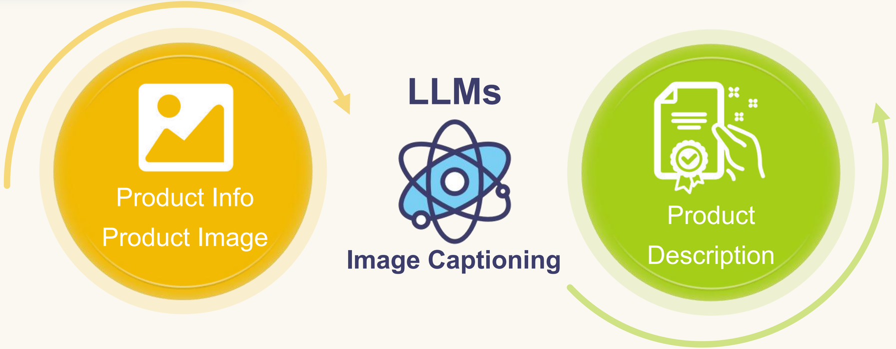
Architecting Azure Cloud Pipeline to Improve Product Information

Goutham Kumar Vemasani, Harish Datta Chitneni, Harthik Miriyala, Jinxin Ren, Srujana Kalyadapu, Yu-hui Lin, Matthew A. Lanham
Purdue University, Mitchell E. Daniels, Jr. School of Business
gvemasan@purdue.edu; hchitnen@purdue.edu; mharthik@purdue.edu; ren270@purdue.edu; skalyada@purdue.edu; lin1740@purdue.edu; lanhamm@purdue.edu

THE TEAM

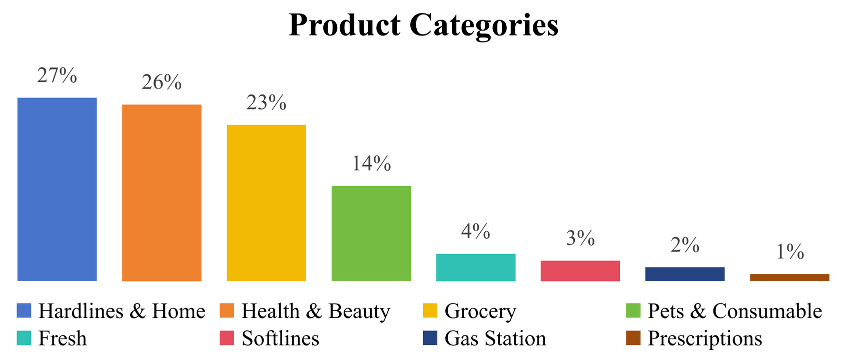
BUSINESS PROBLEM FRAMING

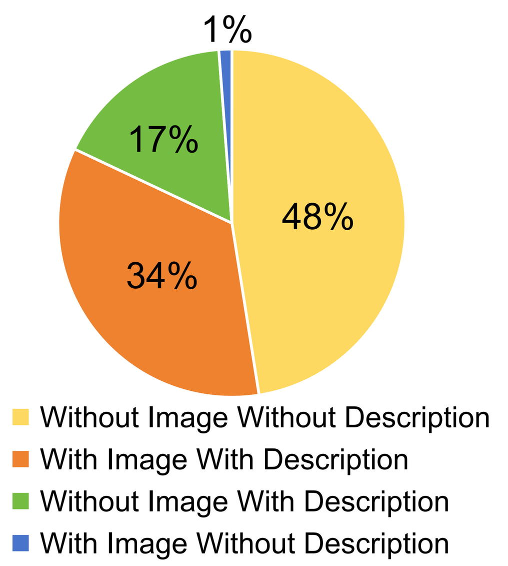


In response to the significant challenge of product returns in the online retail industry, where approximately 40% of consumers return purchases due to poor product information, we are collaborating with a leading tech company to develop an AI-driven solution for a national retailer. This initiative aims to utilize advanced Language Learning Models (LLMs) and other AI technologies to generate accurate accurate and detailed product descriptions from images, and a text-scoring model to evaluate and flag descriptions needing improvements. Addressing the needs of both the retailer and its customers, this project is set within the constraints of current AI capabilities and aims to enhance to enhance customer satisfaction, reduce return rates, and ultimately improve the retailer's efficiency and profit. Eventually, we will deploy an end-to-end pipeline using Microsoft Azure services to help the retailer solve the product description inconsistency automatically at scale.

DATA

The dataset is provided by a major grocery store in the U.S. It comprises 309,826 unique products spanning diverse categories and contain attributes such as product names, descriptions, images(URL), and image angles.





ANALYTICS PROBLEM FRAMING

Our project uses cutting-edge AI for automating online retail product descriptions, focusing on two tasks:

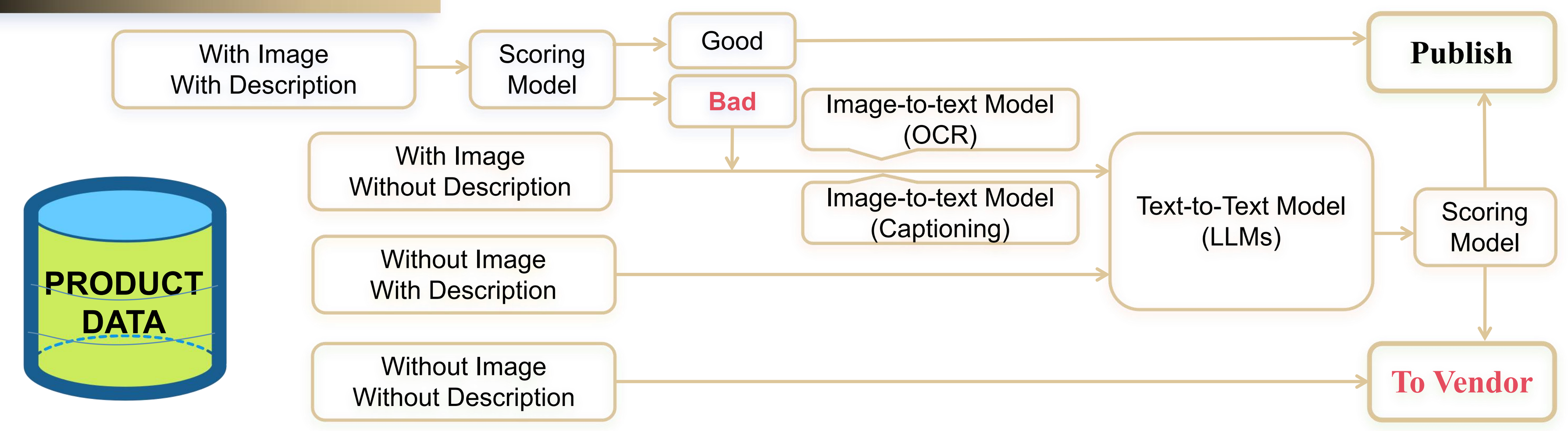
1. Image-to-text: To capture information from product images
2. Text-to-text: To refine auto-generated product description

Based on practical trials with trending open-sourced models on Huggingface, we're confident in AI's capability for this task.

The generated text will be measured by a scoring model that focuses on 4 rubrics:

Readability | Relevance | Descriptive Language | Grammar

METHODOLOGY

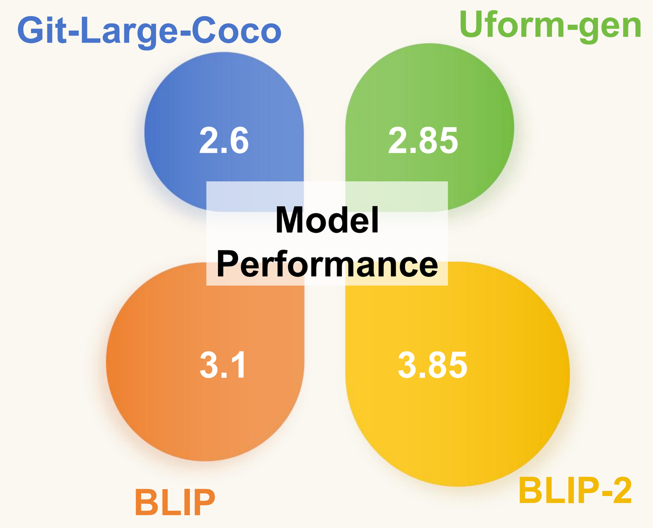


Our project presents a methodology for enhancing online product descriptions through a ML pipeline in Azure cloud with alternate paths for each product scenario. For the products with no description or improper description, we extract text from the product image (label) through OCR model and also generate text employing image-captioning models.

The pooled content from both the models is refined into desired format using the text-to-text LLM and later the output quality is assessed using a scoring algorithm.

MODEL BUILDING

Evaluating Image-to-Text Models:



1. Sample Selection: 80 diverse product images across 8 categories.
2. Model Testing: Human evaluators rate text outputs from different open-source models on a 1-5 scale (1 = irrelevant, 5 = highly accurate).
3. Final Choice: Select the model with the highest average score for implementation.

1 Image Captioning

BLIP-2

Sheba meaty tuna flavor sticks

BLIP-2

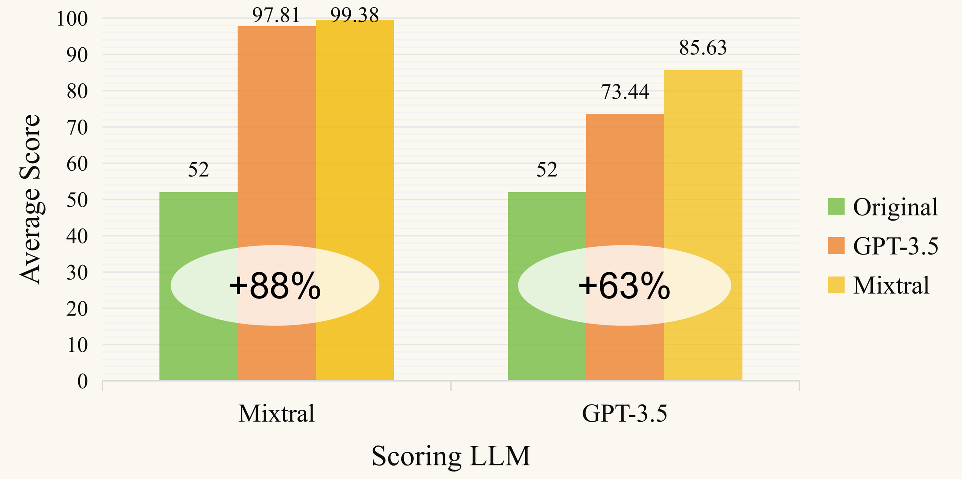
The scotch super hold tape

2 LLM Generation

Scotch Super-Hold Tape

Experience superior adhesion with Scotch Super-Hold Tape, perfect for important jobs that require a strong, lasting hold. With 50% more adhesive than our standard transparent tape, this tape provides an exceptional bond, concealing confidential…

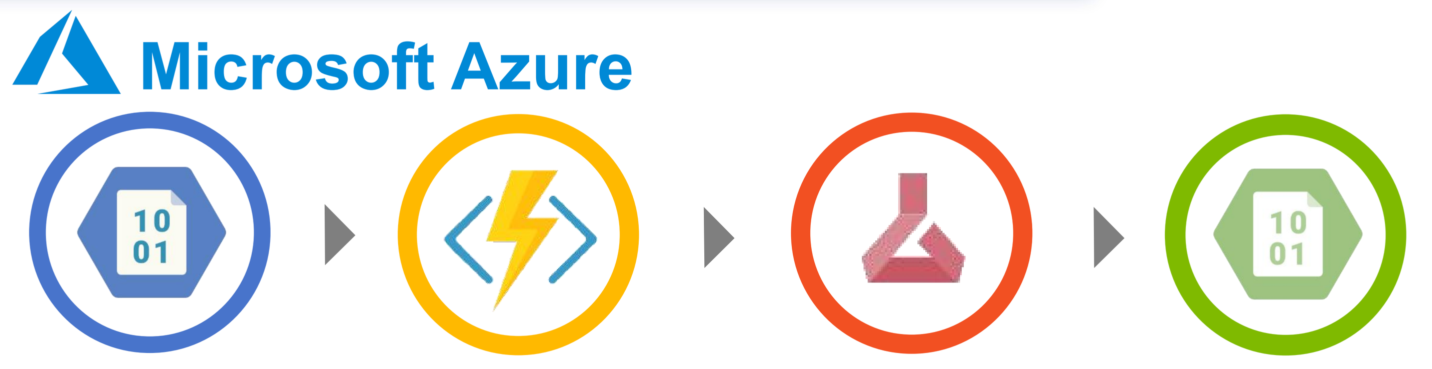
3 Scoring



	GPT-3.5	Mixtral 8x7B
Readability	✖	○
Relevance	○	○
Descriptive	✖	○
Grammar	○	○

We utilized LLMs to generate product descriptions and to score the results. Compared to the vendor-provided product information, our solution can increase the average quality score by more than 63% regardless of which LLM is used.

DEPLOYMENT & LIFE CYCLE MANAGEMENT



Blob Storage	Functions	Machine Learning	Blob Storage
Product information in CSV format gets uploaded online	File triggers Functions to feed data into Machine Learning for action	Machine Learning generates product descriptions and scores	Generated content and scores are saved in CSV file

To deploy our solution, we developed an Azure pipeline that automatically processes product description creation and scoring. Architected with cloud services, the pipeline provides scalability, reliability, and cost-effectiveness. After deployment, we can seamlessly update our models without interrupting the service. Leveraging features such as model versioning, rolling updates, and A/B testing, we can iterate rapidly, adapt to user needs, and maximize business agility and competitiveness.

IMPACT

Our project demonstrates promising results in reducing operation costs, enhancing customer satisfaction, and boosting profitability for the retailer. It also has great potential for similar applications across various industries, such as consumer goods. We hope our work facilitates further research and development in this field for broader impacts.

ACKNOWLEDGEMENTS

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