

Mphasis' models, which are available on AWS Marketplace, accelerated the experimentation phase. The models allow learning the multi-dimensional, relational structure from unstructured textual data.

Rens ter Weijde, Co-Founder and CEO, KIMO

Customer Challenge

It is important to fully comprehend (i.e., map) knowledge domains to create truly personalized learning paths. Some examples of relevant knowledge domains are Computer Science, Machine Learning, Artificial Intelligence, Blockchain, Computer Vision, Cloud Computing, Internet of Things, Natural Language Processing, and so on. The mapping of such knowledge domains is a significant challenge. Take the simple example of webpage design to illustrate the idea of mapping and how it is relevant for personalization. Consider the text: "Cascading Style Sheets (CSS) is a language for describing the appearance - colors, layout, fonts - of webpages written in markup languages such as HTML". Mapping involves identifying key concepts and how they are connected to one another. In this example, five concepts are identified: HTML, markup languages, CSS, webpage appearance, and webpage. Webpage is connected to markup language, markup language is connected to HTML, webpage is connected to webpage appearance, CSS is connected to webpage appearance, CSS is connected to HTML, and so on. Nature of the connections among concepts are unique to this domain of webpage design. For example, HTML is 'one of the' markup languages. The connection between CSS and HTML would be understood as a 'precedence relation' i.e., CSS is relevant only after a webpage is created using HTML.


Mapping a domain this way helps to identify and retrieve information easily using a computer. A user who wishes to learn webpage design, would be recommended the content on markup language or CSS based on the learner's prior experience. A learner with no prior experience would first be recommended markup languages like HTML and only then CSS. Content can be further personalized based on the difficulty level, content length, content type, and so on. Imagine the complexity of mapping, say, more than 1 million sentences. Identifying the concepts, how they are connected to one another, and the nature of these connections for a large text corpus is a daunting task!

The traditional method of mapping knowledge domains with the help of experts (university professors) is time-consuming, subjective (prone to disciplinary silos), static (doesn't reflect job market demands), and unscalable. As a result, KIMO decided to take a completely different strategy and study the structure of these knowledge domains from the ground-up via the web. The idea was to create comprehensive knowledge graphs that represent the structure of knowledge domains in detail using state-of-the-art AI/ML. These knowledge graphs would subsequently be used as a key input in the creation of personalized learning paths. Take, for instance, a knowledge domain Artificial Neural Network.

About KIMO

KIMO

Online education platforms delivering content – MOOCs (Massive Open Online Courses) – have high dropout rates and limited personalization opportunities. The web is replete with various types of content such as articles, courses, videos, books, podcasts, publications, and so on. This means that majority of the content is already available on the internet. However, the issue in this situation is finding the appropriate content. It's difficult for learners to know what to learn and when to learn it. Here's where KIMO comes into play. KIMO is an AI company that focuses on personalized education. KIMO's goal is to create the best personalized learning paths for learners ensuring that everyone receives the right content at the right time.



The raw data on the web is used to learn about the concepts in this domain (such as 3-D convolutional neural networks, AlexNet, stochastic neural networks, and so on) and how they are connected to one another. The relationships between the concepts are represented as a multidimensional graph. This important component is used to develop personalized learning paths for learning Artificial Neural Network.

Partner Solution

Systematic experimentation is an important phase in developing ML products. This involves empirically studying and testing the behavior of ML models under different conditions. During this phase, KIMO used Mphasis' ML models (*Mphasis DeepInsights Knowledge Graph, DeepInsights Semantic Triplet Generator*), listed in the AWS Marketplace, to generate knowledge graph for a few knowledge domains (like Computer Science). A text corpus descriptive of the domain was fed to the pre-built models to identify the key concepts and how they are connected to one another. This offered a general method of mapping knowledge domains that paved way for the development of a technique to map any knowledge domain with ease.

Primary AWS services used in the Mphasis' ML models are as follows:

- Amazon Elastic Compute Cloud (Amazon EC2) instances to dynamically scale up or down based on compute demand.
- Amazon SageMaker to easily deploy ML models. Amazon SageMaker also provides a secure environment to use KIMO's raw data with Mphasis' ML models.
- Amazon Simple Storage Service (Amazon S3): The underlying ML model takes the input - text corpus for a knowledge domain - from an S3 bucket. After generating the knowledge graph, the outputs are fed to another S3 bucket and made available to the user.
- AWS Single Sign-on (AWS SSO) service that allows users access to AWS resources across multiple AWS accounts.

Results and Benefits

The KIMO team advanced their understanding of knowledge graphs through the collaboration with Mphasis on AWS Marketplace. Mphasis' ML models served as a catalyst for KIMO's experimentation phase. Building on this experience, a method was developed that can map any knowledge domain. Apart from its versatility, this technique is also scalable, in that it does not require the use of experts to map knowledge domains; instead, the mapping is done using raw data from the internet. By depending on a cloud-based system to map knowledge domains, KIMO can sustain a massive growth in the number and complexity of ever-evolving knowledge domains. This scalability, flexibility, and on-demand processing capacity has the potential to personalize learning for 10 million users using KIMO's AI platform on a daily basis.



- DevOps Services Competency
- Security Services Competency
- Financial Services Competency

- Travel & Hospitality Services Competency
- Migration & Modernization Services Competency

About Mphasis

Mphasis' purpose is to be the "Driver in the Driverless Car" for Global Enterprises by applying next-generation design, architecture and engineering services, to deliver scalable and sustainable software and technology solutions. Customer centricity is foundational to Mphasis, and is reflected in the Mphasis' Front2Back™ Transformation approach. Front2Back™ uses the exponential power of cloud and cognitive to provide hyper-personalized ($C = X2C_{tm} = 1$) digital experience to clients and their end customers. Mphasis' Service Transformation approach helps 'shrink the core' through the application of digital technologies across legacy environments within an enterprise, enabling businesses to stay ahead in a changing world. Mphasis' core reference architectures and tools, speed and innovation with domain expertise and specialization, combined with an integrated sustainability and purpose-led approach across its operations and solutions are key to building strong relationships with marquee clients. [Click here to know more.](#) (BSE: 526299; NSE: MPHASIS)

