Using Machine Learning on AWS to Eliminate Manual Contract Reviews

aws partner network | LinkSquares

"We're excited to build out more AI and take advantage of new AWS services to continue exploring what's possible"

-   Vishal Sunak, Co-founder and CEO at LinkSquares

Using AWS to enable faster contract discovery

Companies experiencing rapid growth often lack the bandwidth to track each line of every contract, service agreement, or legal document before it's executed. Even in the most carefully reviewed agreements, some information is forgotten as soon as the contract is signed. Once the business has matured and due diligence projects arise (for example, when a law changes or an acquisition takes place), companies must conduct detailed reviews of all signed contracts and identify specific terms within them.

LinkSquares' founders experienced the painful reality of reviewing existing legal contracts firsthand while their previous employer underwent an acquisition. "We manually searched through all of our existing contracts to identify privacy language and other information crucial to legally moving clients to a new infrastructure provider for our software service," says Vishal Sunak, co-founder and chief executive officer at LinkSquares. "We found that the language deviated from contract to contract, making the review process of thousands of agreements both timely and frustrating." The team identified existing software solutions helping companies efficiently address the pre-signature workflow: contract creation, terms negotiation, and internal workflow. However, the industry lacked a software solution to help companies mine for information in existing contracts. LinkSquares saw this gap as an opportunity to develop software to help customers with post-signature contract analysis.

"We sought to disrupt an older industry historically focused on pre-signature work. We're focused on post-signature analysis and we don't deal with anything pre-signature," says Eric Alexander, chief technology officer at LinkSquares. "We chose to build a software as a service (SaaS) offering on AWS so that we can get companies migrated from their existing storage solutions and up and running using our software quickly, enabling them to understand what they agreed to in their contracts."

Why did LinkSquares use SFL Scientific?

"SFL Scientific understand the business challenges we're trying to solve, and they've given us guidance we need to use new technology to tackle these challenges."

- Eric Alexander, CTO at LinkSquares

About LinkSquares

An industry disruptor in contract review, LinkSquares provides high-growth companies with a suite of tools to complete fast and systematic legal reviews of executed business agreements.

Challenges

- Scaling to meet the needs of a growing customer base
- Review accuracy
- Time spent on manual reviews

Benefits

- Faster review times
- Increased accuracy
- Scalability
- Time savings

Building a long-term partnership with the experts at SFL Scientific

Even with the ability to quickly mine for contract data in a cloud-based environment — an invaluable service for clients — the LinkSquares team was still in need of a scalable solution for identifying and classifying legal language. Initially, the LinkSquares team built a searchable contract database, but as the company grew, so did its need for an automated way of extracting key contract metadata.

Seeking to build a solution to alleviate its pain points, the LinkSquares team turned to the experts at SFL Scientific, a data science consulting firm, AWS Partner Network (APN) Consulting Partner and AWS Machine Learning Competency Partner. The team at SFL Scientific builds deep relationships with each client to understand the client's challenges and its short- and long-term vision for using artificial intelligence and machine learning technologies. SFL Scientific excels in its ability to help clients execute data-driven strategies, and it worked closely with LinkSquares to understand the company's current pain points and future goals.

"LinkSquares built its initial prototype using SQL running on AWS, but wasn't using any machine learning technology," says Michael Luk, chief technology officer at SFL Scientific. "We learned about the team's vision to process terms and language automatically and understood the business pain points. We proposed building a custom machine learning solution to help the team scale and improve accuracy."

One month after its initial engagement, data scientists at SFL conducted a Proof of Concept (PoC) showing the LinkSquares team how they could deploy a scalable automated analysis solution using machine learning on AWS.

The role machine learning plays in automating post-signature contract reviews

SFL Scientific used Natural Language Processing (NLP), an Artificial Intelligence (AI) method helping computers understand and interpret human language, to build its machine learning algorithm. Implementing the algorithm enabled LinkSquares' software to extract key terms from a document and tokenize these terms into pre-defined categories. Upon deployment on AWS, the algorithm ran the code on demand. Whenever a document was uploaded, the machine learning code automatically launched.

The text extraction algorithm process consisted of three main steps: Feature Engineering, Modeling – stacking ensemble, and Post-processing. First, the algorithm parses raw text and stores it individually. Next, tokenized texts create hundreds of unique features based on rule-based features, token-based features, and sequence-level classes as features. After the feature engineering, a model stacking ensemble technique predicts the class of a token. The modeling, which was trained against the human-tagged data, assigns a probability to each class prediction, making it possible to determine a probability threshold (or level of guaranteed accuracy). Finally, once the classes for each token are predicted and cleaned, continuous tokens are strung together, making it easier to digest the data. Learn more about the algorithm SFL Scientific built by clicking here.

The NLP algorithm developed by SFL completely revolutionized the post-signature contract review process for LinkSquares. The machine learning code enables the LinkSquares software platform to automatically run code on thousands of documents in seconds. Every result showed an exponential improvement in time spent reviewing each document, and eventually, improvement in tagging accuracy compared to the human auditors.

Saving time, resources, and headaches using machine learning on AWS

Using AWS to power its document storage, automated search, and machine learning capabilities has enabled LinkSquares to focus its resources on optimizing products rather than maintaining infrastructure. "AWS makes it easy for us, as a small company, to focus on maturing our application rather than spending time on infrastructure as we continue to grow our business," says Alexander.

Having identified SFL Scientific to help it take advantage of machine learning technology further emboldens LinkSquares as the team develops cutting-edge solutions on AWS. "It's been fantastic engaging with SFL Scientific as its team are experts in the AI space," says Alexander. "They understand the business challenges we're trying to solve, and they've given us guidance we need to use new technology to tackle these challenges. I think of them like they're a part of our team. They're a valued partner."

LinkSquares' AI-powered solution on AWS is a fundamentally new approach to the streamlining of post-signature contract analysis, and the team plans to explore additional technologies on AWS they can use to drive further innovation in their industry. "We're excited about the future of our offering and how we can help legal and finance teams eliminate manual reviews of files," says Sunak. "We're excited to build out more AI and take advantage of new AWS services to continue exploring what's possible."

SFL Scientific is a data science consulting and professional services firm, and an APN Consulting Partner and AWS Machine Learning Competency Partner. SFL uses specific domain knowledge to solve complex, novel, and R&D problems, specializing in helping develop a fully integrated approach to leveraging data-driven systems and improve decision making with AI.