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Better Outcomes Through a Data-Driven Strategy

Executive summary

A Fortune 200 US airline wanted to revolutionize passenger experience by deploying an AI/ML model to predict travelers' readiness by analyzing document uploads, including critical items like COVID test reports and vaccine certificates. They wanted to automate and streamline document approval to expedite passenger journeys.

Challenges included:

1. Ensuring data security and privacy
2. Adapting to evolving regulations
3. Refining the AI/ML model for more accurate predictions

Impetus Technologies utilized AWS services like EKS Fargate containers, SageMaker endpoints, and DynamoDB to deploy an advanced OCR Model Inference Solution. The implementation reduced manual efforts, improved document validation, and streamlined passenger experiences. An OCR audit tool and Single Sign-On (SSO) integration further enhanced auditing processes, promoting efficiency and security.

The solution enabled the airlines to offer personalized bundles, reduced wait times at airport gates, and automated travel readiness approvals, ultimately enhancing the airline's operations and passenger experience.

The challenge

> ### Predicting travel-readiness
> Using AI/ML to predict passenger readiness from document uploads (e.g., COVID tests, vaccine certificates)

> ### Ensuring safe travel
> Addressing passenger safety amid increased workload for gate agents

> ### Managing document overload
> Mitigating the impact of rising document reviews on customer service overhead

About the leading American airline

A Fortune 200 airlines recognized for its commitment to excellence, it distinguishes itself through an unwavering dedication to elevating the passenger journey. Committed to adopting cutting-edge technology for unparalleled customer service, it stands out for its continuous efforts to streamline travel procedures and prioritize passenger safety and comfort.

"Today, our airline is the sole organization operating an AI/ML model in production to predict customer's travel readiness when they upload covid test details. This is a tremendous landmark critical for our customers and operations.

I want to call out the focus, dedication, collaboration, and quality work of the entire Impetus ML engineering team. We achieved the above milestone because of hard work of every member of the team."

Principal Database Administrator

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Learn how to build a data driven strategy with Amazon Web Services (AWS)

Data-Driven Everything is a complimentary 2-day workshop where AWS experts and AWS Partners come together to customize a data driven strategy for driving business outcomes. Customers receive a complimentary 20 page read-out that includes a Minimum Viable Product with a high-level architecture and delivery plan.

Why Impetus?

Impetus has collaborated with the airlines to bring innovative concepts to fruition over several years. As a preferred partner and prominent cloud migration ally for the airlines, Impetus is an AWS Advanced Tier Services Partner and an AWS Marketplace Seller, boasting competencies across multiple categories. Impetus strategically leveraged a comprehensive service bundle, spanning data engineering, AI/ML, and more, and tapped into its expert engineering teams to ensure successful project execution.

The solution

The Impetus team engineered a cutting-edge Optical Character Recognition (OCR) Model Inference Solution, optimizing efficiency and flexibility. Their versatile framework streamlined various models through a single endpoint, enhancing unified data processing.

To overcome conventional API limitations and ensure scalability, Impetus custom-built REST APIs on AWS Elastic Kubernetes Service (EKS) Fargate containers. OCR models, integrated with Lambda functions, were orchestrated using Step Function pipelines, providing automatic retry and robust exception handling.

Data integrity and privacy were upheld as results were stored securely in DynamoDB, with PII removed and rigorous AWS Key Management Service (KMS) encryption.

Lambda warmers optimized performance and minimized costs. Reporting and monitoring tools offered comprehensive insights, driving data-driven optimizations.

The OCR audit tool, designed as a microservices application on Docker containers deployed on EKS/Fargate, ensured horizontal scalability to adapt to varying traffic.

To maintain rigorous security standards, the solution incorporated Single Sign-On (SSO) authentication for seamless onboarding and PII data protection.

Results

The successful implementation of the OCR Model Inference Solution and related advancements yielded significant changes in the operations, benefiting the airlines and their passengers. Key results include:

1. Reduced manual effort: The deployment of an automated ML model, integrated with the latest technology stack and an iterative development approach, substantially minimized the manual effort required for document validation.This outcome significantly improved operational efficiency and expedited passenger processes, benefiting gate agents and contact center staff.

2. Automated model monitoring: The introduction of automated model monitoring and drift calculation, enabled by Elasticsearch and Kibana dashboards, ensured that custom models consistently delivered optimal performance. This capability addressed data variability and maintained the accuracy and efficiency of the document validation process.

3. Enhanced scalability and security: The migration from an on-premises .NET environment to the AWS cloud, augmented with the latest technology stack, significantly improved scalability, resource optimization, and security. This transition provided a more robust infrastructure for the airlines, ensuring enhanced data protection and efficiency.

"This team is well on track to deliver additional pipelines enabling vaccine and destination entry document models. This will further enhance the customer travel experience and reduce the load on gate agents and contact center agents."

Principal Database Administrator

Benefits

The project's successful outcomes extended several notable benefits to the airlines and its passengers:

1. Streamlined passenger experience: The manual effort reduction and the document validation process enhancement resulted in a smoother and more efficient passenger experience. Passengers could navigate the travel process with increased ease and confidence.

2. Cost reduction: The implementation of Lambda warmers and other optimizations led to reduced operational costs. The project was beneficial in terms of passenger experience and economically advantageous.

3. Empowered auditors: The OCR audit tool, featuring a user-friendly visual interface and Single Sign-On (SSO) integration, empowered auditors to expedite the manual auditing of documents while ensuring data accuracy and compliance.

4. Future enhancements: The project's success paved the way for additional pipelines to improve the customer travel experience further and alleviate the workload on gate agents and contact center staff. The airlines are well-positioned to continue enhancing their services and operations.

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Key highlights

> **Resource optimization**

Automated ML model deployment with the latest technology stack and a seamless iterative development process significantly reduced time and effort for tasks

> **Real-time model monitoring**

Automated model monitoring and drift calculation through Elasticsearch and Kibana dashboards for real-time insights into model performance

> **Enhanced scalability**

The deployed solution demonstrated high scalability and availability, utilizing EKS/Fargate pods and a serverless architecture (Lambda, SNS, DynamoDB, Step Functions, etc.)

About Impetus

Impetus Technologies, an AWS Advanced Tier Services Partner and AWS Marketplace Seller, holds AWS Competencies in Migration, DevOps, and Data & Analytics Consulting. Combining unparalleled expertise in cloud and data engineering, Impetus specializes in data platform engineering, Gen AI & ML, DevOps, application and workloads modernization, and more, offering comprehensive solutions to solve the data, AI, and cloud puzzle.

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