



# CASE STUDY



## USING USER IMAGES TO CLASSIFY RESTAURANTS

### Company Info

**Name:** Yelp

**Location:** California, United States

**Industry:** Online Service

**Turning Pictures into**

**Words with Yelp.**

**Assigning multiple labels to restaurant images using AI.**

Would you like to express your gratitude or something you believe about a restaurant? That is what Yelp is all about: letting people express their feelings about the different places they visited. How Yelp does it? One of the ways is allowing users to upload photos, which Yelp's engineers transform into words.

Yelp was established in 2004 by former PayPal employees Russel Simmons and Jeremy Stoppelman. Since then, it has developed into a site with millions of entries about businesses from all over the world. The company has used AI from all these entries since it began to interpret and classify the millions of photos received.

Using its photo-collection, Yelp created a dataset, which it wanted to use to create a restaurant attribute predictor based on 9 different characteristics. The challenge Yelp had was that restaurant labels associated with the images were generated by Yelp users. Selecting the tags is optional, leaving some restaurants uncategorized or, worse, partially categorized. As this classification model had to evolve with the uploaded continuous material, Yelp chose to develop it using machine learning technology.

*“LogicPlum helps all stakeholders to participate in an AI project”*



## A Snapshot of LogicPlum

LogicPlum's platform is software that uses artificial intelligence to help organizations discover and create industry-specific models. LogicPlum contains top-notch algorithms mostly developed by the worldwide open source community and can work autonomously.

This automation allows for the testing of many models very rapidly without the need for human intervention. This feature has significant benefits, as it reduces research time and the need for an expert user, allowing all stakeholders to participate in an AI project.

The open-source modeling framework, which LogicPlum employs, provides significant advantages, as data scientists worldwide are continually pushing the envelope with novel algorithms. Leveraging the community in this way helps AI innovations to rapidly become available and applied in the business setting.

## The Power of Data Pre-processing

The data assembled by Yelp consisted of photos and attributes annotated by the Yelp community. However, the set contained duplicate images. This was due to two factors. Firstly, users sometimes upload the same photo twice. Secondly, chain restaurants occasionally upload the same photo to different locations.

The dataset was then fed into LogicPlum's platform. Partitioning, splitting the data into train and test sets were automatically completed. LogicPlum extracted features from the images it found to be necessary.

## The LogicPlum's AI Process

Once the platform had created a new dataset based off or relevant features from the Yelp images, it started trying hundreds of various algorithms. All of which were then evaluated using the F1 score, also known as example-based F-measure, which is commonly used in information retrieval. This metric considers recall and precision equally, and a good retrieval algorithm will maximize both simultaneously.

LogicPlum found an optimal solution through the weighted combination of three algorithms, namely, the Gradient Boosting, Logistic regression, and a multi-output neural network. The model reached a mean F1 score of 85%, where 100% is perfect.

***"We were thrilled with the final result and how little time it actually took to produce it. Even the best image experts in the world would not have come up with such a solution in a short period,"*** added the data scientist.





## A Solution for Yelp

*"In our experience, having the right model only represents 16% of the entire solution that a client needs. What clients need is an end-to-end process to consume AI. For us, that starts with problem framing and ends with model maintenance without the tech hassle",* stated the data scientist.

The model developed is simple to deploy with a single-point API endpoint connected to a user-friendly front-end. Documentation of the AI methodology written in business terms can help include others within the organization who may want to contribute once they understand what has taken place.

The AI project was concluded. The data scientists at LogicPlum had created a model that could predict its labels given a photo. *"We knew from the very beginning that if we used LogicPlum, we would succeed in creating an efficient solution in a day's work. Its automated featured extraction and its AI blueprints made this problem extremely straight forward",* concluded the data scientist.



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