Machine learning for developers
Enhance your customer experience

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AWS

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It is difficult to think of a **major industry** that **AI will not transform**. This includes healthcare, education, transportation, retail, communications, and agriculture. There are surprisingly **clear paths for AI to make a big difference** in all of these industries.
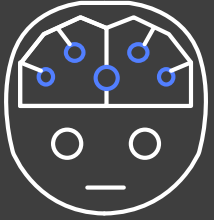
Andrew Ng

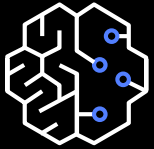Computer Scientist and Global Leader in AI

Stanford University

Agenda

- What is AI/ML

- The AWS AI/ML Services
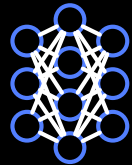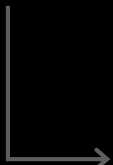
- Demo of Amazon Personalize

What is it?

Artificial intelligence
Any technique that enables computers to mimic human intelligence using logic, if-then statements, and ML (including deep learning)

Machine learning
Subset of AI that uses machines to search for patterns in data to build logic models automatically
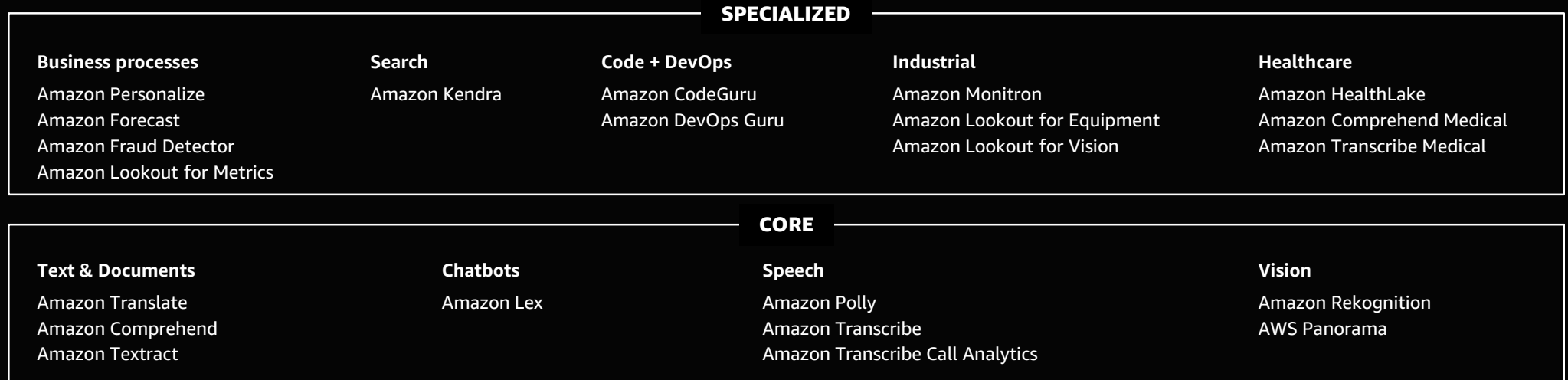
Deep learning
Subset of ML composed of deeply multi-layered neural networks that perform tasks like speech and image recognition

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How can the AWS ML Stack help you?

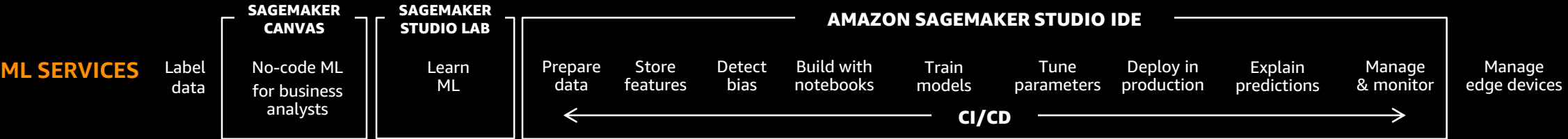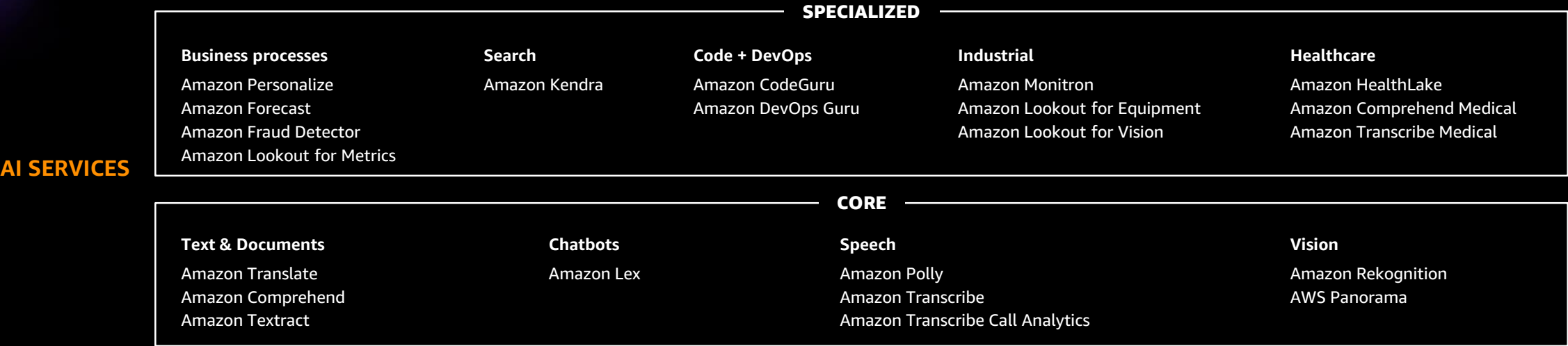## BROADEST AND MOST COMPLETE SET OF MACHINE LEARNING CAPABILITIES

AI SERVICES

SPECIALIZED

Business processes	**Search**	**Code + DevOps**	**Industrial**	**Healthcare**
Amazon Personalize	Amazon Kendra	Amazon CodeGuru	Amazon Monitron	Amazon HealthLake
Amazon Forecast		Amazon DevOps Guru	Amazon Lookout for Equipment	Amazon Comprehend Medical
Amazon Fraud Detector			Amazon Lookout for Vision	Amazon Transcribe Medical
Amazon Lookout for Metrics				

CORE

Text & Documents	**Chatbots**	**Speech**	**Vision**
Amazon Translate	Amazon Lex	Amazon Polly	Amazon Rekognition
Amazon Comprehend		Amazon Transcribe	AWS Panorama
Amazon Textract		Amazon Transcribe Call Analytics	

ML SERVICES

SAGEMAKER CANVAS
SAGEMAKER STUDIO LAB
AMAZON SAGEMAKER STUDIO IDE

Label data	No-code ML for business analysts	Learn ML	Prepare data	Store features	Detect bias	Build with notebooks	Train models	Tune parameters	Deploy in production	Explain predictions	Manage & monitor	Manage edge devices

CI/CD

ML FRAMEWORKS & INFRASTRUCTURE

PyTorch, Apache MXNet, TensorFlow	Amazon Elastic Compute Cloud (Amazon EC2)	CPUs	GPUs	AWS Inferentia	AWS Trainium	Habana Gaudi	FPGA	Elastic inference

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Amazon Personalize

The current landscape

Market leaders are investing in personalization to meet customer expectations

63%

of customers see **PERSONALISATION AS THE STANDARD LEVEL OF SERVICE***

* Source
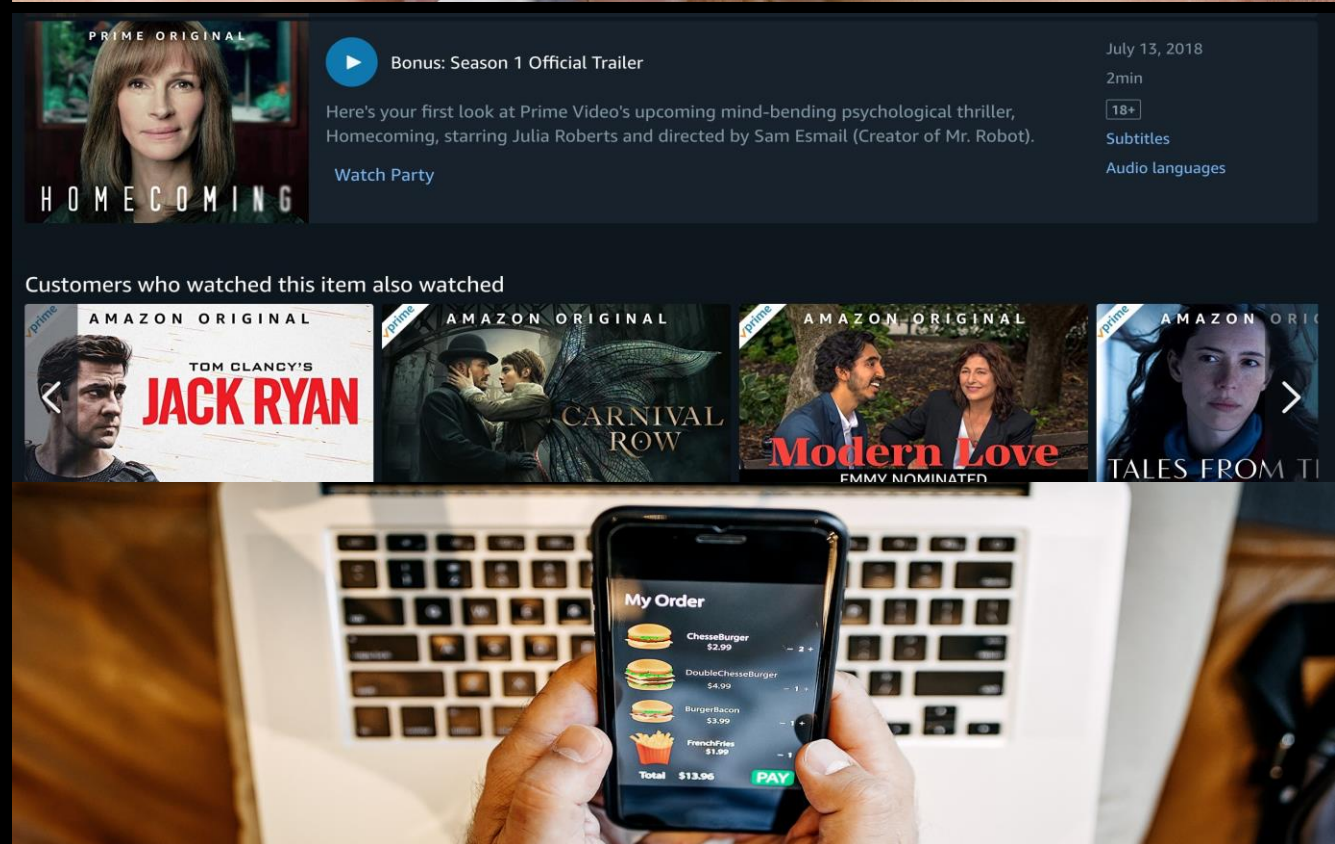
IMPROVING BUSINESS OUTCOMES
The power of personalization

ACQUISITION AND RETENTION

Attracting new customers

Retaining customers in a crowded
digital environment

ENGAGEMENT

Understanding, measuring, and improving
user experiences across digital channels

Increasing time spent
engaging with products and content

EFFICIENCIES AND REVENUE

Improving digital marketing efficiencies

Increasing average revenue per user

DISCOVERABILITY
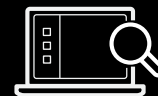
Helping customers easily and quickly
discover products and content they want

Highlight new products,
content, and promotion offerings

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PIONEERING PERSONALIZATION AT AMAZON
The evolution over 20+ years

THEN

First feature launched for recommendations in 1998

NOW

Delivering sophisticated, unique experiences to customers across channels and devices using machine learning
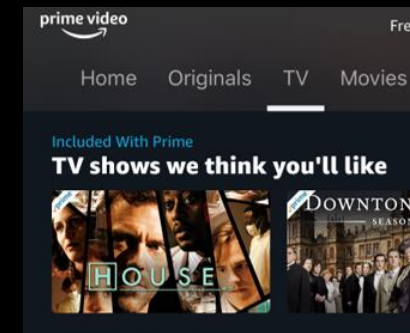
HOW IT WORKS
Amazon Personalize

User events/interactions
(views, signups,
conversions, etc.)

Item metadata
(details of articles,
products, videos, etc.)

User metadata
(age, location, etc.)

Amazon Personalize

Inspect
data

Identify
features

Select
hyper-
parameters

Train
models

Optimize
models

Host
models

Real-time
feature
store

Customized
personalisation
API

Fully-managed by Amazon Personalize

How to get started with Amazon Personalize?

Upload datasets

Datasets are required to create solutions, which are then used to generate recommendations.

View datasets

Install event ingestion SDK

The event ingestion SDK allows you to track user events in your application and feed them to your solutions.

View APIs

Create solutions

Solutions help you generate recommendations. They consist of custom models trained on your datasets along with the underlying infrastructure required to generate recommendations.

View solutions

Create solution

Launch campaigns

Campaigns allow your application to get recommendations from your solution version. They also provide you with analytics on the solution's usage.

View campaigns

Create new campaign

Create batch inference jobs

Batch inference jobs allow your application to get batch recommendations from your solution version.

View jobs   Create new job

Data Ingestion
(Schema and Dataset)

Training

Inference

How to get started with Amazon Personalize?

CONFIGURE THE DATA

```
schema = {
  "type": "record",
  "name": "Interactions",
  "namespace": "com.amazonaws.personalize.schema",
  "fields": [
    {
      "name": "USER_ID",
      "type": "string"
    },
    {
      "name": "ITEM_ID",
      "type": "string"
    },
    {
      "name": "TIMESTAMP",
      "type": "long"
    }
  ],
  "version": "1.0"
}
```

Required for
Interactions

```
create_schema_response = personalize.create_schema(
    name="personalize-demo-schema",
    schema=json.dumps(schema)
)

schema_arn = create_schema_response['schemaArn']
```

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How to get started with Amazon Personalize?

Dataset Group creation in Python with boto3:

```python
personalize.create_dataset_group(
    name="personalize-launch-demo"
)
```

Datasets are required to create solutions, which are then used to generate recommendations.

Dataset creation:

```python
dataset_type = "INTERACTIONS"
personalize.create_dataset(
    name="personalize-launch-interactions",
    datasetType=dataset_type,
    datasetGroupArn=dataset_group_arn,
    schemaArn=schema_arn
)
```

How to get started with Amazon Personalize?

Dataset import job creation:

```python
bucket = "yourbucket"
filename = "interactions.csv"


create_dataset_import_job_resp = personalize.create_dataset_import_job(
    jobName="personalize-demo-import1",
    datasetArn=dataset_arn,
    dataSource={
        "dataLocation": "s3://{}/{}".format(bucket, filename)
    },
    roleArn=role_arn
)
```
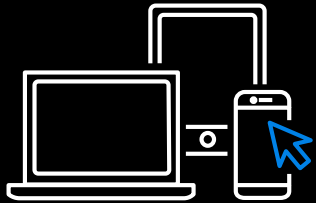
Import the events with the SDKs and through Amazon S3

How to get started with Amazon Personalize?
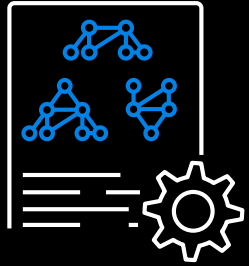
Recipe:

```
recipe_arn = "arn:aws:personalize:::recipe/aws-user-personalization"
```

Solution creation:

```
create_solution_response = personalize.create_solution(
    name="personalize-demo-soln-user-personalization",
    datasetGroupArn=dataset_group_arn,
    recipeArn=recipe_arn
)
```

Solutions help you generate recommendations. They consist of custom models trained on your datasets along with the underlying infrastructure required to generate recommendations.

Solution version creation:

```
create_solution_version_response = personalize.create_solution_version(
    solutionArn=solution_arn
)
```

Retrieve Solution metrics:

```
get_solution_metrics_response = personalize.get_solution_metrics(
    solutionVersionArn=solution_version_arn
)
```

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How to get started with Amazon Personalize?

CREATE CAMPAIGN
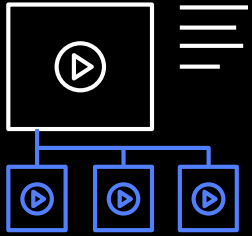
Campaigns allow your application to get recommendations from your solution version. They also provide you with analytics on the solution's usage.

Campaign creation:

```python
create_campaign_response = personalize.create_campaign(
    name="personalize-demo-camp",
    solutionVersionArn=solution_version_arn,
    minProvisionedTPS=1,
    campaignConfig={"itemExplorationConfig": {"explorationWeight":
"0.5"}}
)
```

Checking progress:

```python
max_time = time.time() + 3 * 60 * 60 # 3 hours
while time.time() < max_time:
    describe_campaign_response = personalize.describe_campaign(
        campaignArn=campaign_arn
    )
    status = describe_campaign_response["campaign"]["status"]
    print("Campaign: {}".format(status))
    if status == "ACTIVE" or status == "CREATE FAILED":
        break
    time.sleep(60)
```

How to get started with Amazon Personalize?
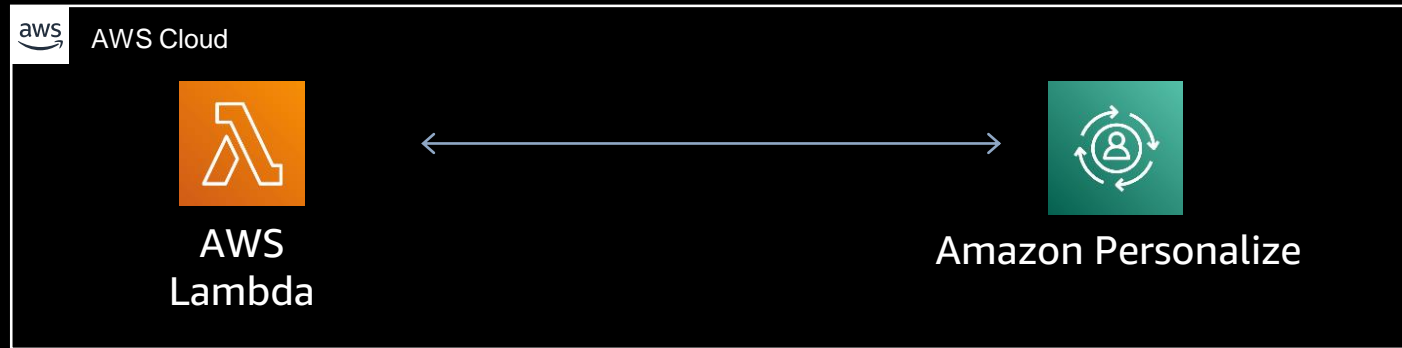
```
get_recommendations_response = personalize_runtime.get_recommendations(
    campaignArn=campaign_arn,
    userId=str(user_id),
)
```

https://github.com/aws-samples/amazon-personalize-samples

Demo

Machine Learning for Developers –
Personalization hands-on workshop

https://bit.ly/3o1QEWa

Recap

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Personalization hands-on workshop

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  Accelerate machine learning innovation with the right cloud services & infrastructure e-book
- Choosing the right compute infrastructure for machine learning e-book
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Validate your expertise

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Thank you!

Janos Schwellach