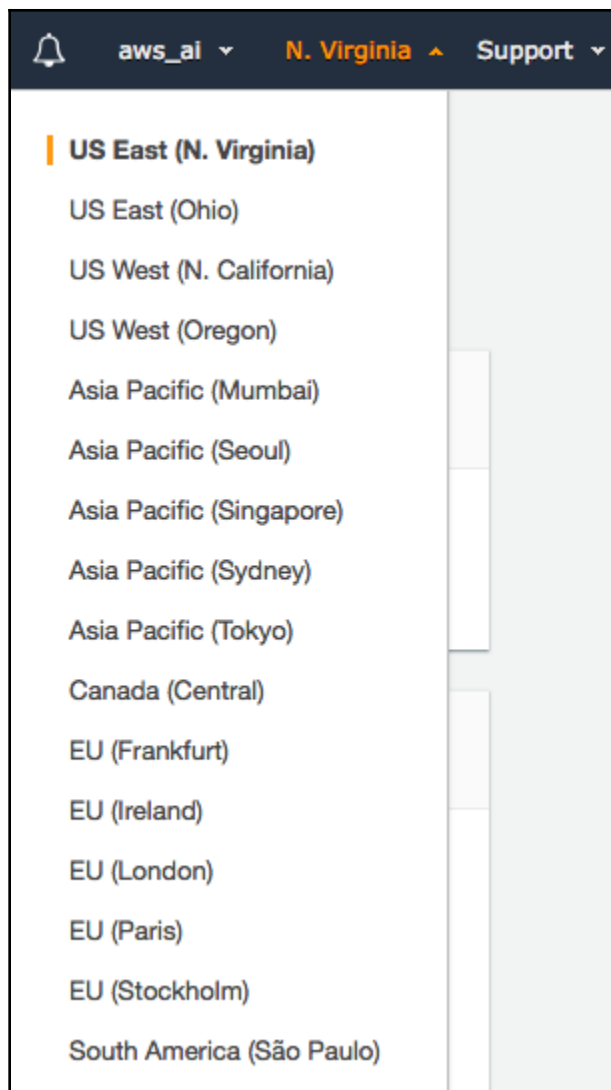
Supported Regions

Asia Pacific (Sydney)

US East (N. Virginia)

EU (Ireland)

US West (Oregon)



Amazon Rekognition

Metrics

Demos

Object and scene detection

Image moderation

Facial analysis

Celebrity recognition

Face comparison

Text in image

Video Demos

Video analysis

Additional Resources

Getting started guide

Download SDKs

Developer resources

Pricing

FAQ

Forum

Object and scene detection

Rekognition automatically labels objects, concepts and scenes in your images, and provides a confidence score.



Choose a sample image



Use your own image

Image must be .jpeg or .png format and no larger than 5MB. Your image isn't stored.

Upload

or drag and drop

Use image URL

Go

Done with the demo?

Learn more

Results

Transportation	98.8 %
Vehicle	98.8 %
Automobile	98.8 %
Car	98.8 %
Person	98.3 %
Human	98.3 %

Show more

Request

Response

S3 buckets

Discover the console

Q Search for buckets

All access types

+ Create bucket

Edit public access settings

Empty

Delete

0 Buckets

0 Regions

You do not have any buckets. Here is how to get started with Amazon S3.



Create a new bucket

Buckets are globally unique containers for everything that you store in Amazon S3.

Learn more



Upload your data

After you create a bucket, you can upload your objects (for example, your photo or video files).

Learn more



Set up your permissions

By default, the permissions on an object are private, but you can set up access control policies to grant permissions to others.

Learn more

Get started

[8]

Create bucket

1 Name and region

2 Configure options

3 Set permissions

4 Review

Name and region

Bucket name ⓘ

Enter DNS-compliant bucket name

Region

US East (N. Virginia)

Copy settings from an existing bucket

You have no buckets0 Buckets

Create

Cancel

Next

S3 buckets

Discover the console

Q Search for buckets

All access types

+ Create bucket

Edit public access settings

Empty

Delete

3 Buckets

1 Regions

☐ Bucket name ▾	Access ⓘ ▾	Region ▾	Date created ▾
☐  contents.aws.ai	Bucket and objects not public	US East (N. Virginia)	Dec 23, 2018 6:01:20 PM GMT-0500
☐  data.aws.ai	Bucket and objects not public	US East (N. Virginia)	Dec 23, 2018 6:01:49 PM GMT-0500
☐  website.aws.ai	Bucket and objects not public	US East (N. Virginia)	Dec 23, 2018 6:01:35 PM GMT-0500

Amazon S3 > contents.aws.ai

Overview

Properties

Permissions

Management

Upload

Create folder

Download

Actions

US East (N. Virginia)

This bucket is empty. Upload new objects to get started.



Upload an object

Buckets are globally unique containers for everything that you store in Amazon S3.

Learn more



Set object properties

After you create a bucket, you can upload your objects (for example, your photo or video files).

Learn more



Set object permissions

By default, the permissions on an object are private, but you can set up access control policies to grant permissions to others.

Learn more

Get started

[10]

Search IAM

Dashboard

Groups

Users

Roles

Policies

Identity providers

Account settings

Credential report

Encryption keys

Welcome to Identity and Access Management

IAM users sign-in link:
[https://\[REDACTED\].signin.aws.amazon.com/console](https://[REDACTED].signin.aws.amazon.com/console)  [Customize](#)

IAM Resources

Users: 0

Groups: 0

Customer Managed Policies: 0

Roles: 2

Identity Providers: 0

Security Status

Delete your root access keys

Activate MFA on your root account

Create individual IAM users

Use groups to assign permissions

Apply an IAM password policy

1 out of 5 complete.

Add user

Delete user

Find users by username or access key

Showing 0 results

☐	User name ▾	Groups	Access key age	Password age	Last activity	MFA
There are no IAM users. Learn more						

Add user

12345

Set user details

You can add multiple users at once with the same access type and permissions. [Learn more](#)

User name*

aws_ai

➕ Add another user

Select AWS access type

Select how these users will access AWS. Access keys and autogenerated passwords are provided in the last step. [Learn more](#)

Access type*

☒ Programmatic access

Enables an **access key ID** and **secret access key** for the AWS API, CLI, SDK, and other development tools.

☐ AWS Management Console access

Enables a **password** that allows users to sign-in to the AWS Management Console.

Add user

12345

▼ Set permissions

 Add user to group

 Copy permissions from existing user

 Attach existing policies directly

 **Get started with groups**

You haven't created any groups yet. Using groups is a best-practice way to manage users' permissions by job functions, AWS service access, or your custom permissions. Get started by creating a group. [Learn more](#)

Create group

[12]

Create group

Create a group and select the policies to be attached to the group. Using groups is a best-practice way to manage users' permissions by job functions, AWS service access, or your custom permissions. [Learn more](#)

Group name

Developer

Create policy

Refresh

Filter policies

Search

Showing 406 results

	Policy name	Type	Used as	Description
☒	AdministratorAccess	Job function	None	Provides full access to AWS services a...
☐	AlexaForBusinessD...	AWS managed	None	Provide device setup access to AlexaF...
☐	AlexaForBusinessF...	AWS managed	None	Grants full access to AlexaForBusiness ...
☐	AlexaForBusinessG...	AWS managed	None	Provide gateway execution access to A...
☐	AlexaForBusinessR...	AWS managed	None	Provide read only access to AlexaForB...
☐	AmazonAPIGatewa...	AWS managed	None	Provides full access to create/edit/delet...
☐	AmazonAPIGatewa...	AWS managed	None	Provides full access to invoke APIs in A...
☐	AmazonAPIGatewa...	AWS managed	None	Allows API Gateway to push logs to us...
☐	AmazonAppStream...	AWS managed	None	Provides full access to Amazon AppStr...
☐	AmazonAppStream...	AWS managed	None	Provides read only access to Amazon A...

Cancel

Create group

Add user

1

2

3

4

5

Success

You successfully created the users shown below. You can view and download user security credentials. You can also email users instructions for signing in to the AWS Management Console. This is the last time these credentials will be available to download. However, you can create new credentials at any time.

Users with AWS Management Console access can sign-in at: <https://029430794426.signin.aws.amazon.com/console>

Download .csv

User	Access key ID	Secret access key
aws.ai	AKIAJG5XQQUUJGI4PIEQ	***** Show

[13]

IAM Resources

Users: 1

Roles: 2

Groups: 1

Identity Providers: 0

Customer Managed Policies: 0

Security Status

 3 out of 5 complete.

-  Delete your root access keys 
-  Activate MFA on your root account 
-  Create individual IAM users 
-  Use groups to assign permissions 
-  Apply an IAM password policy 

Create access key



Success

This is the **only** time that the secret access keys can be viewed or downloaded. You cannot recover them later. However, you can create new access keys at any time.

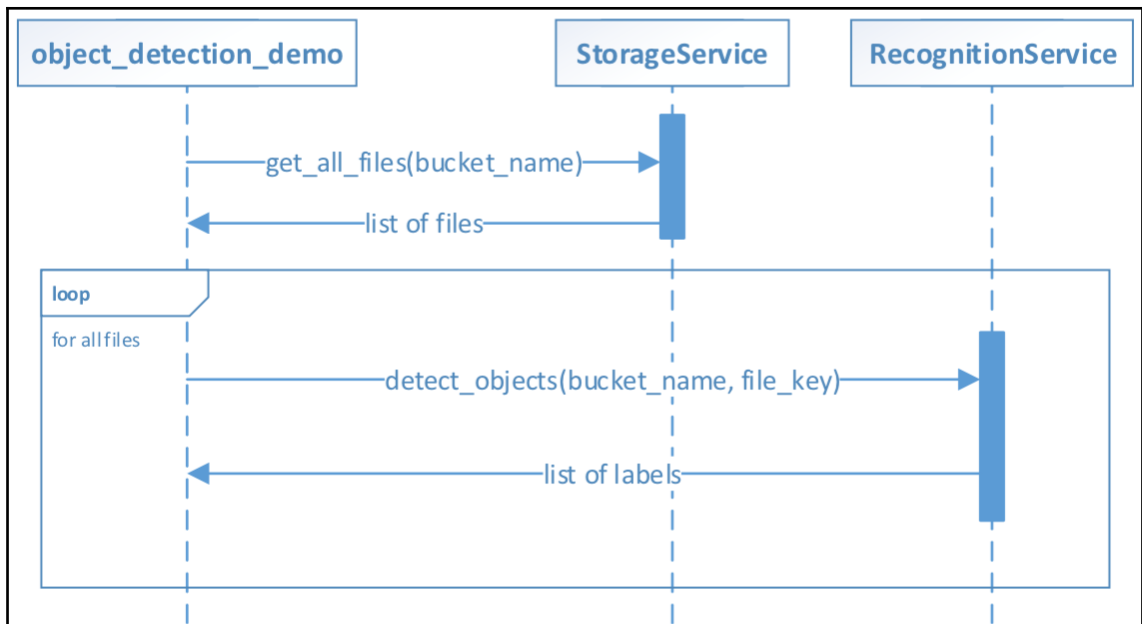
 Download .csv file

Access key ID	Secret access key
---------------	-------------------

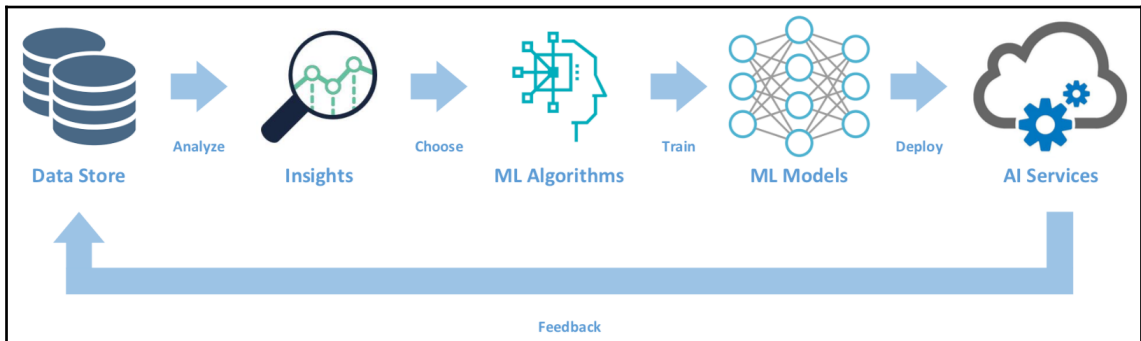
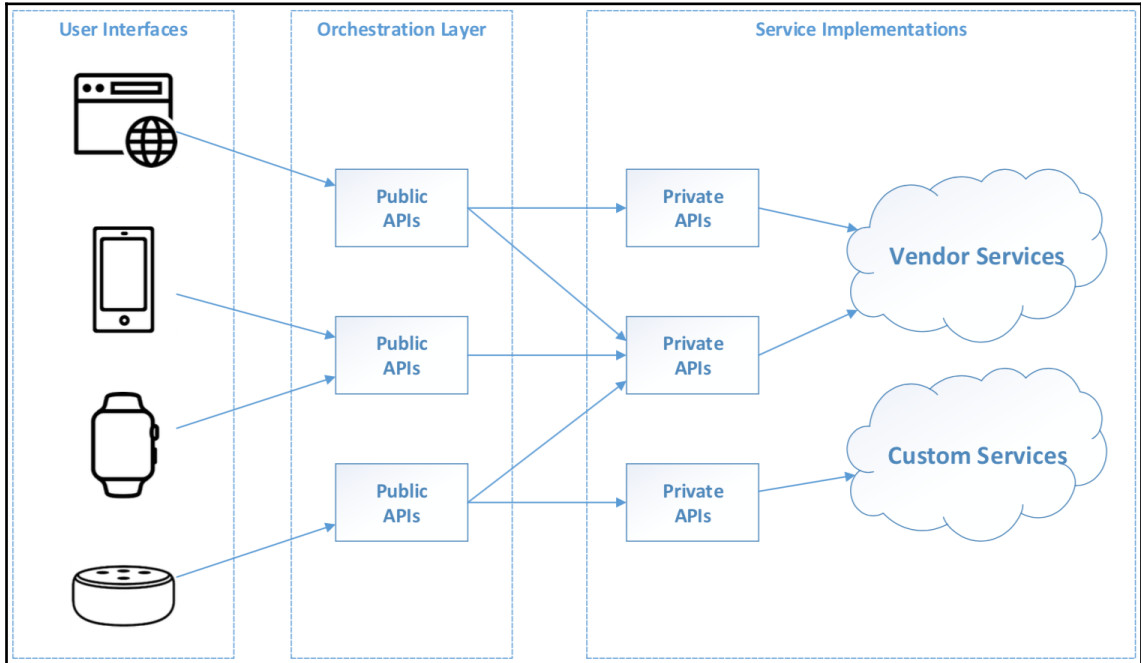
AKIAIWXIWEYS5OELWQQ	***** Show
---------------------	----------------------------

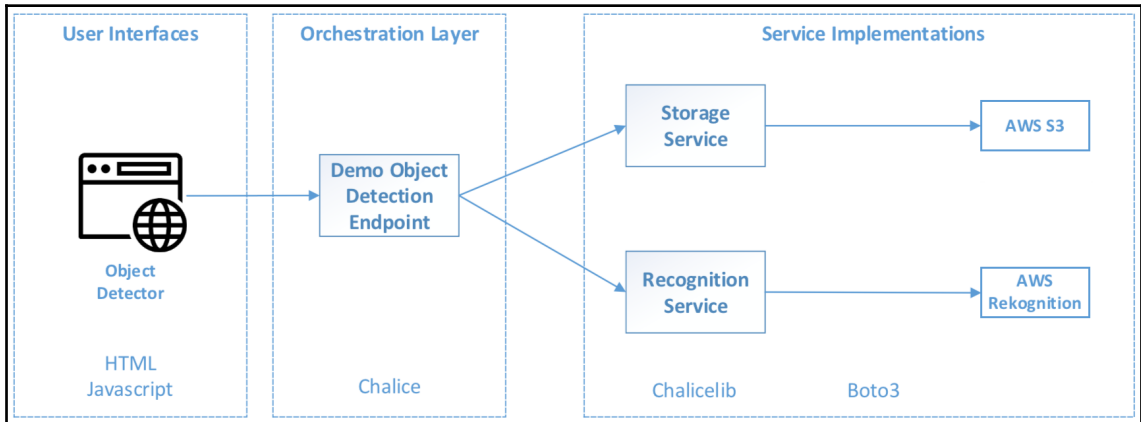
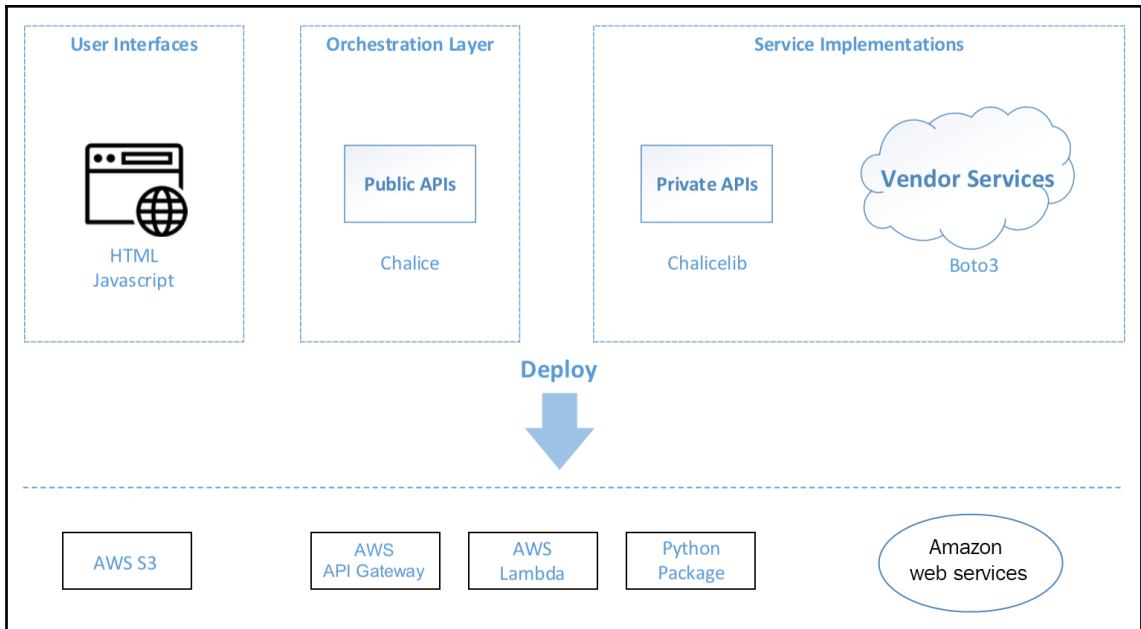
Close

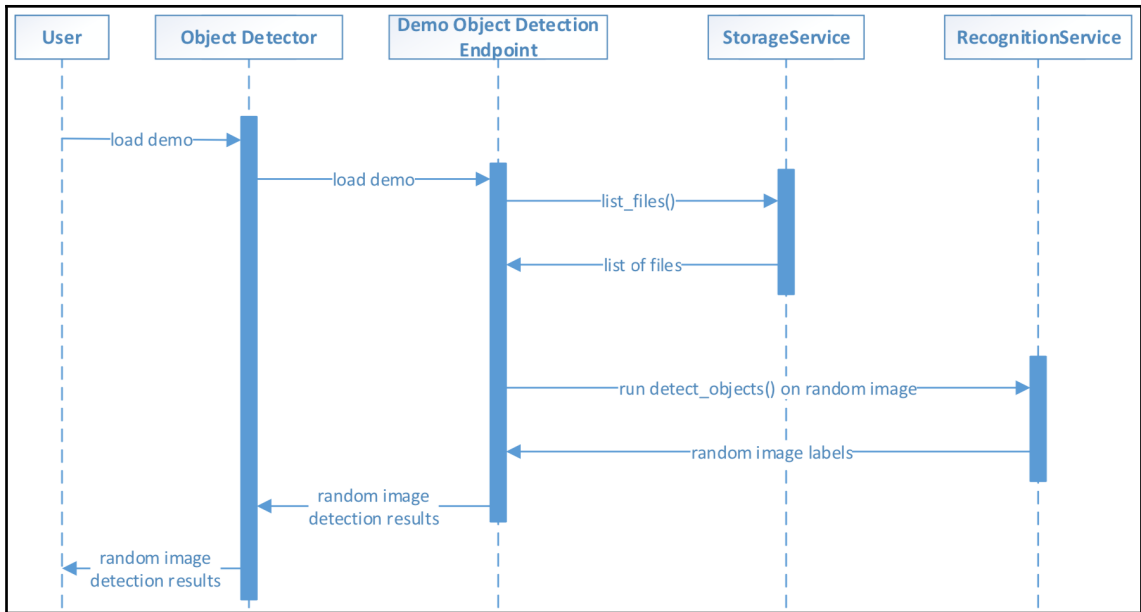




Chapter 2: Anatomy of a Modern AI Application







Object Detector

Randomly Selected Demo Image



Objects Detected:

Canine: 98.9777603149414%

Mammal: 98.9777603149414%

Pet: 98.9777603149414%

Dog: 98.9777603149414%

Hound: 98.9777603149414%

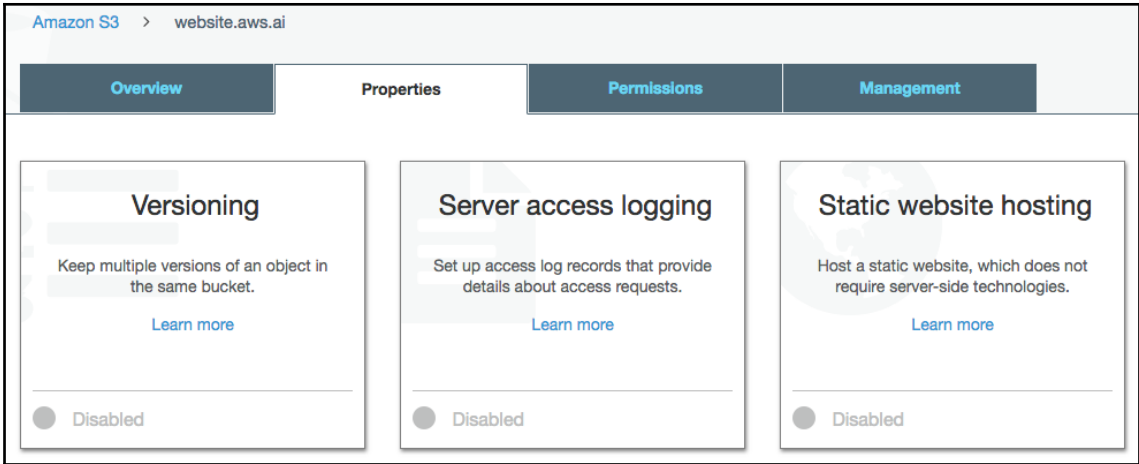
Animal: 98.9777603149414%

Beagle: 98.03479766845703%

Road: 82.47953033447266%

Dirt Road: 74.52914428710938%

Gravel: 74.52914428710938%



Static website hosting

Endpoint : <http://website.aws.ai.s3-website-us-east-1.amazonaws.com>

☒ Use this bucket to host a website [Learn more](#)

Index document [i](#)

index.html

Error document [i](#)

error.html

Redirection rules (optional) [i](#)

☐ Redirect requests [Learn more](#)

☐ Disable website hosting

Cancel

Save

Amazon S3 > website.aws.ai

Overview

Properties

Permissions

Management

Public access settings

Access Control List

Bucket Policy

CORS configuration

Public access settings for this bucket

Use the Amazon S3 block public access settings to enforce that buckets don't allow public access to data. You can also configure the Amazon S3 block public access settings at the account level. [Learn more](#)

Manage public access control lists (ACLs) for this bucket

Access control lists (ACLs) are used to grant basic read/write permissions to other AWS accounts.

☐ Block new public ACLs and uploading public objects *(Recommended)*

☐ Remove public access granted through public ACLs *(Recommended)*

Manage public bucket policies for this bucket

Bucket policies use JSON-based access policy language to manage advanced permission to your Amazon S3 resources.

☐ Block new public bucket policies *(Recommended)*

☐ Block public and cross-account access if bucket has public policies *(Recommended)*

[23]

Amazon S3 > website.aws.ai

Overview

Properties

Permissions

Management

Q

Type a prefix and press Enter to search. Press ESC to clear.

Upload

Create folder

Download

Actions

US East (N. Virginia)

Name

Index.html

scripts.js

Open

Download as

Get total size

Change storage class

Restore from Glacier

Change encryption

Change metadata

Add tags

Make public

Rename

Delete

Undo delete

Cut

Copy

Paste

Select from

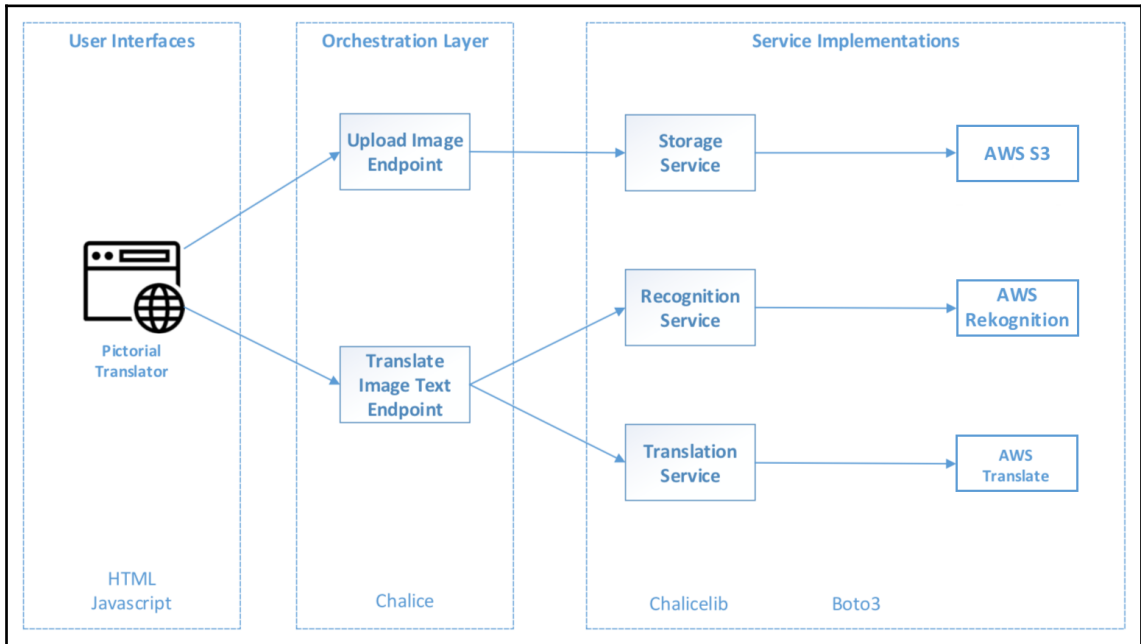
Viewing 1 to 2

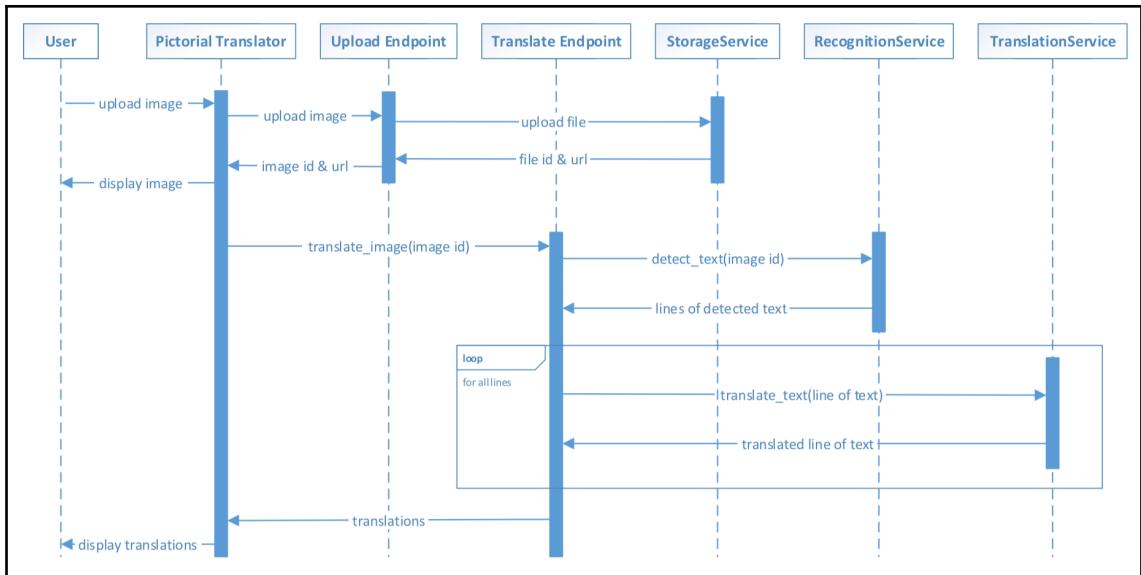
Last modified	Size	Storage class
5, 2019 7:39:57 PM GMT-00	1.1 KB	Standard
5, 2019 7:40:36 PM GMT-00	1.0 KB	Standard

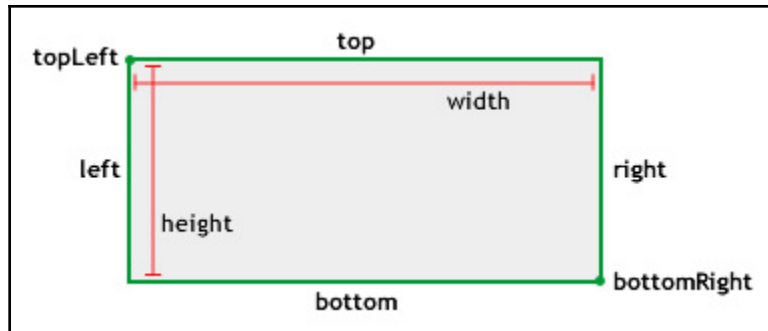
Viewing 1 to 2

[24]

Chapter 3: Detecting and Translating Text with Amazon Rekognition and Translate







Pictorial Translator

Upload

Choose File

No file chosen

Upload

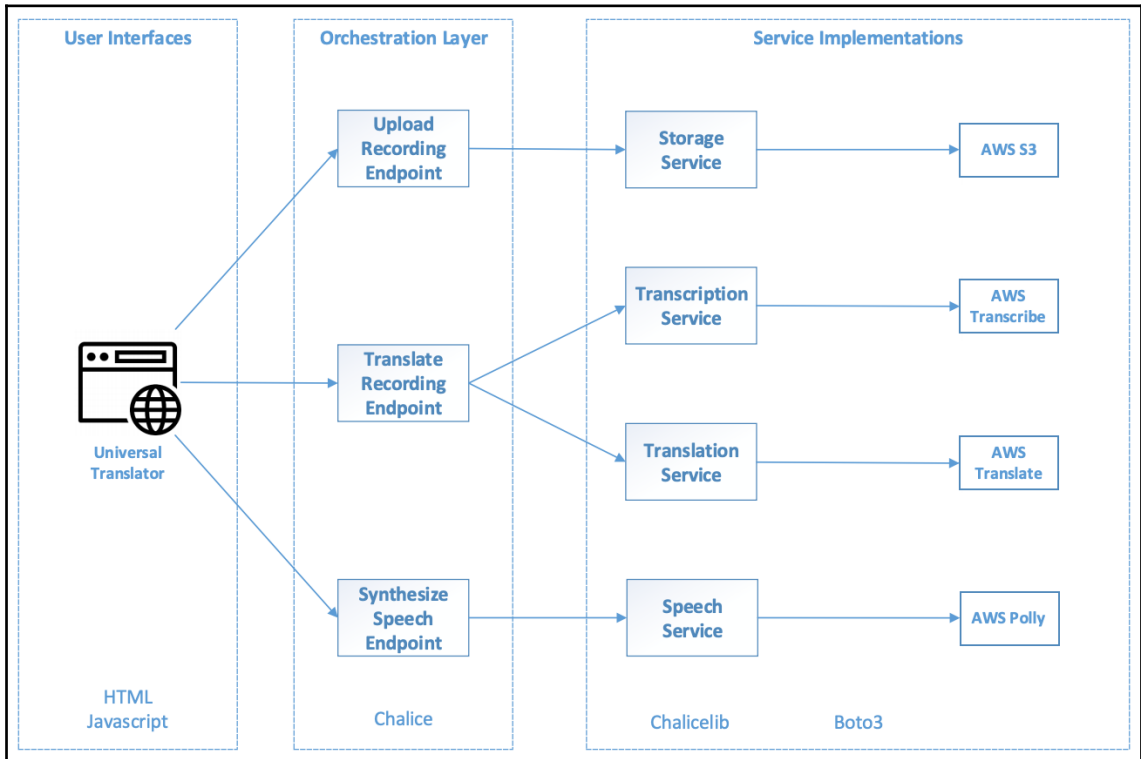
Image

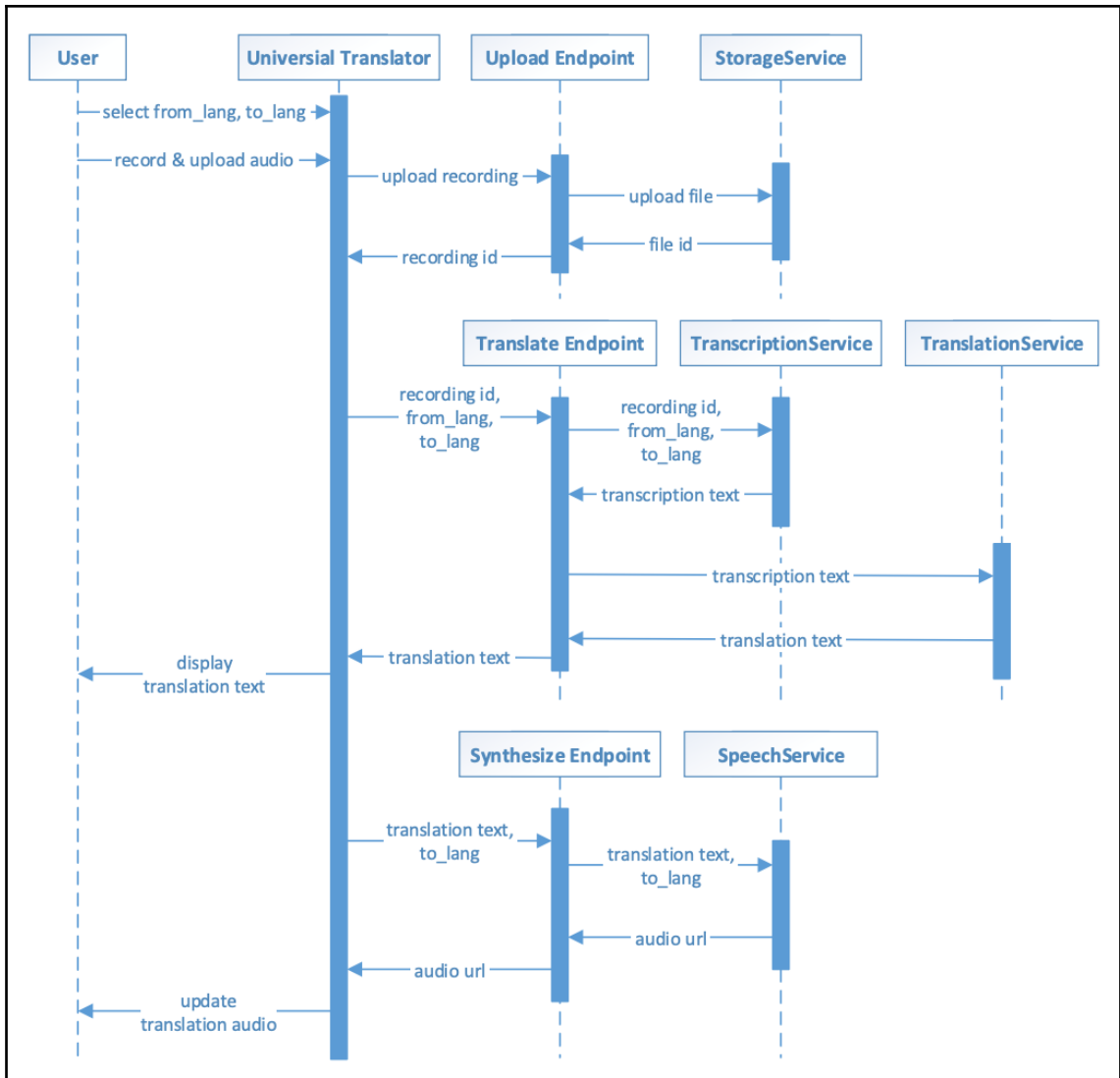


Translated Text:

Einbahnstrabe -> One way

Chapter 4: Performing Speech-to-Text and Vice Versa with Amazon Transcribe and Polly





Universal Translator

Select Languages

From: English ▾

To: German ▾

Record Audio

▶ 0:04 / 0:04 ————— 🔊 ⋮

Record Translate

Translation Text



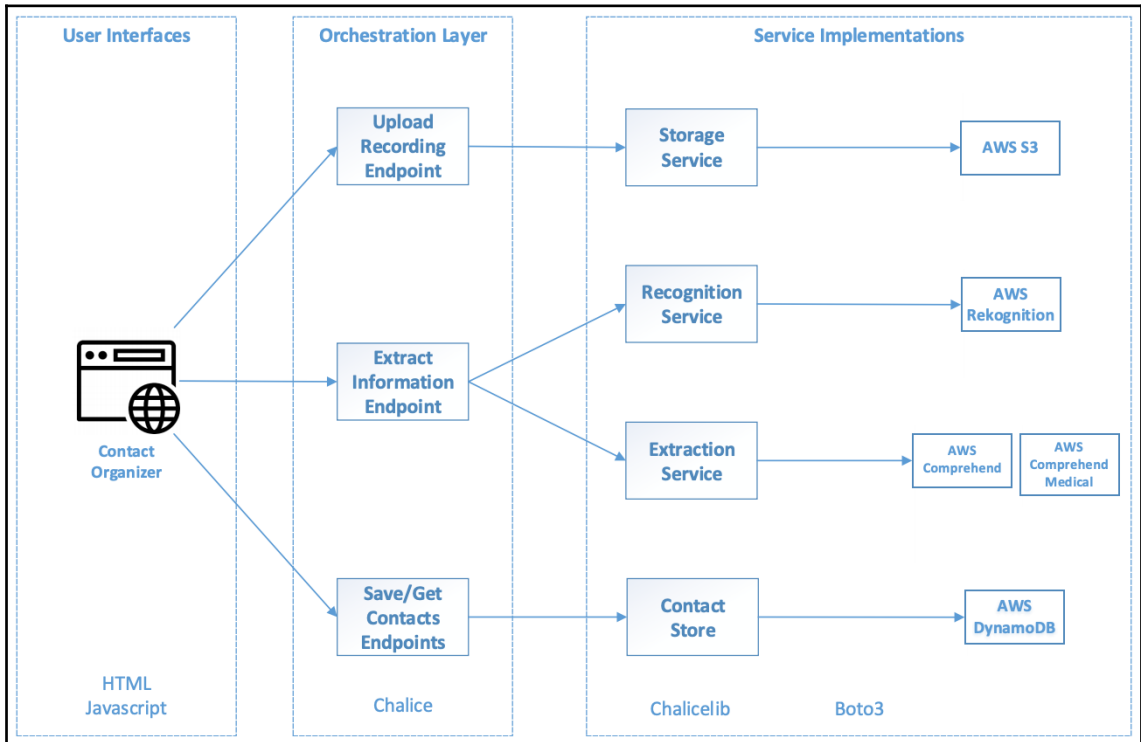
Transcription:

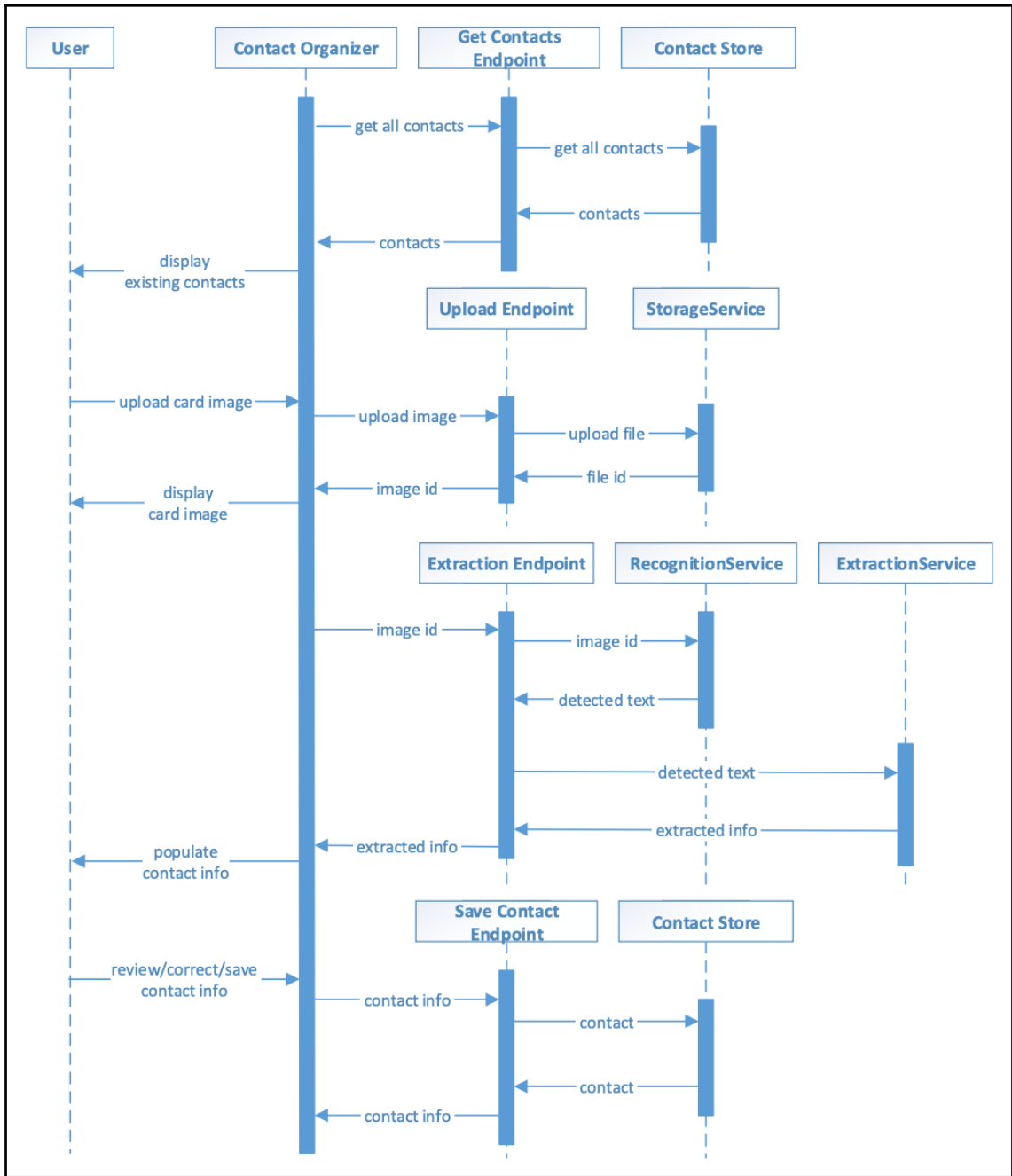
Translation:

Translation Audio

▶ 0:00 / 0:00 ————— 🔊

Chapter 5: Extracting Information from Text with Amazon Comprehend





DynamoDB

Dashboard

Tables

Backups

Reserved capacity

Preferences

DAX

Dashboard

Create table

Amazon DynamoDB is a fully managed non-relational database service that provides fast and predictable performance with seamless scalability.

Create table

Recent alerts

No CloudWatch alarms have been triggered.

View all in CloudWatch

Create DynamoDB table

Tutorial?

DynamoDB is a schema-less database that only requires a table name and primary key. The table's primary key is made up of one or two attributes that uniquely identify items, partition the data, and sort data within each partition.

Table name*

Contacts

Primary key*

Partition key

name

String

Add sort key

Table settings

Default settings provide the fastest way to get started with your table. You can modify these default settings now or after your table has been created.

Use default settings

No secondary indexes.

Auto Scaling capacity set to 70% target utilization, at minimum capacity of 5 reads and 5 writes.

Encryption at Rest with DEFAULT encryption type.

Additional charges may apply if you exceed the AWS Free Tier levels for CloudWatch or Simple Notification Service. Advanced alarm settings are available in the CloudWatch management console.

Cancel

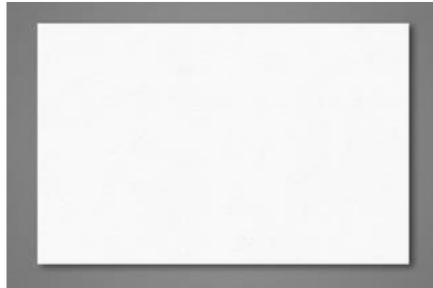
Create

Contact Organizer

Add Contact

Choose File No file chosen

Extract Info



Information

Name

Title

Email

Phone

Address

Organization

Address

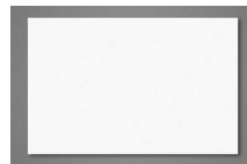
City

State Zip

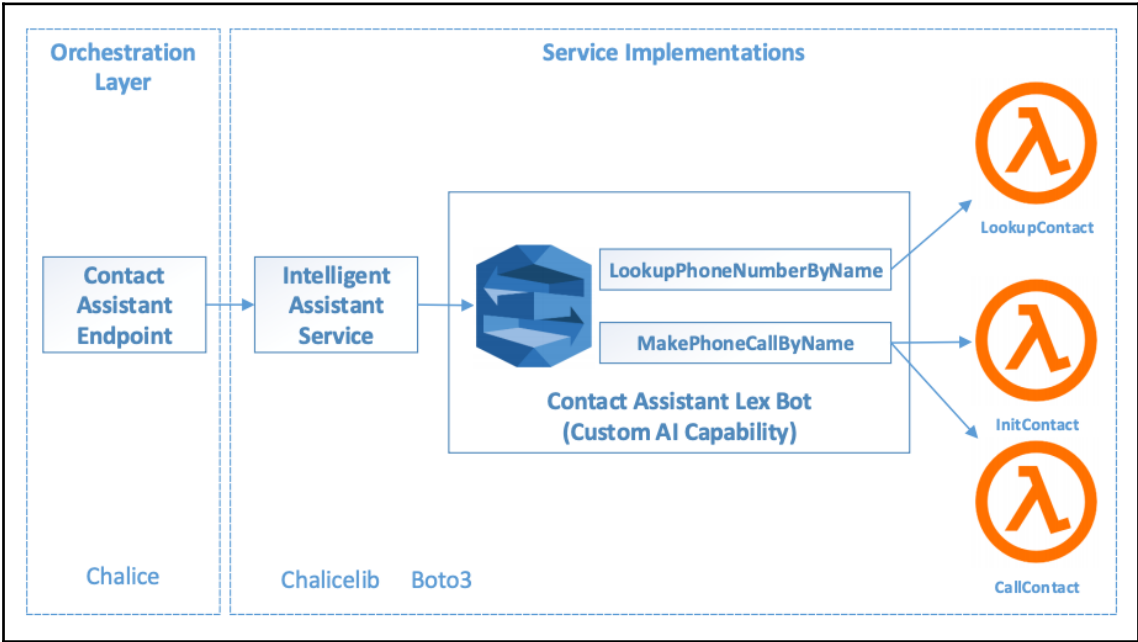
Save Contact

My Contacts Refresh

John Smith
Senior Software Engineer
AI Enterprise Inc.
123 Main Street
Washington D.C., undefined 20001
phone: (202) 123-4567
email: john.smith@aienterprise.com



Chapter 6: Building a Voice Chatbot with Amazon Lex



Create your bot

Amazon Lex enables any developer to build conversational chatbots quickly and easily. With Amazon Lex, no deep learning expertise is necessary—you just specify the basic conversational flow directly from the console, and then Amazon Lex manages the dialogue and dynamically adjusts the response. To get started, you can choose one of the sample bots provided below or build a new custom bot from scratch.

CREATE YOUR OWN

Custom bot

TRY A SAMPLE

BookTrip

OrderFlowers

ScheduleAppointment

Bot name

Language

Output voice



Session timeout



IAM role [AWSServiceRoleForLexBots](#)
Automatically created on your behalf



COPPA Please indicate if your use of this bot is subject to the [Children's Online Privacy Protection Act](#) (COPPA).
[Learn more](#)

☐ Yes ☒ No

Cancel

Create

Contact_Assistant

Latest

Build

Publish

Test bot (Latest)

Not ready for testing. Build to test.

Editor

Settings

Channels

Monitoring

Intents

No intents created

Slot types

No slots created

Error Handling

Getting started with your bot

Welcome to your bot editor. You can start right away by adding an intent using the button in the Intents section of the left navigation.

Create Intent

Components of your bot.

BookHotel

Intents

A particular goal that the user wants to achieve

I'd like to book a hotel

Utterances

Spoken or typed phrases that invoke your intent

Sure, which city?

Slots

Data the user must provide to fulfill the intent

New York City

Prompts

Questions that ask the user to input data

What date do you check in?

Fulfillment

The business logic required to fulfill the user's intent

November 30th.

Are you sure you want to book the hotel in New York City?

Yes

Thank you. The Reservation went through successfully

The bot is not ready for testing. You will be able to test conversations when you click "Build" and the status changes to "Ready".

Clear chat history

Chat with your bot...

Inspect response

Hide

When you chat with your bot, you can see the fulfillment state of your intent and the response here.

Sample utterances

e.g. I would like to book a flight.

I would like to look up a phone number

What's {FirstName} {LastName} phone number

What's the phone number for {FirstName} {LastName}

Slots

Priority	Required	Name	Slot type	Version	Prompt
		e.g. Location	e.g. AMAZON.US_CITY		e.g. What city?
1.	✓	FirstName	AMAZON.US_FIRST_NAME	Built-in	What's the contact's first name?
2.	✓	LastName	AMAZON.US_LAST_NAME	Built-in	What's the {FirstName}'s last name?

FirstName settings

Prompts

e.g. What is your destination?

+

What's the contact's first name?

x

Maximum number of retries

2

Corresponding utterances

e.g. I would like to go to {toCity}

+

Cancel

Save

Confirmation prompt

☒ Confirmation prompt

Confirm

Would you like me to call {FirstName} {LastName}?

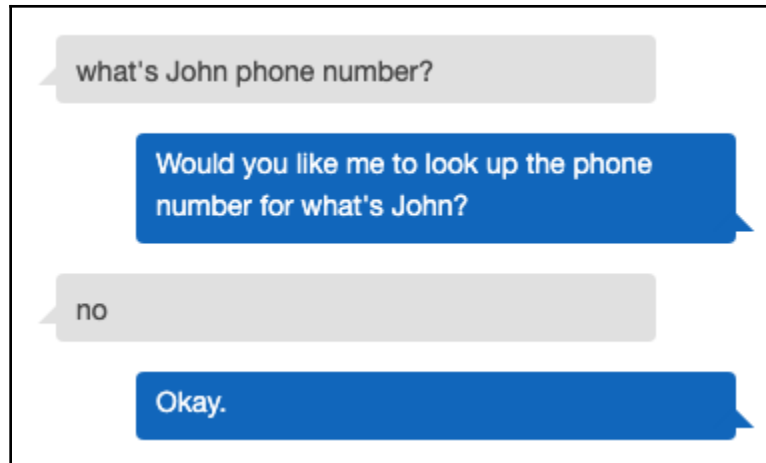
⚙

Cancel (if the user says "no")

Okay, I will not start the call.

⚙

[38]



▼ Response ⓘ

▶ Preview

|| ☒ Message ☐ Custom Markup ⓘ

One of these messages will be presented at random.

e.g. Thank you. Your {Drink_Name} has been ordered.

+

Calling {FirstName} {LastName} at [Phone]

×

+

 Add Message

[39]

Create function [Info](#)

Choose one of the following options to create your function.

Author from scratch ☒

Start with a simple Hello World example.



Use a blueprint ☐

Build a Lambda application from sample code and configuration presets for common use cases.



Browse serverless app repository ☐

Deploy a sample Lambda application from the AWS Serverless Application Repository.



Basic information

Function name

Enter a name that describes the purpose of your function.

Use only letters, numbers, hyphens, or underscores with no spaces.

Runtime [Info](#)

Choose the language to use to write your function.

Permissions [Info](#)

Lambda will create an execution role with permission to upload logs to Amazon CloudWatch Logs. You can configure and modify permissions further when you add triggers.

▼ Choose or create an execution role

Execution role

Choose a role that defines the permissions of your function. To create a custom role, go to the [IAM console](#).

 Role creation might take a few minutes. The new role will be scoped to the current function. To use it with other functions, you can modify it in the IAM console.

Lambda will create an execution role named `LookupPhoneNumberByName-role-7yfezcp0`, with permission to upload logs to Amazon CloudWatch Logs.

Cancel

Create function

LookupPhoneNumbe...

Throttle

Qualifiers ▾

Actions ▾

Select a test event ▾

Test

Save

Configuration

Monitoring

▼ Designer

Add triggers

Choose a trigger from the list below to add it to your function.

API Gateway

AWS IoT

Alexa Skills Kit

Alexa Smart Home

Application Load Balancer

CloudFront

LookupPhoneNumbe

erByName

Layers

(0)

Add triggers from the list on the left

Amazon CloudWatch Logs

Resources that the function's role has access to appear here

Function code [Info](#)

Code entry type

Edit code inline ▾

Runtime

Python 3.7 ▾

Handler [Info](#)

lambda_function.lambda_handle

File Edit Find View Go Tools Window

Environment

LookupPhoneNumb

lambda_function.py

lambda_function

```
1 import json
2
3 def lambda_handler(event, context):
4     # TODO implement
5     return {
6         'statusCode': 200,
7         'body': json.dumps('Hello from Lambda!')
8     }
9
```

[41]

PermissionsTrust relationshipsTagsAccess AdvisorRevoke sessions

▼ Permissions policies (2 policies applied)

Attach policies

Policy name ▼	Policy type ▼
▶  AmazonDynamoDBFullAccess	AWS managed policy
▶ AWSLambdaBasicExecutionRole-e217c5f8-466e-40ea-8f7a-2...	Managed policy

▶ Permissions boundary (not set)

▼ Fulfillment ⓘ

☒ AWS Lambda function

☐ Return parameters to client

Lambda function

LookupPhoneNumberByName ▼

[View in Lambda console](#) 

Version or alias

Latest ▼

Add permission to Lambda Function



You are about to give Amazon Lex permission to invoke your Lambda Function.

Cancel

OK

I would like to look up a phone number

What's the contact's first name?

John

What's the John's last name?

Smith

Would you like me to look up the phone number for John Smith?

yes

John's phone number is (202) 123-4567

what's the phone number for John Smith?

Would you like me to look up the phone number for John Smith?

yes

John's phone number is (202) 123-4567



Chat with your bot...

▼ Sample utterances ⓘ

e.g. I would like to book a flight.



Call {FirstName} {LastName}



Connect me



Call her



Call him



▼ **Lambda initialization and validation** ⓘ

☒ Initialization and validation code hook

Lambda function

InitContact ▼

[View in Lambda console](#) ↗

Version or alias

Latest ▼

▼ **Confirmation prompt** ⓘ

☒ Confirmation prompt

Confirm

Would you like me to call {FirstName} {LastName}?



Cancel (if the user says "no")

Okay, I will not start the call.



▼ **Confirmation prompt** ⓘ

☒ Confirmation prompt

Confirm

Would you like me to call {FirstName} {LastName}?



Cancel (if the user says "no")

Okay, I will not start the call.



▼ Fulfillment ⓘ

☒ AWS Lambda function ☐ Return parameters to client

Lambda function

LookupPhoneNumberByName ▼

[View in Lambda console](#) 

Version or alias

Latest ▼

▼ Response ⓘ

 [Preview](#)



☒ Message

☐ Custom Markup



One of these messages will be presented at random.

e.g. Thank you. Your {Drink_Name} has been ordered.



Calling {FirstName} {LastName} at [Phone]



 [Add Message](#)

call John Smith

Would you like me to call John Smith?

yes

Calling John Smith at (202) 123-4567

what's the phone number for John Smith?

Would you like me to look up the phone number for John Smith?

yes

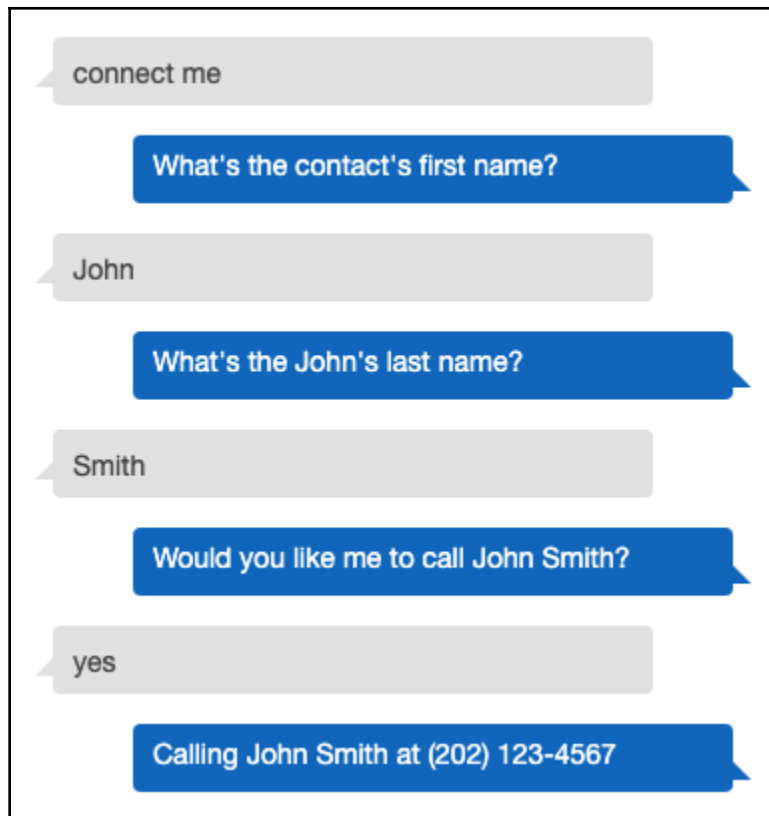
John's phone number is (202) 123-4567

call him

Would you like me to call John Smith?

yes

Calling John Smith at (202) 123-4567

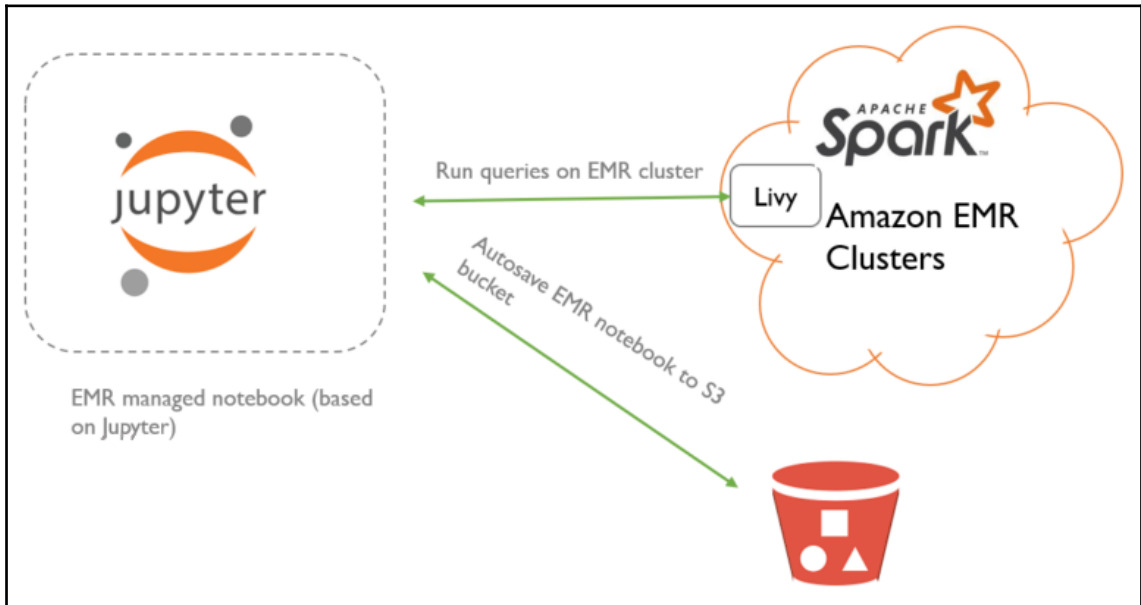


Publish ContactAssistant

Your bot is published! You can now connect to your mobile app or continue to chatbot deployment.

Bot Name	ContactAssistant
Bot Version	1
Alias	Production

Chapter 7: Working with Amazon SageMaker



Create notebook

Name and configure your notebook

Name your notebook, choose a cluster or create one, and customize configuration options if desired. [Learn more](#) 

Notebook name*

Names may only contain letters (a-z), numbers (0-9), hyphens (-), or underscores (_).

Description

256 characters max.

Cluster* ☐ Choose an existing cluster

☒ Create a cluster 

Cluster name:

Release: emr-5.26.0

Applications: Hadoop, Spark, Livy, Hive

Instance:

EMR role:

[EMR_DefaultRole](#)  

EC2 instance profile:

[EMR_EC2_DefaultRole](#)  

EC2 key pair:

No key pairs found

▼



Security groups

☒ Use default security groups 

☐ Choose security groups (vpc-cfadb5a9)

AWS service role*

Create default role

▼



Notebook location*

Choose an S3 location where files for this notebook are saved.

☐ Use a location that EMR creates 

☒ Choose an existing S3 location in us-east-1

s3://ai-in-aws1/Chapter7/EMRNotebook/



► Tags 

* Required

Cancel

Create notebook

Notebook: EMR_BookRatings Ready Notebook is ready to run jobs on cluster j-2S2X3VRUAPRVZ.

Open

Stop

Delete

Notebook

Notebook ID: e-DH0NORC9NE60VJYZKHOUAESRF

Description: EMR notebook to analyze and clean big data

Last modified: 12 minutes ago ⓘ

Last modified by: ...root ⓘ

Created on: 2019-08-23 06:22 (UTC-5)

Created by: ...root ⓘ

Service IAM role: [EMR_Notebooks_DefaultRole](#) ↗

Notebook tags: creatorUserId = 413491515223 [View All](#) / [Edit](#)

Notebook location: s3://ai-in-aws1/Chapter7/EMRNotebook/ 📁

Cluster

Cluster: NotebookCluster

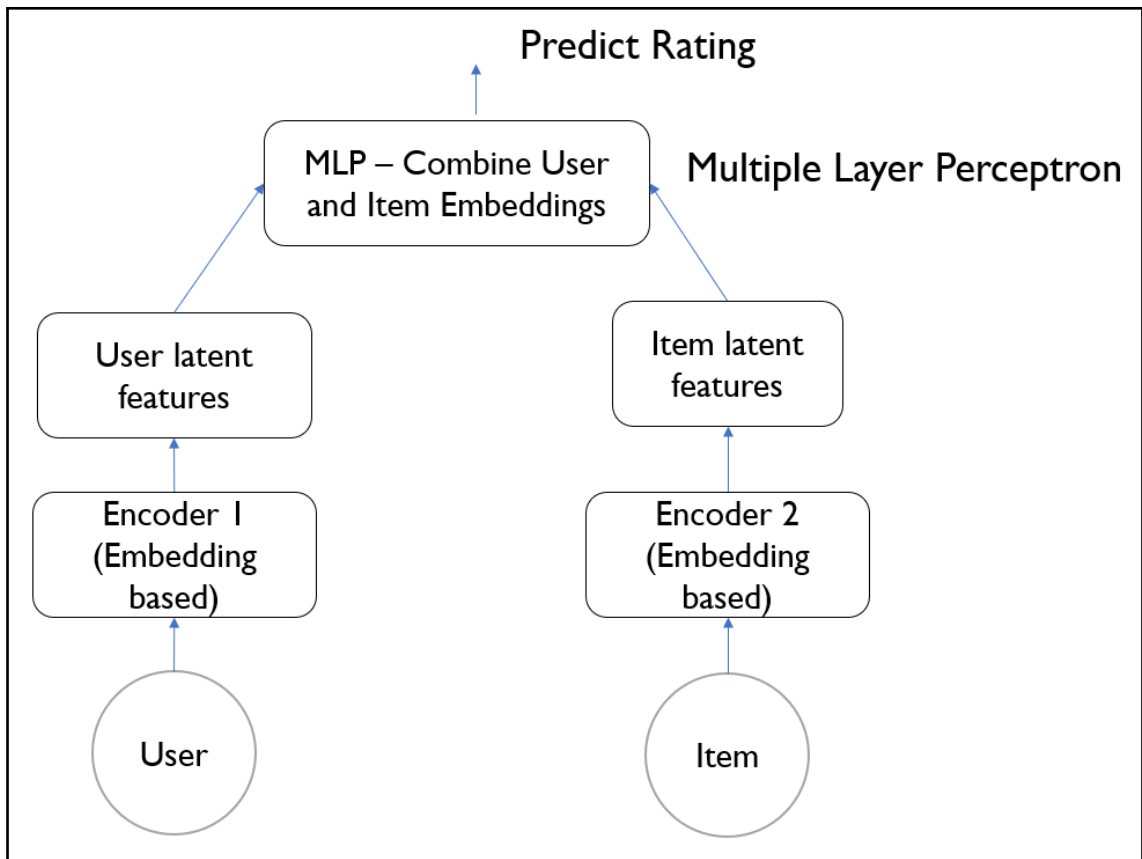
Cluster Id: [j-2S2X3VRUAPRVZ](#)

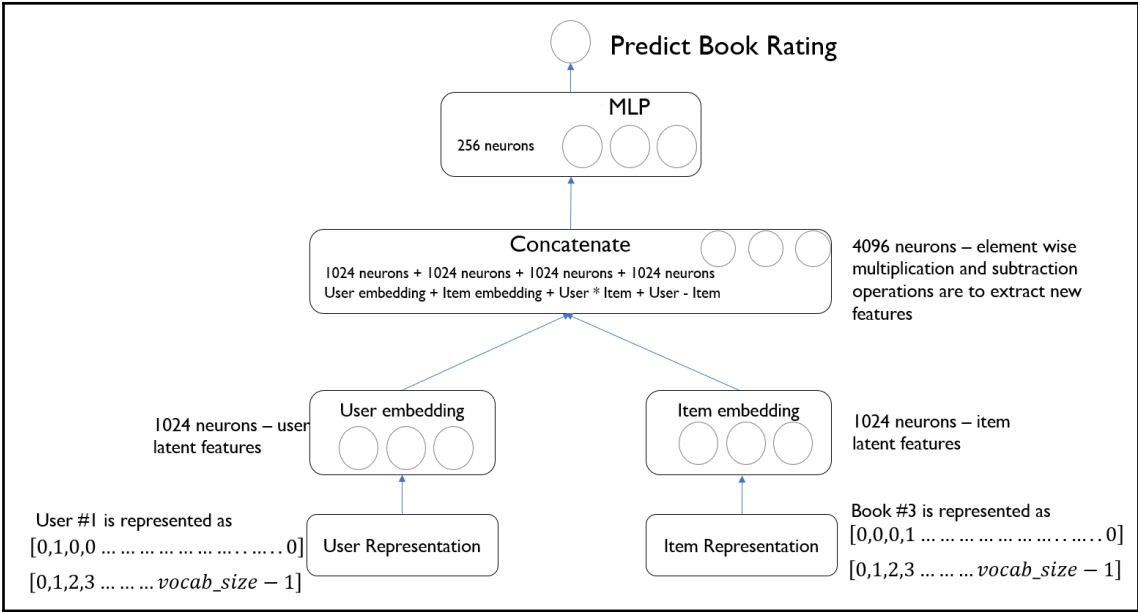
Cluster status: Waiting Cluster ready to run steps.

Cluster tags: creator = NOTEBOOK_CONSOLE [View All](#)

Step logs: s3://aws-logs-413491515223-us-east-1/elasticmapreduce/ 📁

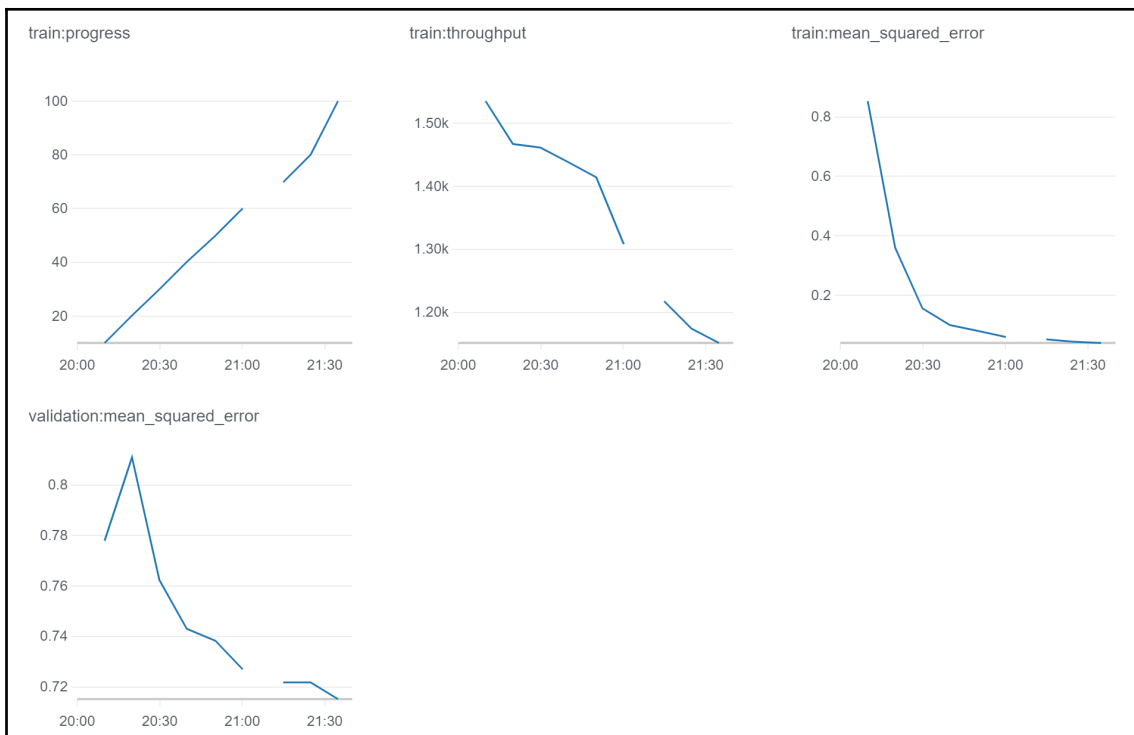
☐ Name ▾	Last modified ▾	Size ▾	Storage class ▾
☐ 📁 _SUCCESS	Jan 30, 2019 2:49:44 PM GMT-0600	0 B	Standard
☐ 📁 part-00000-70be57fc-191f-4624-a9df-af0edc3536aa-c000.snappy.parquet	Jan 30, 2019 2:49:20 PM GMT-0600	32.4 KB	Standard
☐ 📁 part-00001-70be57fc-191f-4624-a9df-af0edc3536aa-c000.snappy.parquet	Jan 30, 2019 2:49:20 PM GMT-0600	27.1 KB	Standard
☐ 📁 part-00002-70be57fc-191f-4624-a9df-af0edc3536aa-c000.snappy.parquet	Jan 30, 2019 2:49:20 PM GMT-0600	31.7 KB	Standard
☐ 📁 part-00003-70be57fc-191f-4624-a9df-af0edc3536aa-c000.snappy.parquet	Jan 30, 2019 2:49:20 PM GMT-0600	35.0 KB	Standard
☐ 📁 part-00004-70be57fc-191f-4624-a9df-af0edc3536aa-c000.snappy.parquet	Jan 30, 2019 2:49:20 PM GMT-0600	28.8 KB	Standard
☐ 📁 part-00005-70be57fc-191f-4624-a9df-af0edc3536aa-c000.snappy.parquet	Jan 30, 2019 2:49:21 PM GMT-0600	34.1 KB	Standard
☐ 📁 part-00006-70be57fc-191f-4624-a9df-af0edc3536aa-c000.snappy.parquet	Jan 30, 2019 2:49:21 PM GMT-0600	38.6 KB	Standard
☐ 📁 part-00007-70be57fc-191f-4624-a9df-af0edc3536aa-c000.snappy.parquet	Jan 30, 2019 2:49:21 PM GMT-0600	28.5 KB	Standard
☐ 📁 part-00008-70be57fc-191f-4624-a9df-af0edc3536aa-c000.snappy.parquet	Jan 30, 2019 2:49:21 PM GMT-0600	39.2 KB	Standard

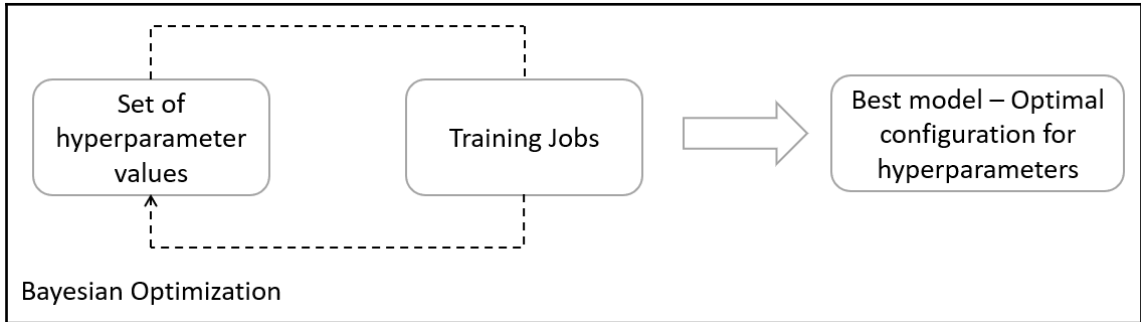




	book_id	user_id	rating	title	book_ind	user_ind
0	1159	32773	5	Stones from the River	80	6320
1	1159	47984	4	Stones from the River	80	9777
2	1159	29097	3	Stones from the River	80	5444
3	1159	5657	3	Stones from the River	80	10959
4	1159	19404	4	Stones from the River	80	2756

```
{"in0": [1832], "in1": [392], "label": 4.0}
{"in0": [3093], "in1": [233], "label": 3.0}
{"in0": [3412], "in1": [385], "label": 4.0}
{"in0": [828], "in1": [561], "label": 5.0}
{"in0": [4267], "in1": [194], "label": 4.0}
{"in0": [11478], "in1": [504], "label": 5.0}
{"in0": [3858], "in1": [555], "label": 4.0}
{"in0": [6739], "in1": [144], "label": 4.0}
{"in0": [11708], "in1": [183], "label": 4.0}
```





	Name ▼	Status ▼	Objective metric value ▼	Creation time ▼	Training Duration
☐	object2vec-job-03-18-19-21-010-0a4f6531	✔ Completed	3.1846425533294678	Feb 03, 2019 20:11 UTC	10 minute(s)
☐	object2vec-job-03-18-19-21-009-6be1cd71	✔ Completed	3.1857500076293945	Feb 03, 2019 20:00 UTC	7 minute(s)
☐	object2vec-job-03-18-19-21-008-59d2ab63	✔ Completed	3.184649705886841	Feb 03, 2019 19:50 UTC	7 minute(s)
☐	object2vec-job-03-18-19-21-007-7783d580	✔ Completed	3.19575834274292	Feb 03, 2019 19:35 UTC	12 minute(s)
☐	object2vec-job-03-18-19-21-006-ccca4715	✔ Completed	3.18619704246521	Feb 03, 2019 19:23 UTC	10 minute(s)
☐	object2vec-job-03-18-19-21-005-40851de2	✔ Completed	3.1850974559783936	Feb 03, 2019 19:12 UTC	7 minute(s)
☐	object2vec-job-03-18-19-21-004-52ed057a	✔ Completed	3.1856284141540527	Feb 03, 2019 19:03 UTC	6 minute(s)
☐	object2vec-job-03-18-19-21-003-72db6efe	✔ Completed	3.1868464946746826	Feb 03, 2019 18:50 UTC	8 minute(s)
☐	object2vec-job-03-18-19-21-002-f9ea778f	✔ Completed	3.1856629848480225	Feb 03, 2019 18:32 UTC	15 minute(s)

Best training job

Training jobs

Job configuration

Hyperparameter configuration

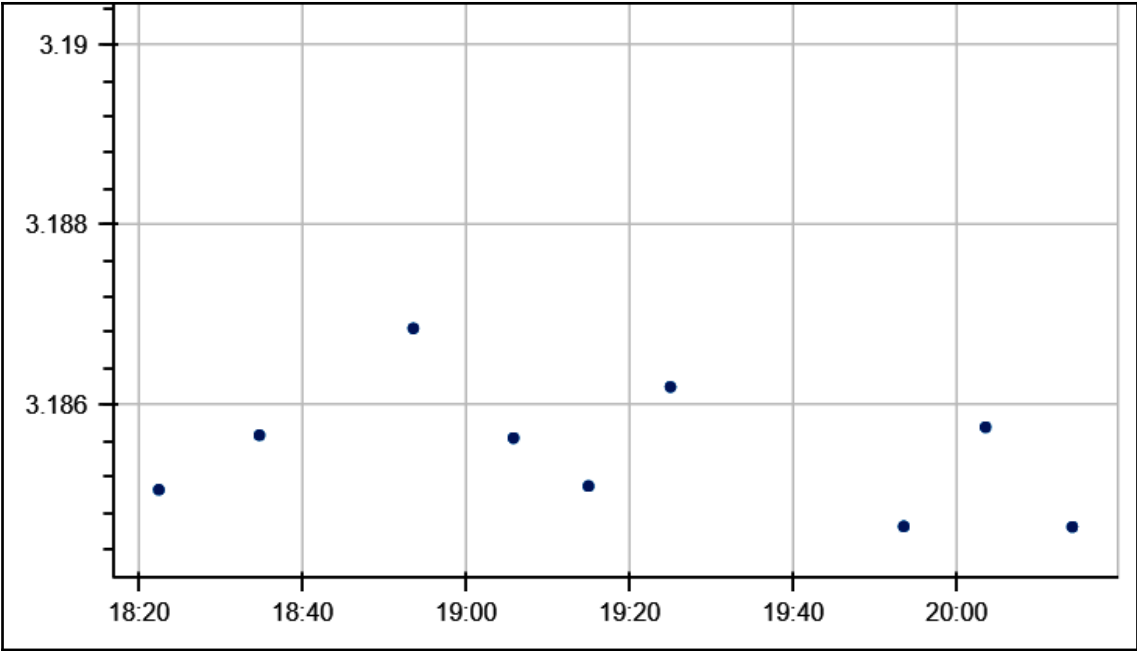
Tags

Best training job summary

This training job is the best training job for only this hyperparameter tuning job.

Create model

Name	Status	Objective metric	Value
object2vec-job-03-18-19-21-010-0a4f6531	✔ Completed	validation:mean_squared_error	3.1846425533294678



▼ Search

Property

Operator

Value

Q AlgorithmSpecification.TrainingImage X

Contains ▼

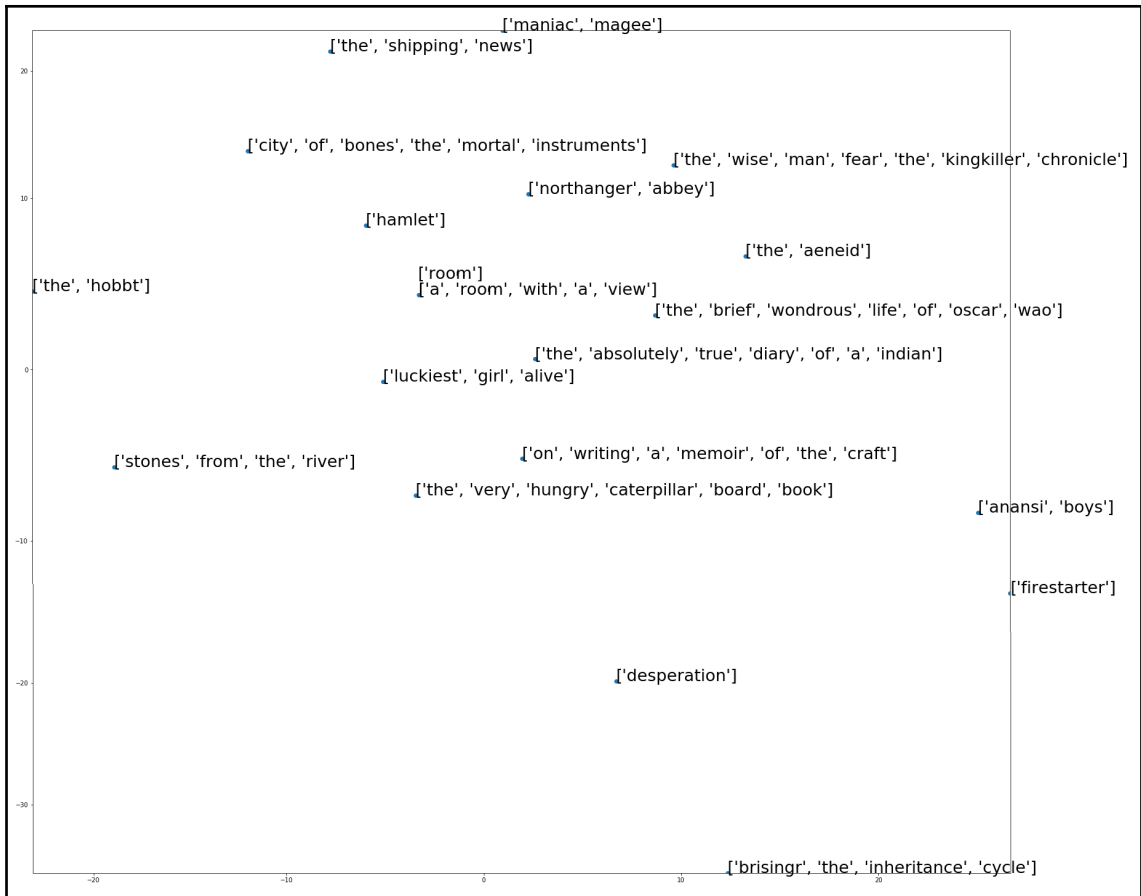
object2vec

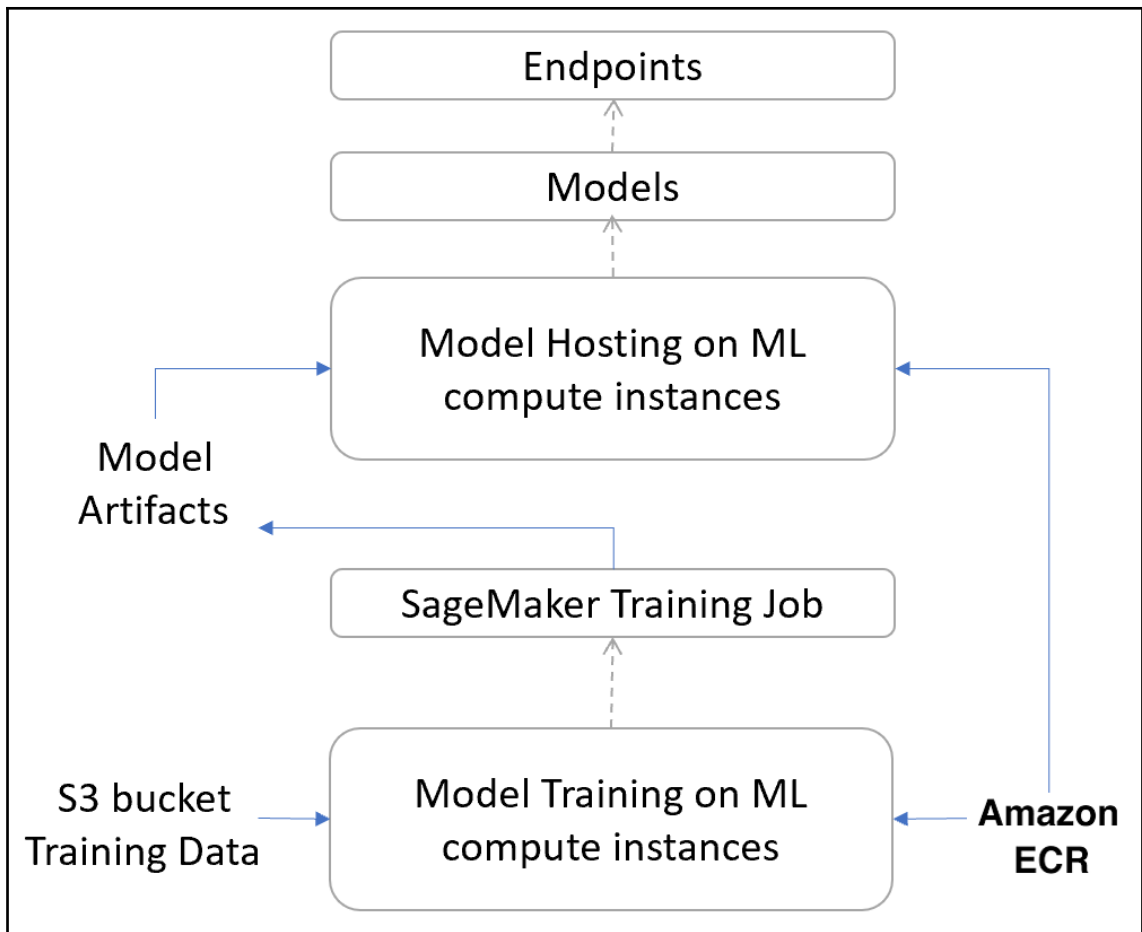
Remove

Add row

Search

Model name	Training job	Variant name	Instance type	Elastic Inference	Initial instance count	Initial weight
object2vec-2019-02-03-22-28-12-576	object2vec-2019-02-03-22-14-21-943	AllTraffic	ml.m4.xlarge	-	1	1

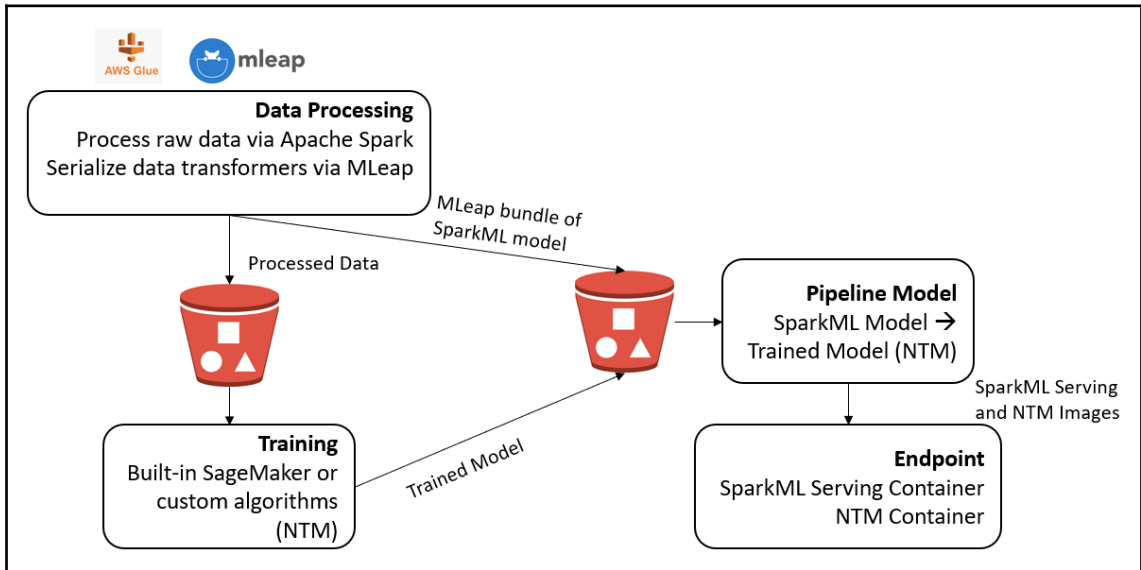




	BK1	BK2	BK3	BK4	BK5	Similarity(i, A)
A*	3	3.72	5	3.7	2	1
B	2	3				0.29
C	5	4	3			0.73
D	1		2	3		0.60
E	2		1	5	2	0.32

The Dark Tower (The Dark Tower, #7) A Tree Grows in Brooklyn The Return of the King (The Lord of the Rings,... Fight Club Life of Pi

Chapter 8: Creating Machine Learning Inference Pipelines



Edit Trust Relationship

You can customize trust relationships by editing the following access control policy document.

Policy Document

```
1 {  
2   "Version": "2012-10-17",  
3   "Statement": [  
4     {  
5       "Effect": "Allow",  
6       "Principal": {  
7         "Service": ["sagemaker.amazonaws.com", "glue.amazonaws.com"]  
8       },  
9       "Action": "sts:AssumeRole"  
10    }  
11  ]  
12 }
```

[Cancel](#) [Update Trust Policy](#)

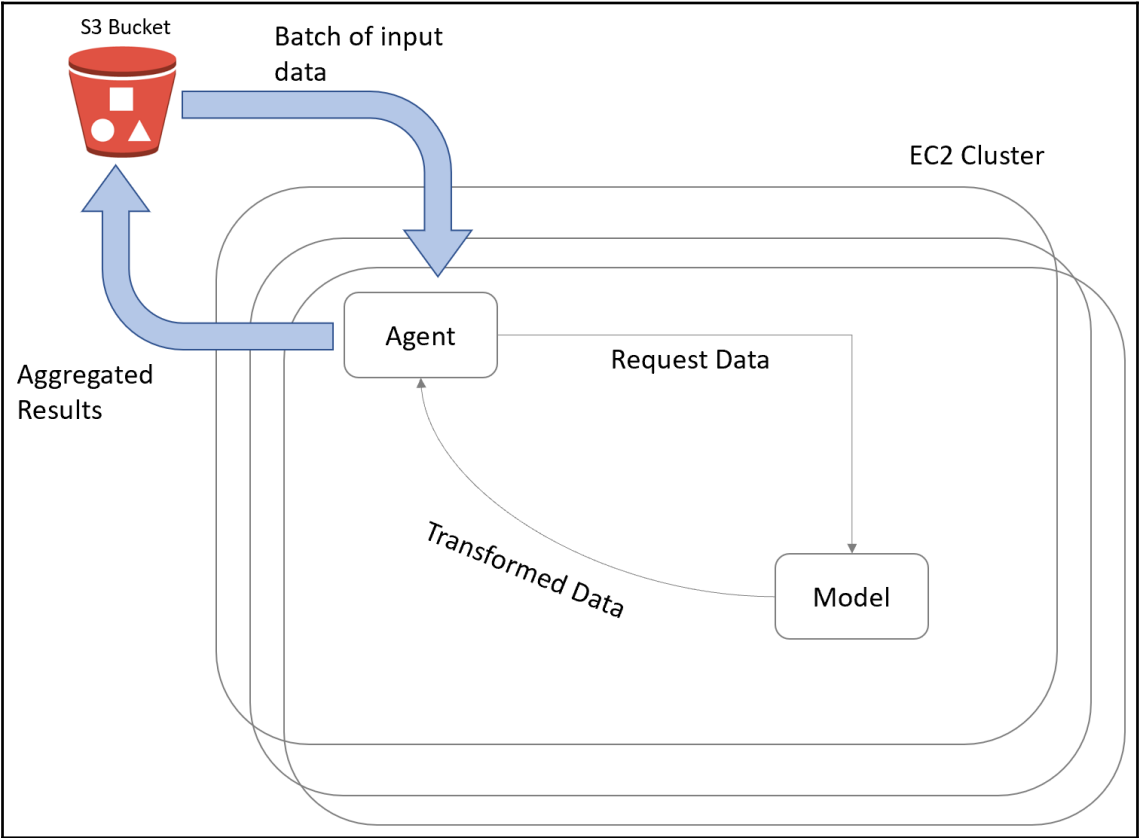
[illegible]

```

RUNNING
RUNNING
RUNNING
RUNNING
SUCCEEDED

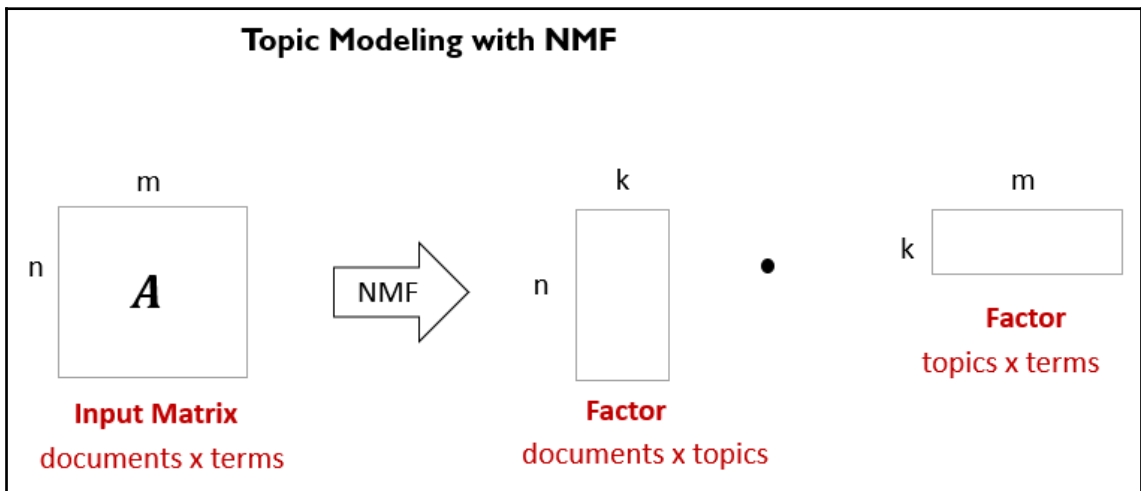
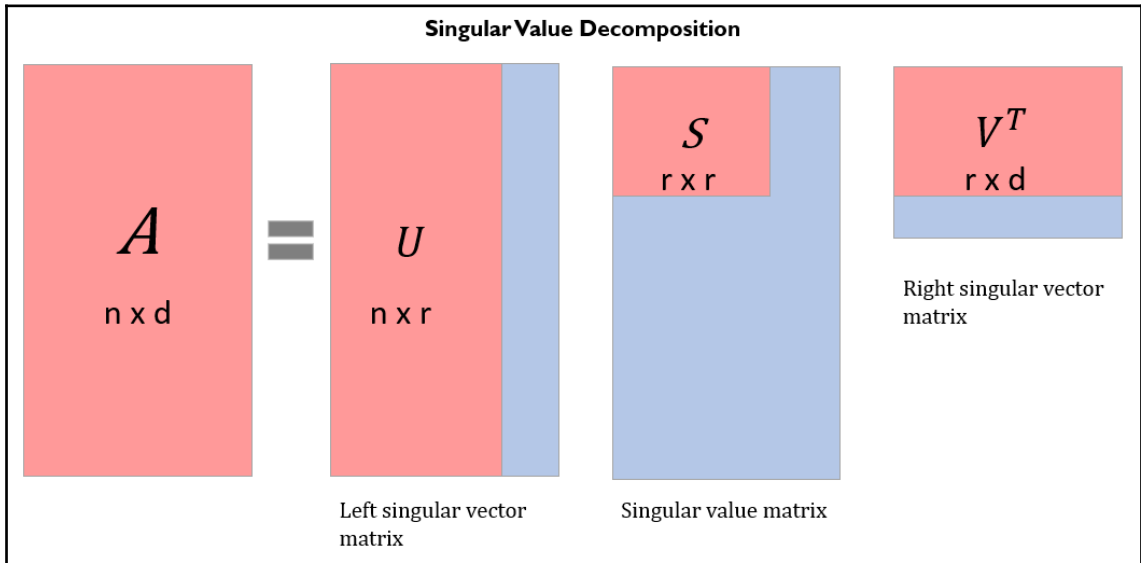
```

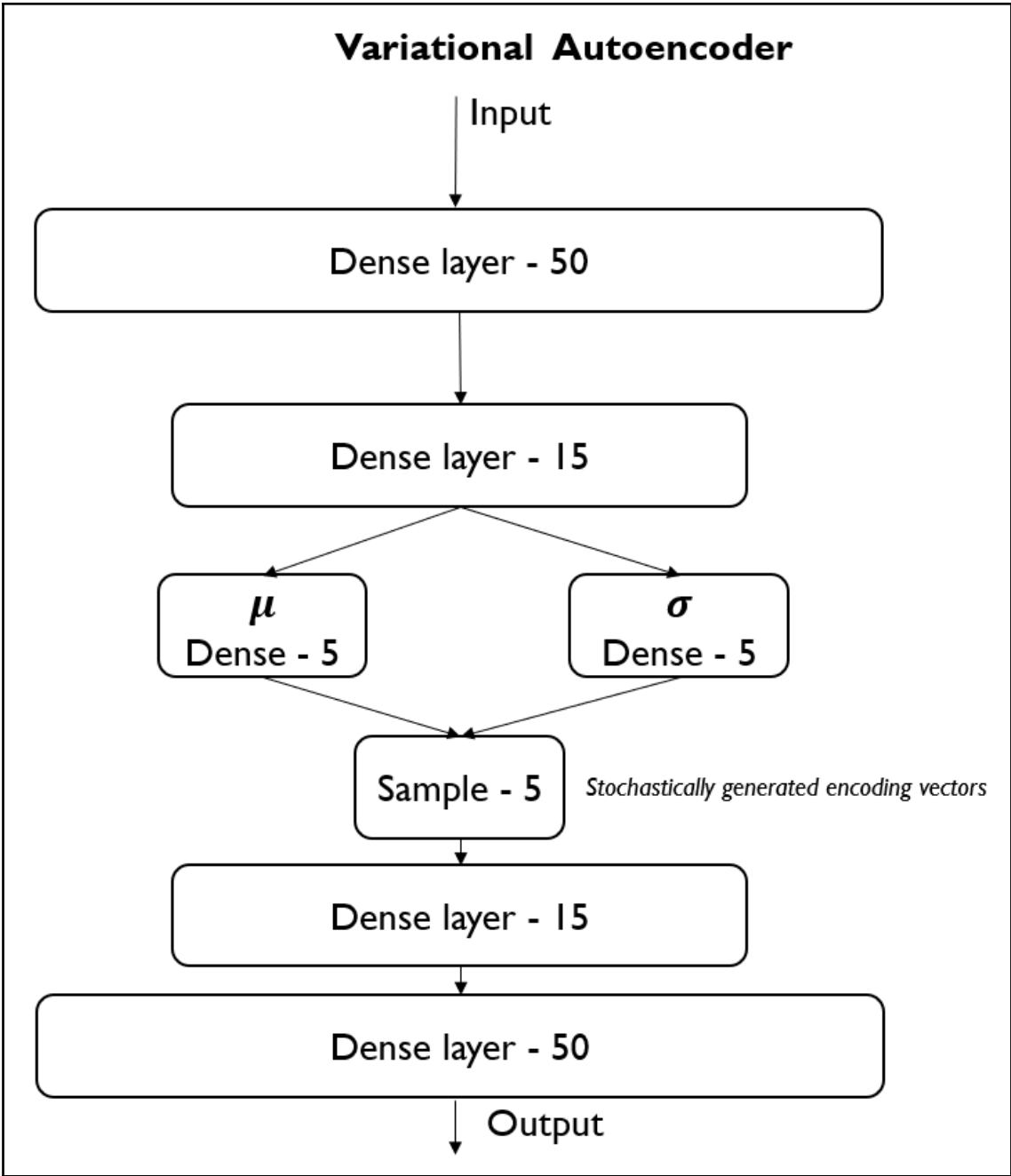
History		Details	Script	Metrics			
View run metrics							
Run ID	Retry attempt	Run status	Error	Logs	Error logs	Execution time	Timeout
jr_53f5d67b...	-	Succeeded		Logs		2 mins	60 mins



Headline	Topic 1	Topic 2	Topic 3	Topic 4	Topic 5
gower warns of french resistance	0.6014835	0.1155266	0.0977373	0.0810384	0.1042142
greens seek inquiry into jockey offer allegations	0.1023946	0.1208197	0.3941616	0.0770099	0.3056142
gregan put on notice horan	0.3041118	0.2034628	0.1746403	0.1478757	0.1699095
gungahlin roadwork delays slow other upgrades	0.3041118	0.2034628	0.1746403	0.1478757	0.1699095
hackers use sony bmg software to hide in pcs	0.3041118	0.2034628	0.1746403	0.1478757	0.1699095
health service faces funding cut	0.2284847	0.0780824	0.3143376	0.2452072	0.1338882
henry takes all blacks into new era	0.2866432	0.2429818	0.2257657	0.1718663	0.0727429
heritage council rejects camberwell station listing	0.3061328	0.0676769	0.3875068	0.0698637	0.1688199
heroin addict gets 20 years for taxi drivers murder	0.1621254	0.2586859	0.3177063	0.0604307	0.2010518
hodge in form with century against windies	0.3041118	0.2034628	0.1746403	0.1478757	0.1699095
hodge justifies test call up	0.0577705	0.3068286	0.3168347	0.1368421	0.1817897
hodge tunes up with half century	0.3041118	0.2034628	0.1746403	0.1478757	0.1699095
hope for aussie on death row not lost labor	0.3925557	0.0913394	0.2443132	0.1058502	0.1659415
hope for health service funding to continue	0.2246623	0.0857421	0.3201226	0.2495116	0.1199614
hospital emergency service delay creates angst	0.1115589	0.1981474	0.2989576	0.156964	0.2343721
hunter man in running for senior of the year award	0.1235819	0.145608	0.1249724	0.1957543	0.4100834
ideas aplenty for harbourside project area	0.3041118	0.2034628	0.1746403	0.1478757	0.1699095
indonesian police say gunfire killed azahari	0.0507304	0.306136	0.1548292	0.140412	0.3478923
iran frees detained aussie british couple	0.1752351	0.3295657	0.1308063	0.0907015	0.2736915

Chapter 9: Discovering Topics in Text Collection



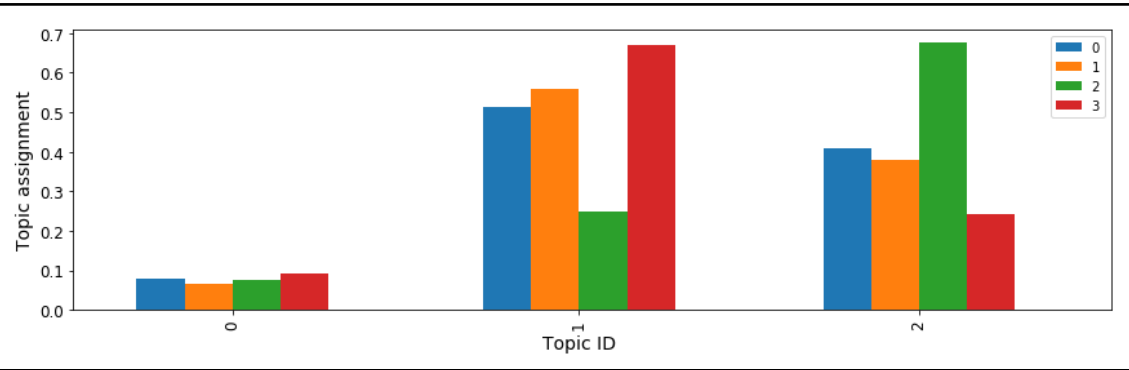


Finished training epoch 48 on 2126 examples from 71 batches, each of size 30.

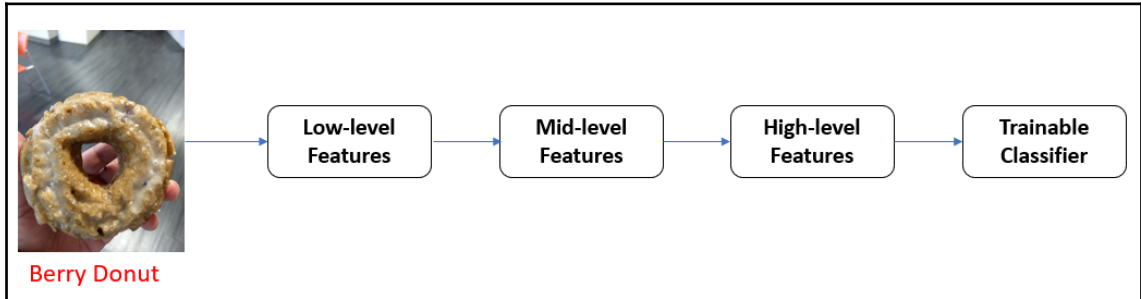
Finished training epoch 23 on 1062 examples from 36 batches, each of size 30.

```
[09/02/2019 00:16:47 INFO 140663462225728] Finished scoring on 390 examples from 13 batches, each of size 30.
[09/02/2019 00:16:47 INFO 140663462225728] Metrics for Inference:
[09/02/2019 00:16:47 INFO 140663462225728] Loss (name: value) total: 8.47499898275
[09/02/2019 00:16:47 INFO 140663462225728] Loss (name: value) kld: 0.189580901464
[09/02/2019 00:16:47 INFO 140663462225728] Loss (name: value) recons: 8.28541795779
[09/02/2019 00:16:47 INFO 140663462225728] Loss (name: value) logppx: 8.47499898275
[09/02/2019 00:16:47 INFO 140663462225728] #quality_metric: host=algo-1, epoch=48, validation total_loss <loss>=8.47499898275
[09/02/2019 00:16:47 INFO 140663462225728] Loss of server-side model: 8.47499898275
[09/02/2019 00:16:47 INFO 140663462225728] Best model based on early stopping at epoch 42. Best loss: 8.46607227815
[09/02/2019 00:16:47 INFO 140663462225728] Topics from epoch:final (num_topics:3) [wetc 0.26, tu 0.73]:
[09/02/2019 00:16:47 INFO 140663462225728] [0.26, 0.60] resource pending request create acceptance admin local type permanen
t nahoutrdhoustonpwrcommonelectric nahoutrdhoustonpwrcommonpower2region approval kobra click application date directory read
risk tail
[09/02/2019 00:16:47 INFO 140663462225728] [0.27, 1.00] andor instruction notification reserves buy responsible sources proh
ibited order securities downgraded based intelligence strong corp web solicitation privacy clicking coverage
[09/02/2019 00:16:47 INFO 140663462225728] [0.26, 0.60] request resource pending create approval type application date tail
directory acceptance admin flip permanent counterparty head click swap kobra risk
```

Endpoints					Update endpoint	Actions ▼	Create endpoint
Search endpoints					< 1 >		
	Name ▼	ARN	Creation time ▼	Status ▼	Last updated		
	ntm-2019-09-02-11-59-50-170	arn:aws:sagemaker:us-east-1:413491515223:endpoint/ntm-2019-09-02-11-59-50-170	Sep 02, 2019 11:59 UTC	InService	Sep 02, 2019 12:08 UTC		



Chapter 10: Classifying Images Using Amazon SageMaker



292	4.000000	»Peanut_Butter_Cookie/IMG_20180713_122625.jpg
160	2.000000	»Hot_Dog_1/IMG_20180711_180650328.jpg
244	4.000000	»Peanut_Butter_Cookie/IMG_20180711_194713371.jpg
132	2.000000	»Hot_Dog_1/IMG_20180711_180400669_HDR.jpg
276	4.000000	»Peanut_Butter_Cookie/IMG_20180711_194816799.jpg
222	3.000000	»Muffin/UNADJUSTEDNONRAW_thumb_bbe.jpg
47	0.000000	»Berry_Donut/IMG_20180711_181553159.jpg
78	0.000000	»Berry_Donut/UNADJUSTEDNONRAW_thumb_a7a.jpg
137	2.000000	»Hot_Dog_1/IMG_20180711_180423874.jpg
142	2.000000	»Hot_Dog_1/IMG_20180711_180446447.jpg
220	3.000000	»Muffin/UNADJUSTEDNONRAW_thumb_bbb.jpg
143	2.000000	»Hot_Dog_1/IMG_20180711_180449768.jpg
21	0.000000	»Berry_Donut/IMG_20180711_181514423.jpg
277	4.000000	»Peanut_Butter_Cookie/IMG_20180711_194817776.jpg
69	0.000000	»Berry_Donut/UNADJUSTEDNONRAW_thumb_a71.jpg
52	0.000000	»Berry_Donut/IMG_20180711_181601582.jpg
155	2.000000	»Hot_Dog_1/IMG_20180711_180624381.jpg
133	2.000000	»Hot_Dog_1/IMG_20180711_180404276_HDR.jpg
299	4.000000	»Peanut_Butter_Cookie/MVIMG_20180713_122610.jpg
33	0.000000	»Berry_Donut/IMG_20180711_181530248.jpg
46	0.000000	»Berry_Donut/IMG_20180711_181551527.jpg
97	1.000000	»Glazed_Twist/IMG_20180711_193453363.jpg
32	0.000000	»Berry_Donut/IMG_20180711_181529339.jpg
300	4.000000	»Peanut_Butter_Cookie/MVIMG_20180713_122614.jpg
240	4.000000	»Peanut_Butter_Cookie/IMG_20180711_194708448.jpg

Amazon S3 > ai-in-aws > image-classification-merchandise

Overview

 Type a prefix and press Enter to search. Press ESC to clear.

 Upload

 Create folder

Download

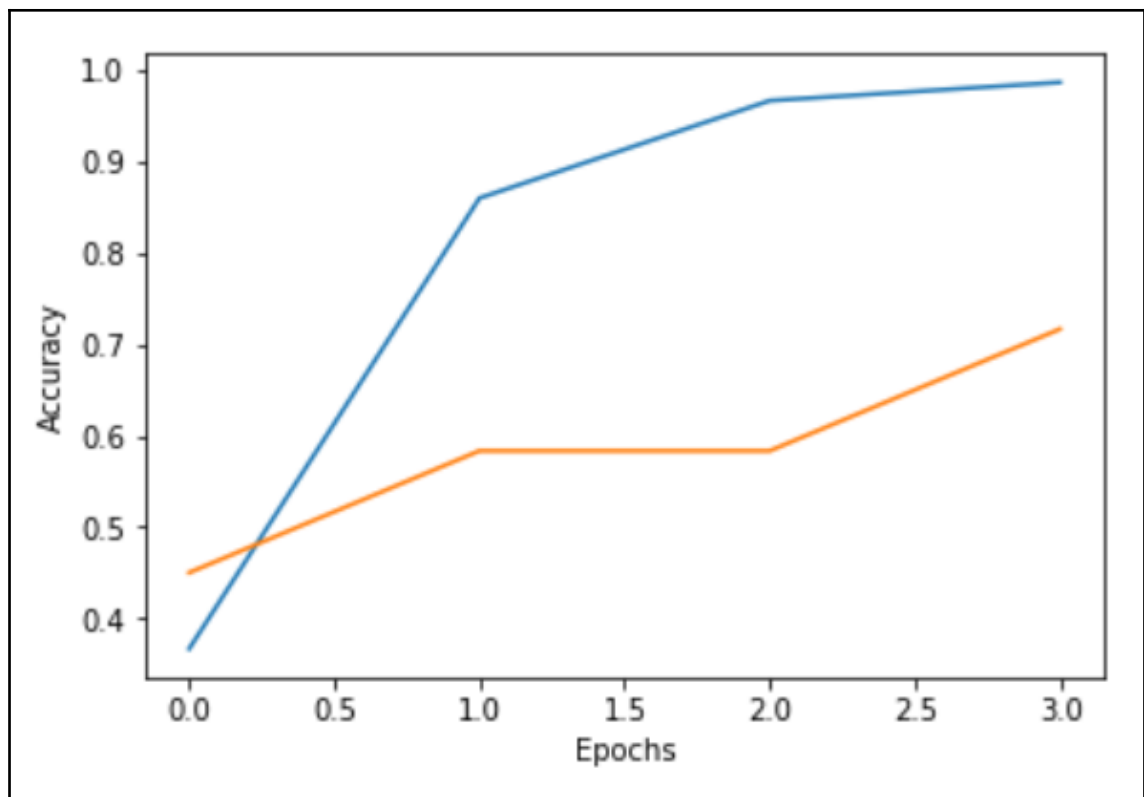
Actions ▾

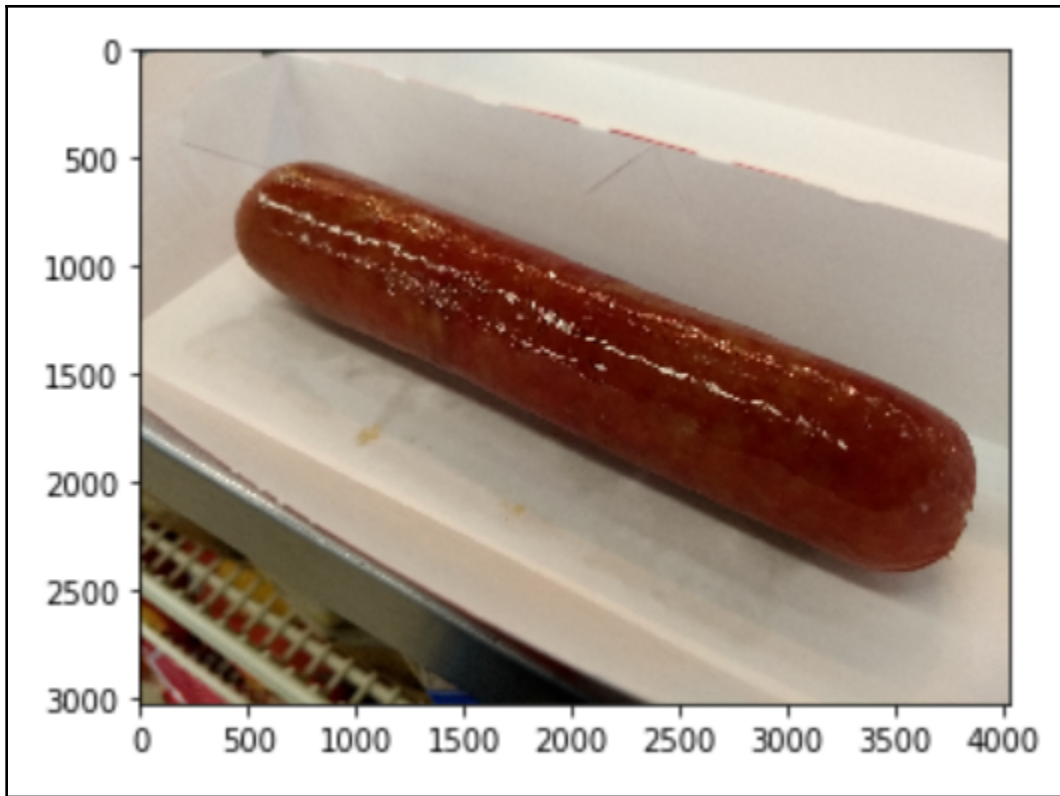
☐ Name ▾

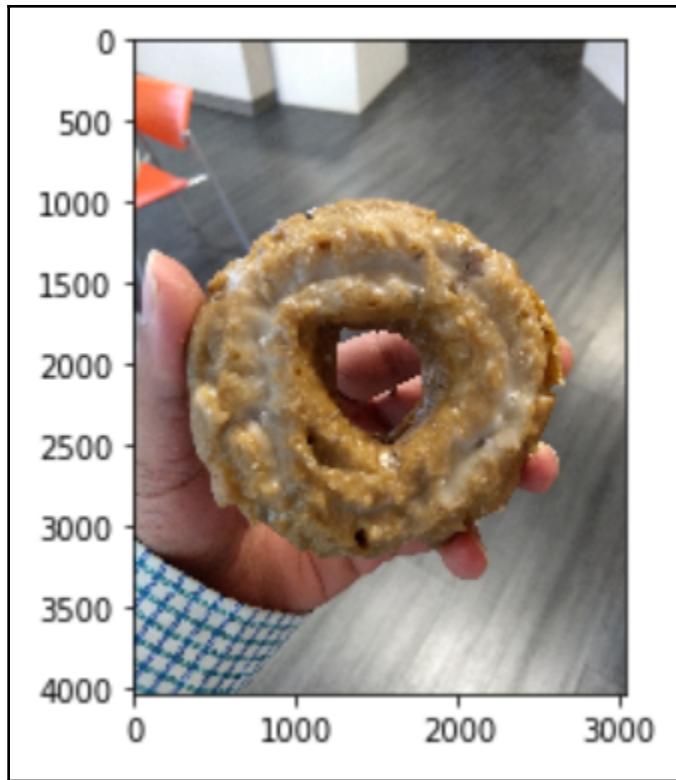
☐  test

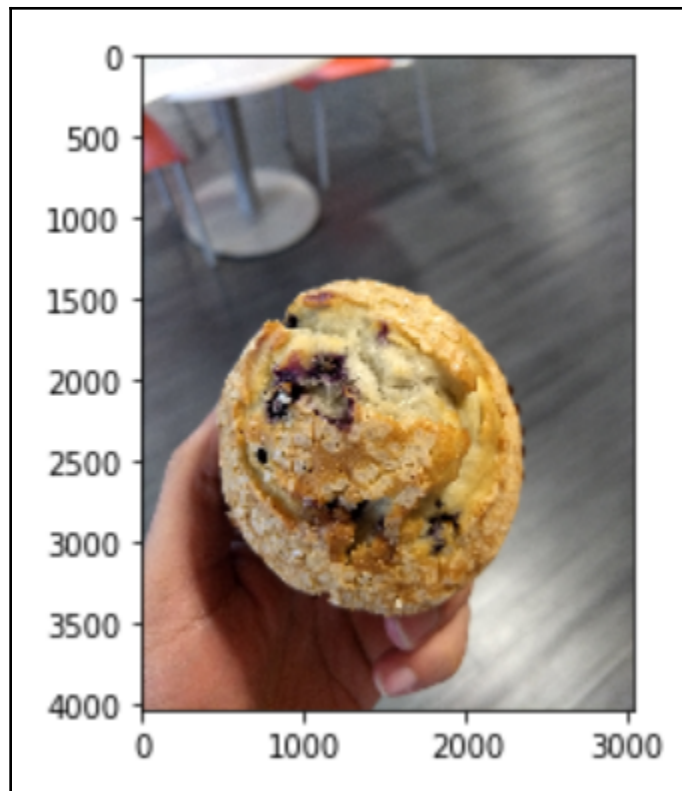
☐  train

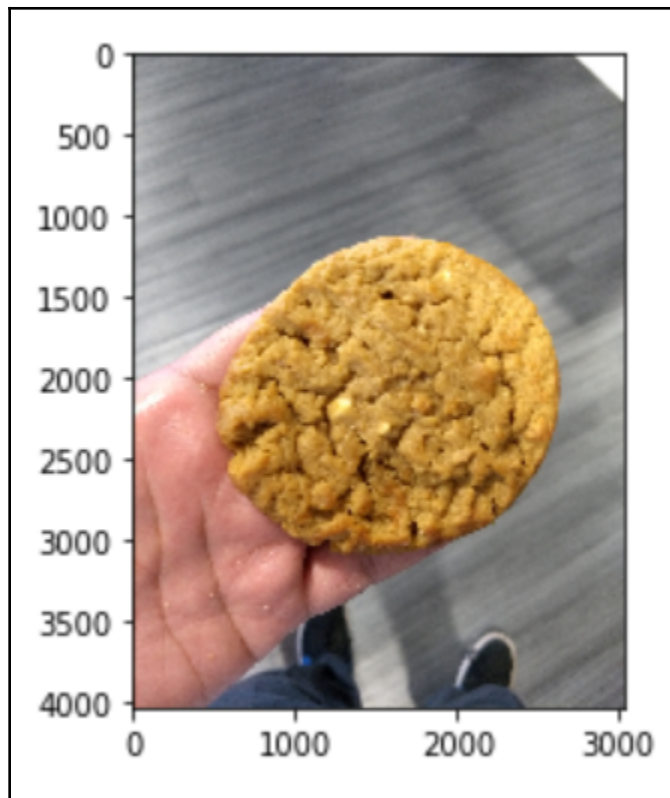
☐  validation



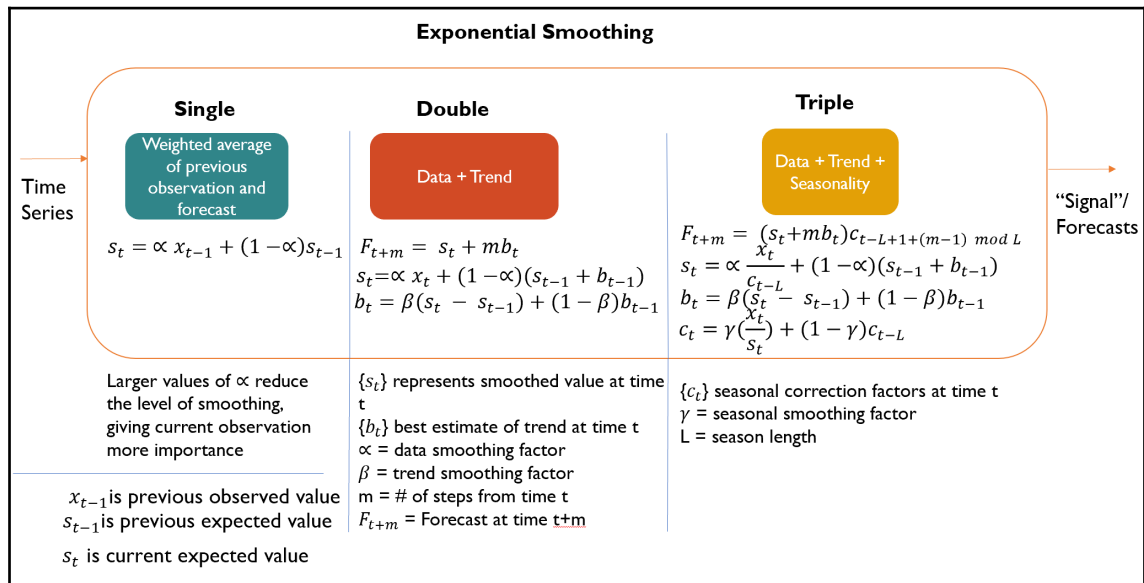
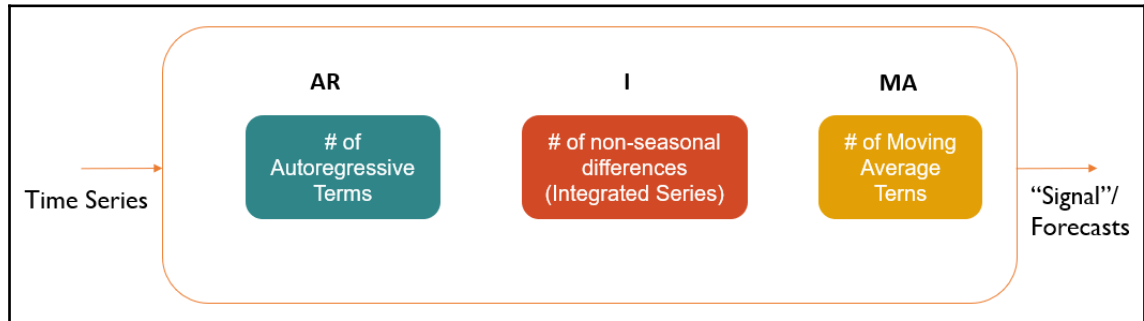


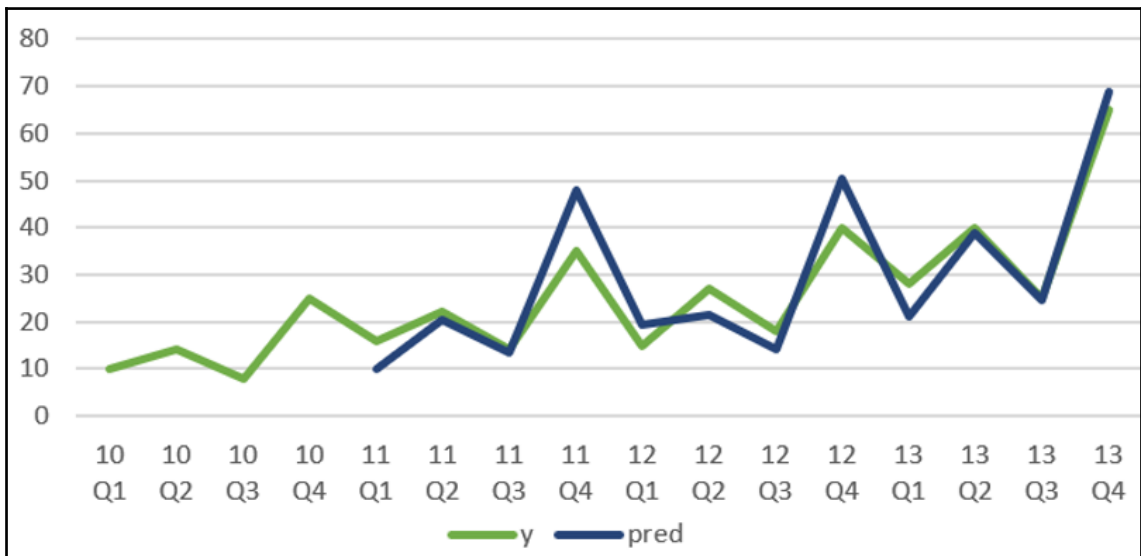
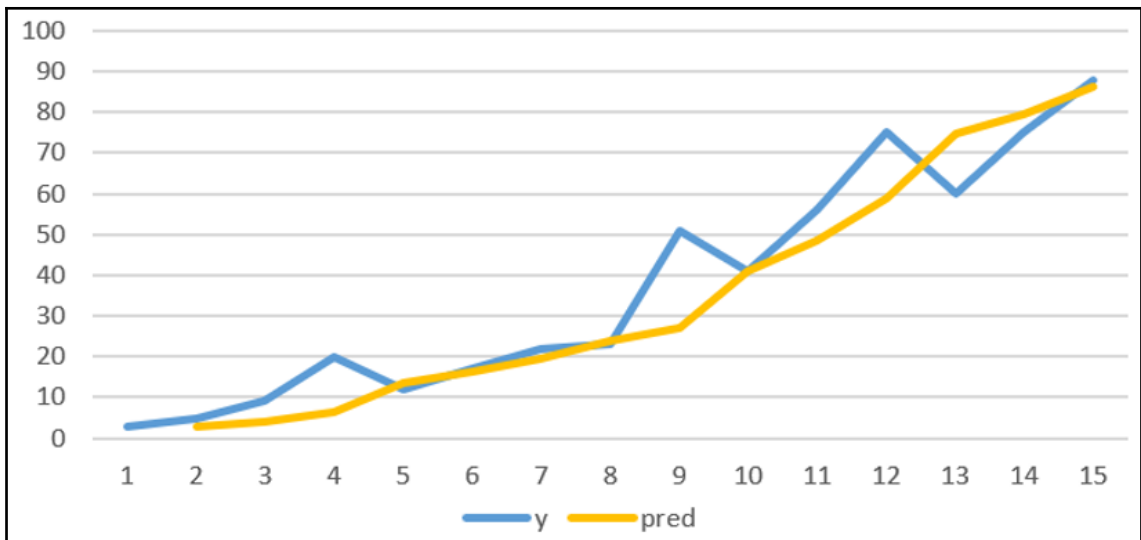


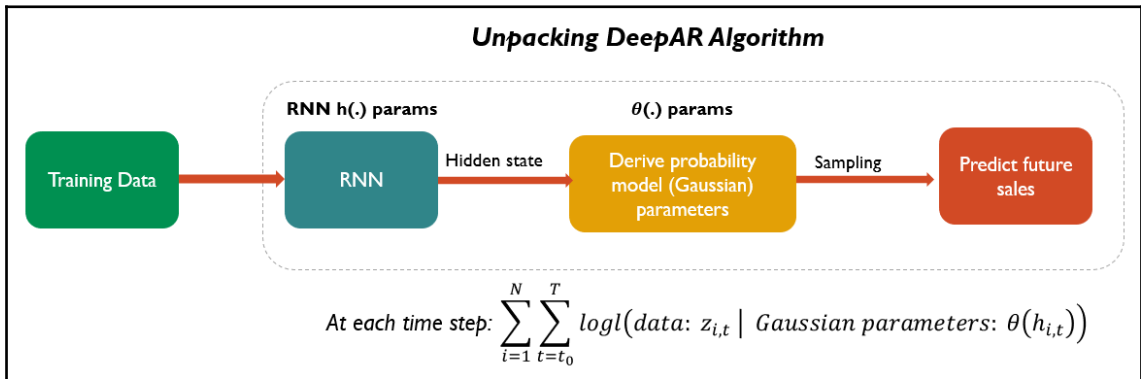
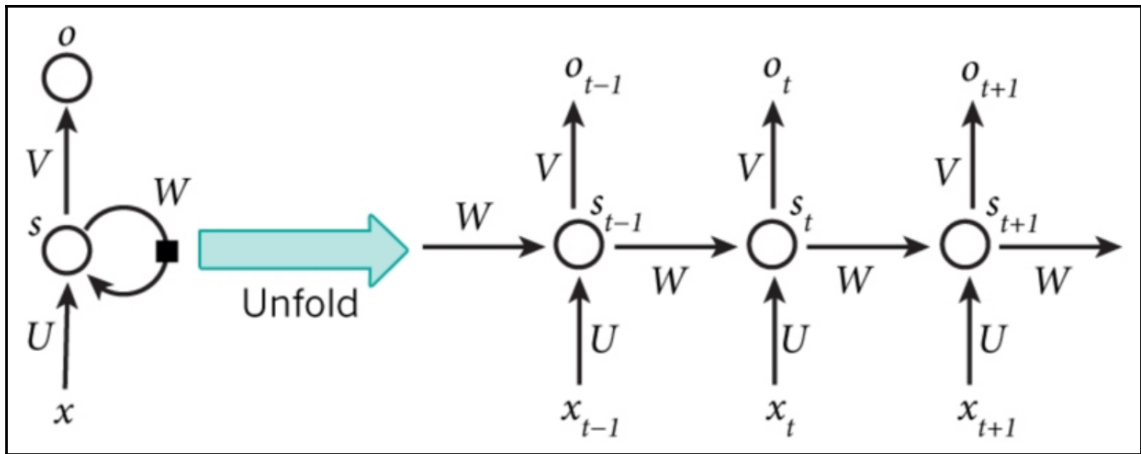


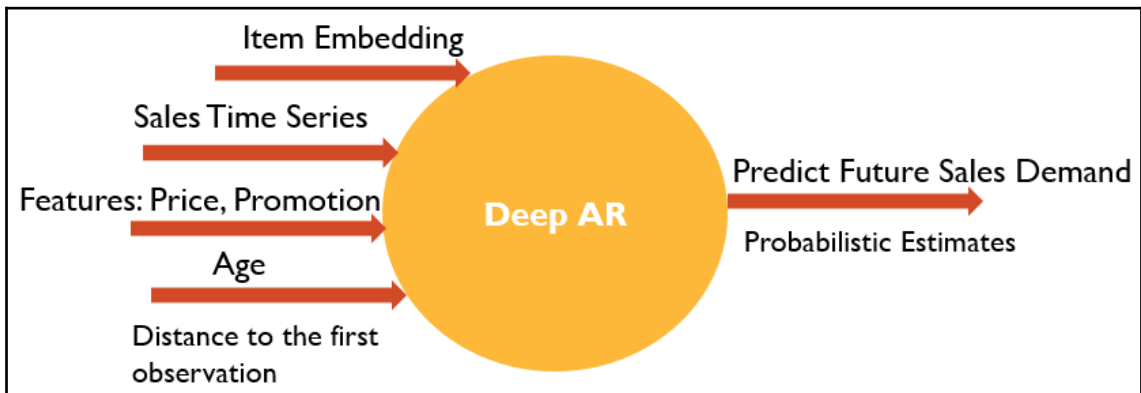
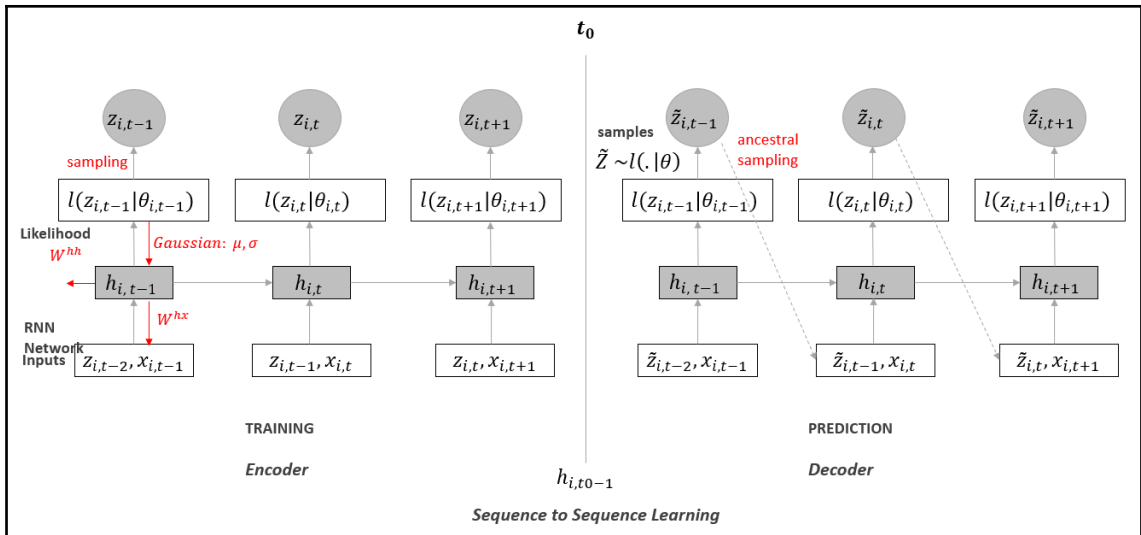


Chapter 11: Sales Forecasting with Deep Learning and Auto Regression









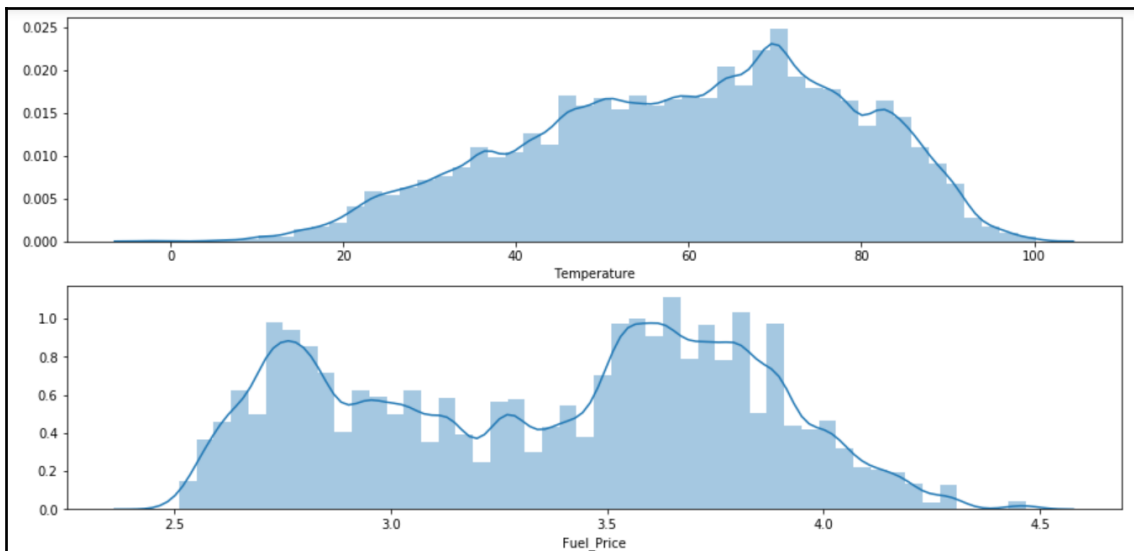
Start notebook

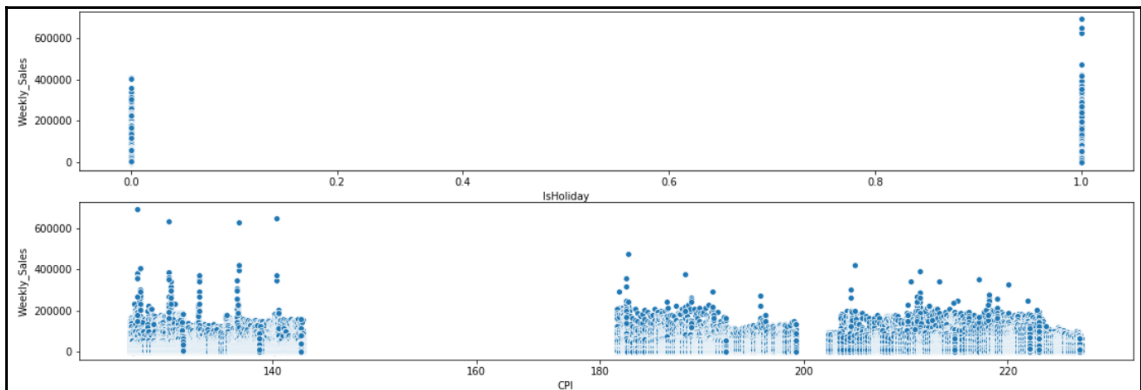
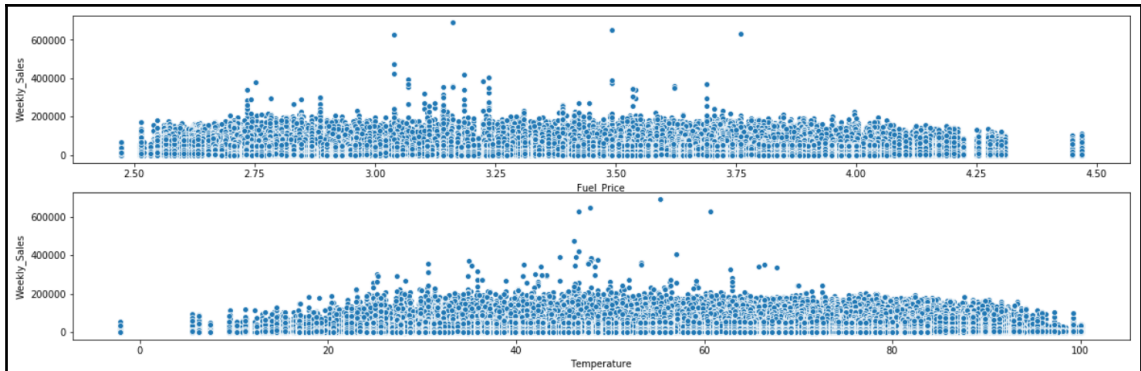
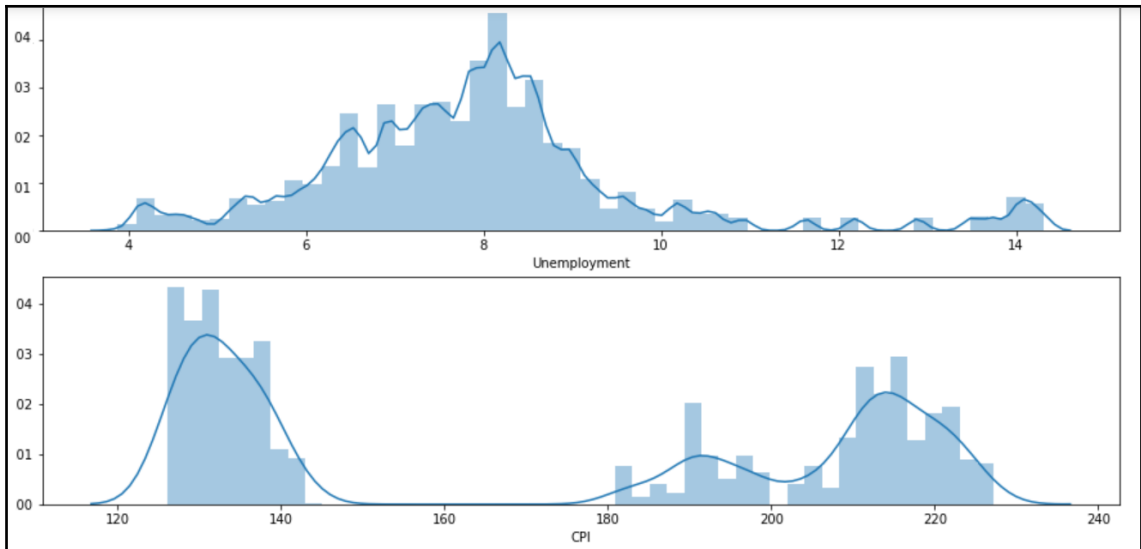
```
1 #!/bin/bash
2
3 set -e
4 pip install --upgrade seaborn
```

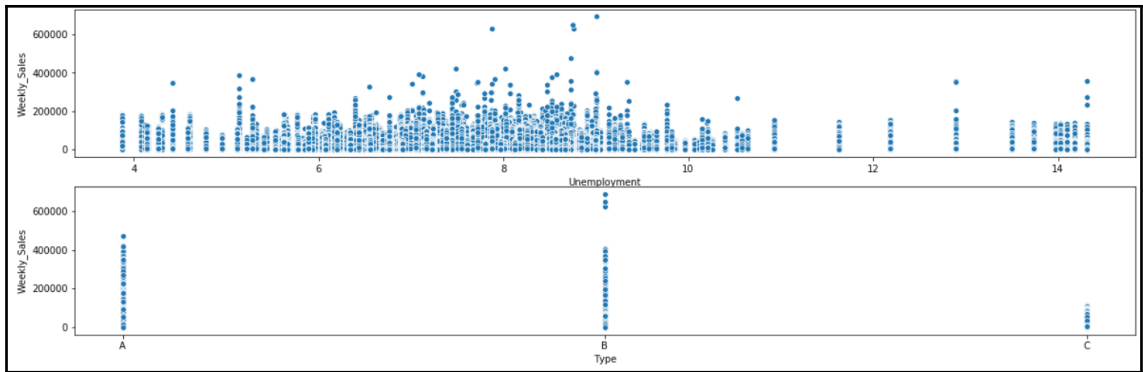
Lifecycle configuration - *optional*

Customize your notebook environment with default scripts and plugins.

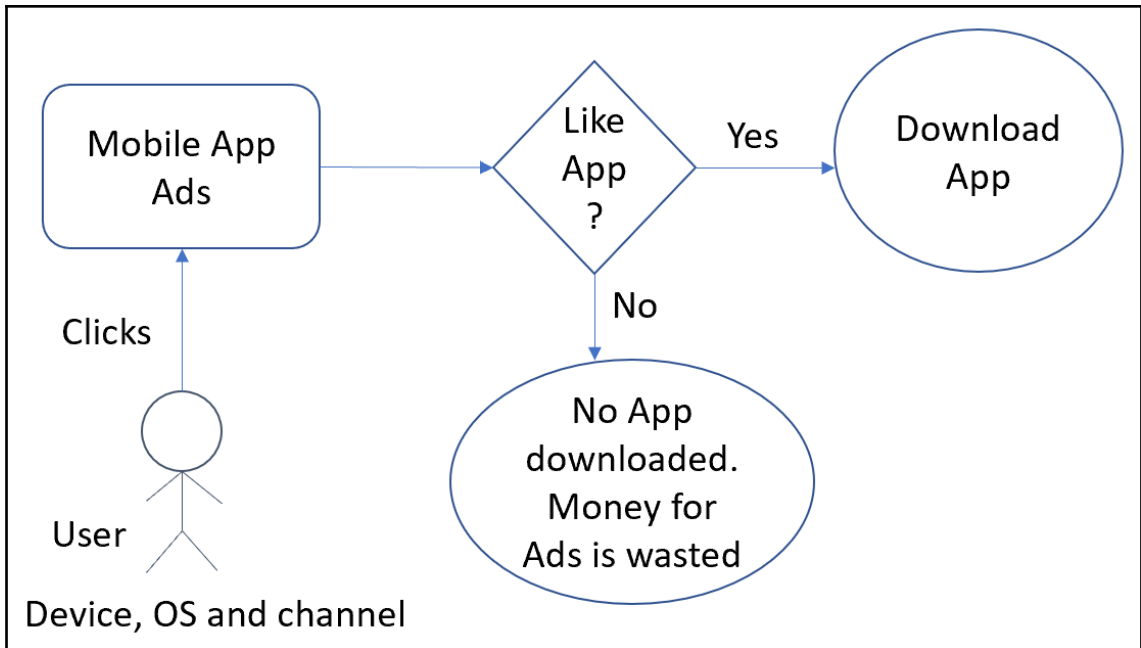
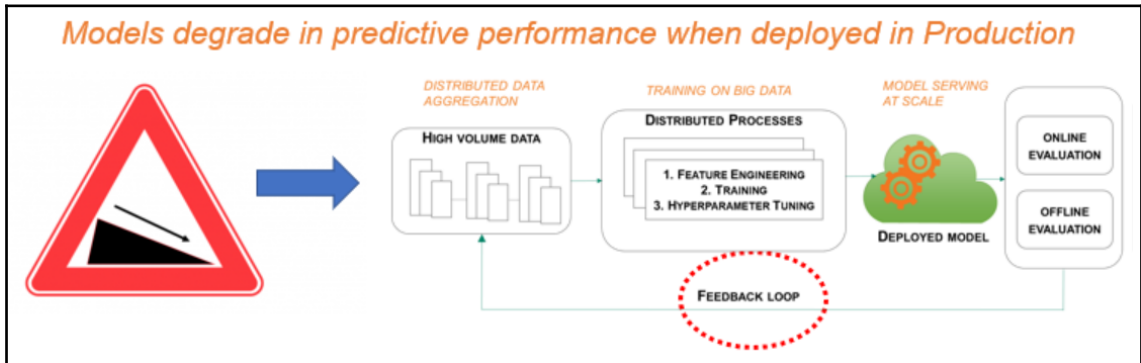
InstallPrereqs

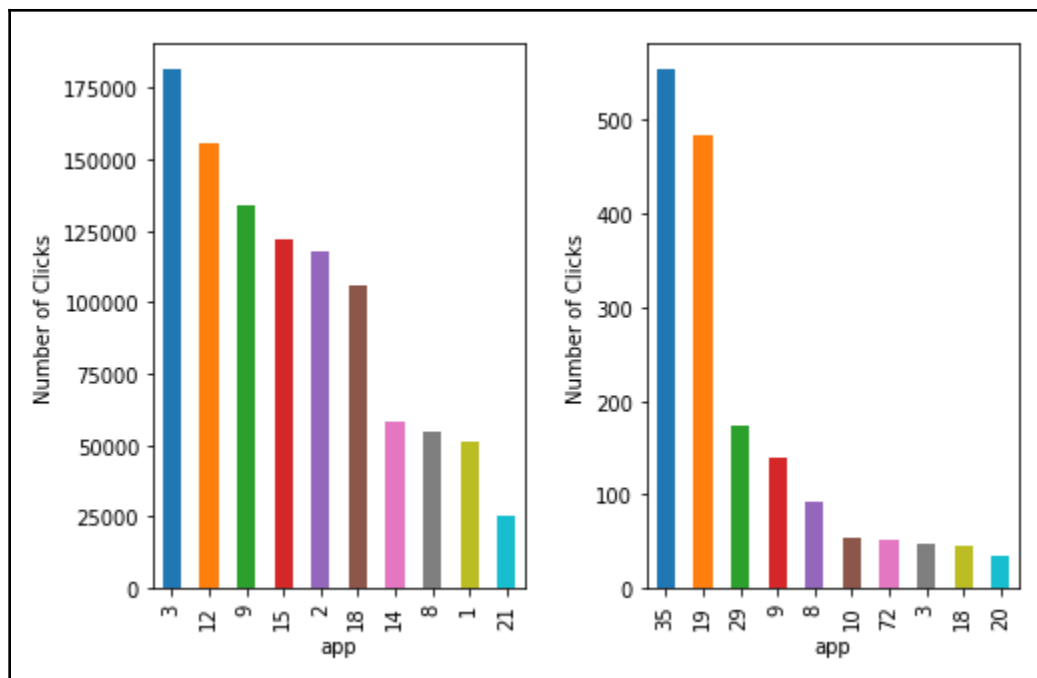


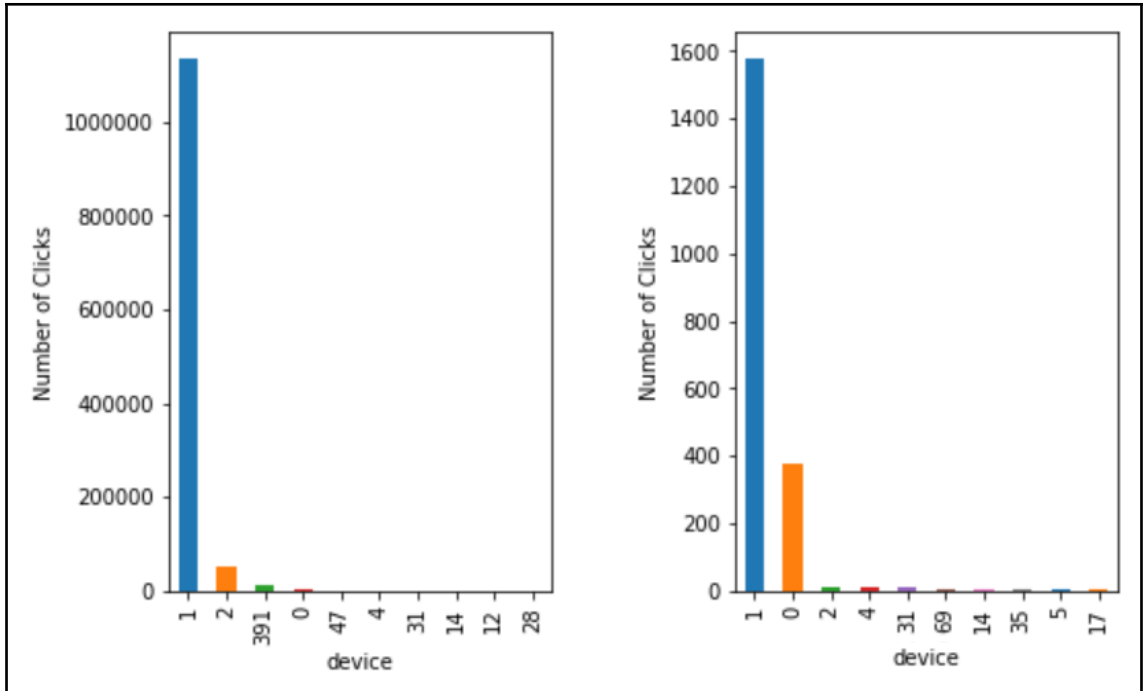




Chapter 12: Model Accuracy Degradation and Feedback Loops



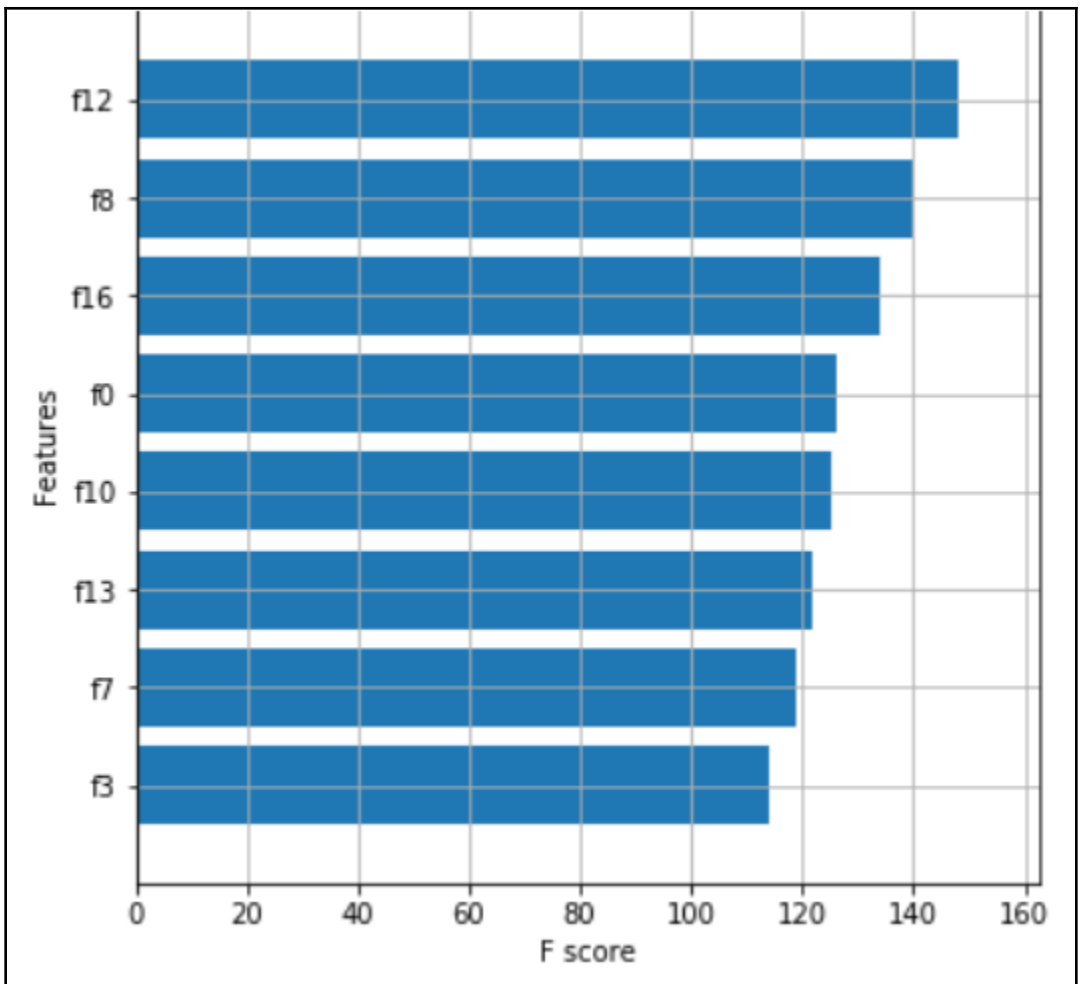


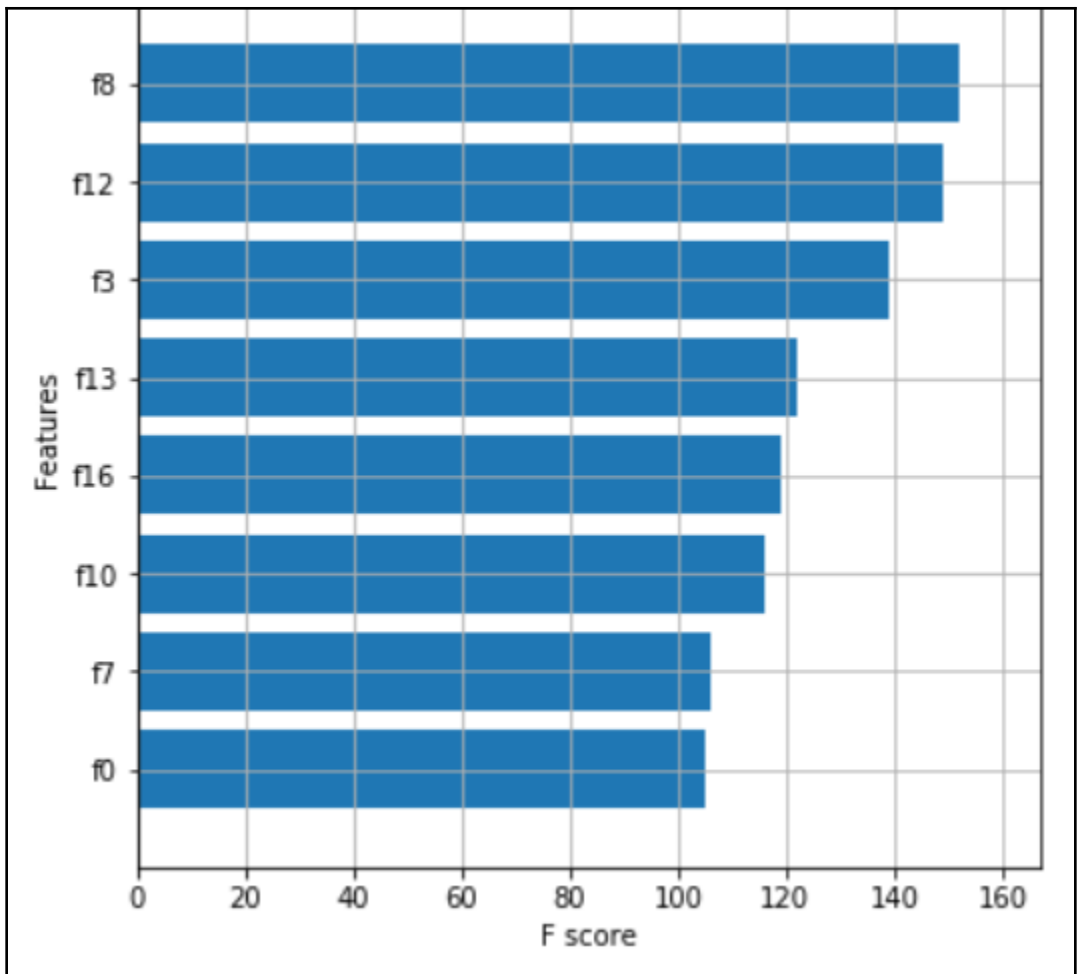


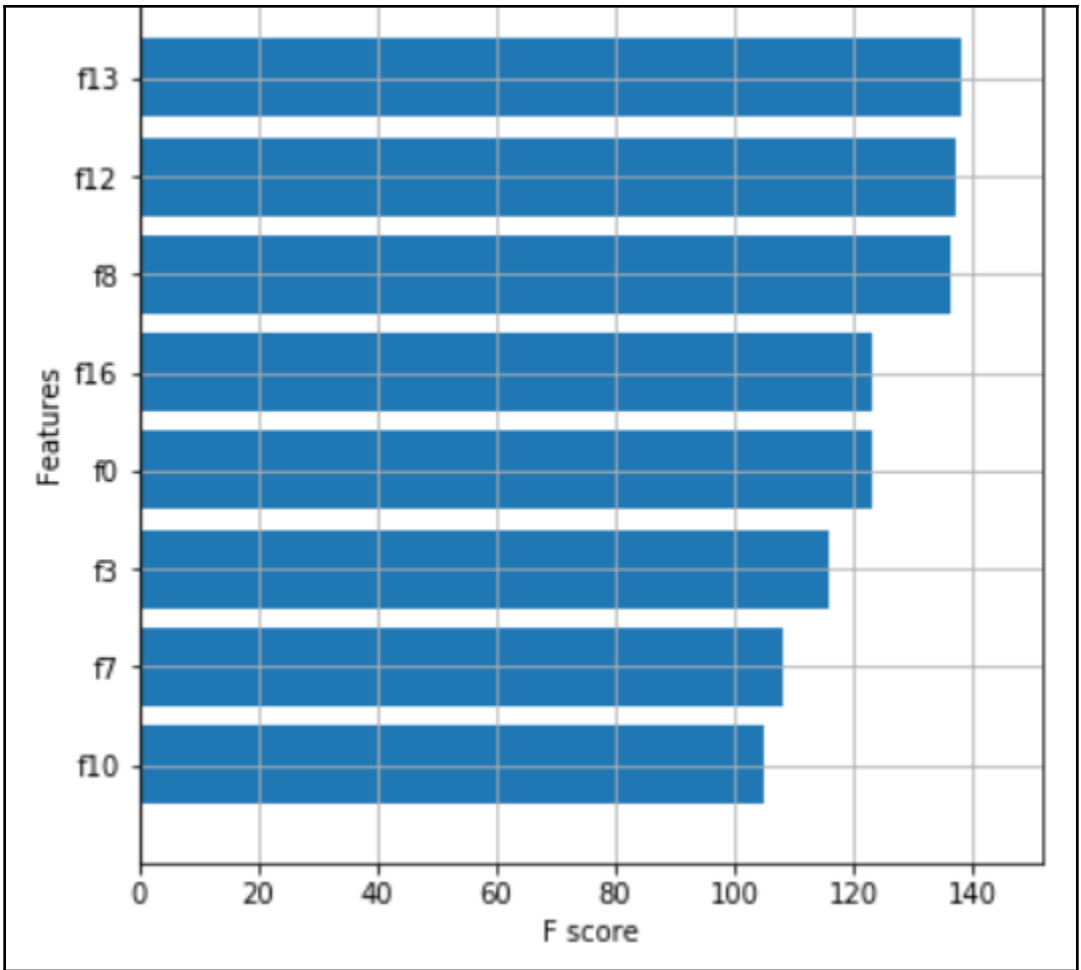
app	device	os	channel	is_downloaded	day	hour	minute	second	clicks_by_ip_day_hr	clicks_by_ip_hr_chnl	clicks_by_ip_hr_os
2	1	18	51	0	4	0	10	27	58	19	3
3	2	13	84	0	4	0	10	27	32	2	11
3	1	13	110	0	4	0	10	27	3	2	3
1	1	22	42	0	4	0	10	27	56	9	3
11	1	19	45	0	4	0	10	27	59	4	59

clicks_by_ip_hr_app	clicks_by_ip_hr_device	app_freq	device_freq	os_freq	channel_freq
24	94	0.091979	0.947446	0.047518	0.020742
7	12	0.169171	0.039588	0.221243	0.058326
2	3	0.169171	0.947446	0.221243	0.025615
7	139	0.046613	0.947446	0.038723	0.029306
5	80	0.014798	0.947446	0.247792	0.007015

	app	device	os	channel	is_downloaded	day	hour	minute	second	clicks_by_ip_day_hr
app	1.000000	0.158022	0.141765	-0.030068	0.058519	014786	-0.014782	0.010294	-0.001414	-0.008291
device	0.158022	1.000000	0.851941	-0.077587	0.007776	0.006948	-0.006943	0.001043	-0.000758	-0.006281
os	0.141765	0.851941	1.000000	-0.056749	-0.001451	0.008148	-0.008140	-0.000644	-0.001469	-0.002912
channel	-0.030068	-0.077587	-0.056749	1.000000	-0.016482	0.053915	-0.053976	0.019662	-0.003592	-0.018300
is_downloaded	0.058519	0.007776	-0.001451	-0.016482	1.000000	0.001237	-0.001237	0.003675	-0.000239	-0.007840
day	0.014786	0.006948	0.008148	0.053915	0.001237	1.000000	-0.999996	-0.087434	-0.006234	-0.116006
hour	-0.014782	-0.006943	-0.008140	-0.053976	-0.001237	-0.999996	1.000000	0.086775	0.006227	0.116030
minute	0.010294	0.001043	-0.000644	0.019662	0.003675	-0.087434	0.086775	1.000000	-0.067187	0.012484
second	-0.001414	-0.000758	-0.001469	-0.003592	-0.000239	-0.006234	0.006227	-0.067187	1.000000	-0.000716
clicks_by_ip_day_hr	-0.008291	-0.006281	-0.002912	-0.018300	-0.007840	-0.116006	0.116030	0.012484	-0.000716	1.000000
clicks_by_ip_hr_chnl	-0.043687	-0.004494	-0.001291	-0.076272	-0.010863	-0.115471	0.115493	0.018248	0.000794	0.652071
clicks_by_ip_hr_os	-0.025790	-0.027571	-0.038357	-0.030014	-0.010035	-0.093681	0.093705	0.013310	0.000698	0.706241
clicks_by_ip_hr_app	-0.058217	-0.011063	-0.007185	-0.022824	-0.009858	-0.102169	0.102188	0.017185	-0.000601	0.800414
clicks_by_ip_hr_device	-0.020919	-0.030611	-0.026420	-0.011767	-0.008612	-0.112401	0.112425	0.012277	-0.000316	0.947810
app_freq	-0.425326	-0.041630	-0.043836	0.049374	-0.062210	-0.06360	0.006313	0.022707	-0.004619	0.025189
device_freq	-0.096505	-0.423654	-0.380922	0.085903	-0.042520	0.43364	-0.043379	-0.003262	-0.000812	-0.069033
os_freq	-0.044316	-0.104758	-0.184141	0.018447	-0.005146	0.009874	-0.009892	0.003801	-0.002031	0.005872
channel_freq	-0.068054	0.021604	0.000538	-0.331483	-0.038358	0.100819	0.100861	-0.007235	-0.004171	0.009254







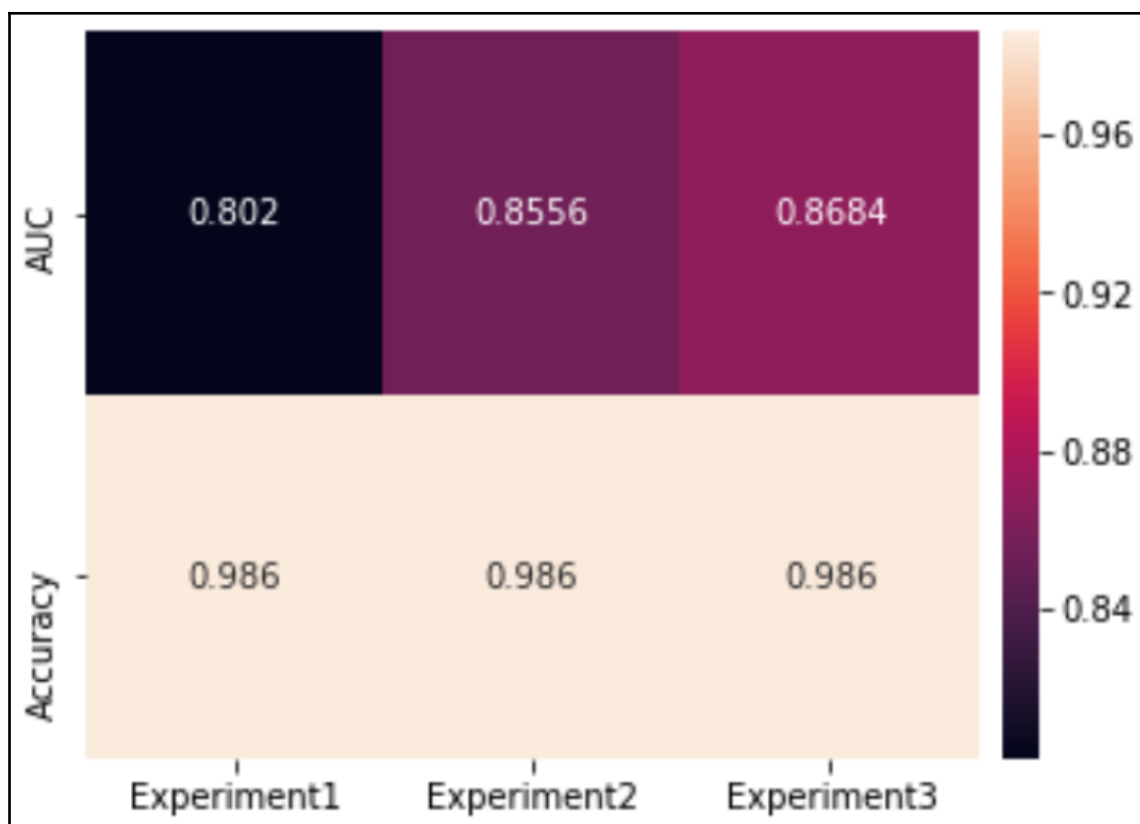
f0	f1	f2	f3	f4	f5	f6	f7	f8	f9	f10	f11	f12	f13	f14	f15	f16
app	device	os	channel	day	hour	minute	second	clicks_by_ip_day_hr	clicks_by_ip_hr_chnl	clicks_by_ip_hr_os	clicks_by_ip_hr_app	clicks_by_ip_hr_device	app_freq	device_freq	os_freq	channel_freq

☐	xgboost-2019-06-24-15-40-47-429	arn:aws:sagemaker:us-east-1:109099157774:endpoint/xgboost-2019-06-24-15-40-47-429	Jun 24, 2019 15:40 UTC	 InService	Jun 24, 2019 15:49 UTC
☐	xgboost-2019-06-24-15-31-29-918	arn:aws:sagemaker:us-east-1:109099157774:endpoint/xgboost-2019-06-24-15-31-29-918	Jun 24, 2019 15:31 UTC	 InService	Jun 24, 2019 15:39 UTC
☐	xgboost-2019-06-24-15-22-33-935	arn:aws:sagemaker:us-east-1:109099157774:endpoint/xgboost-2019-06-24-15-22-33-935	Jun 24, 2019 15:22 UTC	 InService	Jun 24, 2019 15:30 UTC

For exp1 auc is 0.802, accuracy is 0.9864, and confusion matrix is $\begin{bmatrix} 19822 & 142 \\ 14 & 22 \end{bmatrix}$

For exp2 auc is 0.8556, accuracy is 0.9864, and confusion matrix is $\begin{bmatrix} 19745 & 219 \\ 10 & 26 \end{bmatrix}$

For exp3 auc is 0.8684, accuracy is 0.9864, and confusion matrix is $\begin{bmatrix} 19700 & 264 \\ 9 & 27 \end{bmatrix}$



Chapter 13: What Is Next?



