

The background of the slide is decorated with various hand-drawn food items in a sketchy, artistic style. In the top left, there are two tomatoes on a yellow background. In the top center, a bunch of green beans is tied together. In the top right, there is a whole green pepper and a slice of citrus fruit. On the left side, there is a whole avocado. In the bottom left, there is a green bell pepper. In the bottom center, there is a slice of citrus fruit, a small chili pepper, and a whole chili pepper. In the bottom right, there is a whole chili pepper, a slice of citrus fruit, and a whole chili pepper. The text "ByteBITES" is centered in the middle of the slide, with "Byte" in a red serif font and "BITES" in a pink rounded sans-serif font. Below the title, the names "Grace Guo, Yilin Qi, Victoria Tang" are written in a dark grey sans-serif font.

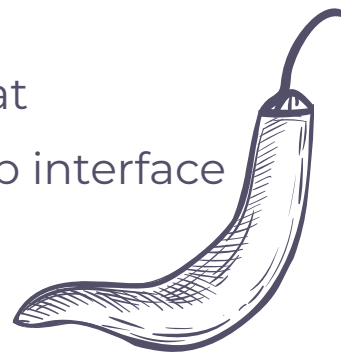
# ByteBITES

Grace Guo, Yilin Qi, Victoria Tang



# ByteBITEs

Generating **nutritious, personalized** recipes that  
best **utilize user ingredients** through a user-friendly web interface





# 01

## Problem Statement

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## Target Audience



**44%**

of Americans meal prep regularly

**26.9%**

of Americans meal prep to save time

**22.2%**

of Americans meal prep to eat healthier



[MyProtein Americans Meal Prepping Habits 2022 Study](#)

# Current cooking resources overlook user needs

allrecipes

Find a recipe or ingredient

DINNERS MEALS INGREDIENTS OCCASIONS CUISINES KITCHEN TIPS NEWS FEATURES

Advertisement

Ad by CRITEO

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Jamie Oliver



## Braised Beef

★★★★★ 4.9 (10) | 9 REVIEWS | 2 PHOTOS

An elevated version of homestyle pot roast, this braised beef is hearty and full of earthy richness. It would pair well with mashed potatoes, buttery noodles, or crusty bread.

By [Nicole McLaughlin](#) | Updated on July 27, 2023

Save

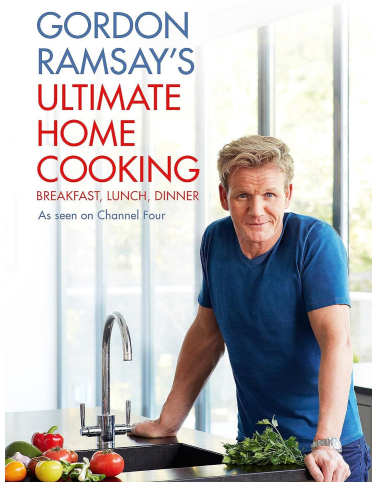
Rate

Print

Share



GORDON  
RAMSAY'S  
ULTIMATE  
HOME  
COOKING  
BREAKFAST, LUNCH, DINNER  
As seen on Channel Four



inconvenient, time consuming  
Little to no nutritional information





an Average American spends

**\$1300**

on food that end up being unused / discarded

[William & Mary 2020 food waste study](#)

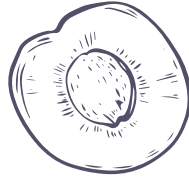


# Problems that ByteBITEs addresses



## Convenience

Our user can conveniently generate recipes with our user-friendly web app.



## Nutrition

Recipes generated by ByteBites provide detailed nutritional facts to users.



## Waste

ByteBites generates recipes that optimally utilize ingredients that the user has bought from their grocery store runs.

# Target Audience



College Students



Early Career  
Individuals

- Looking for efficient, nutritious ways to prep meals
- Looking to optimally utilize ingredients to save costs
- High acceptance for AI-based applications





# 02

Unique  
Value  
Proposition

# Our Uniqueness

01

## Automated Ingredient Recognition

Use OCR model to identify ingredients from receipt

02

## Personalized Meal Planning

Dietary restrictions, time constraints & meal types

03

## Health and Wellness integration

Monitor nutrients intake and provide insights on user's diet

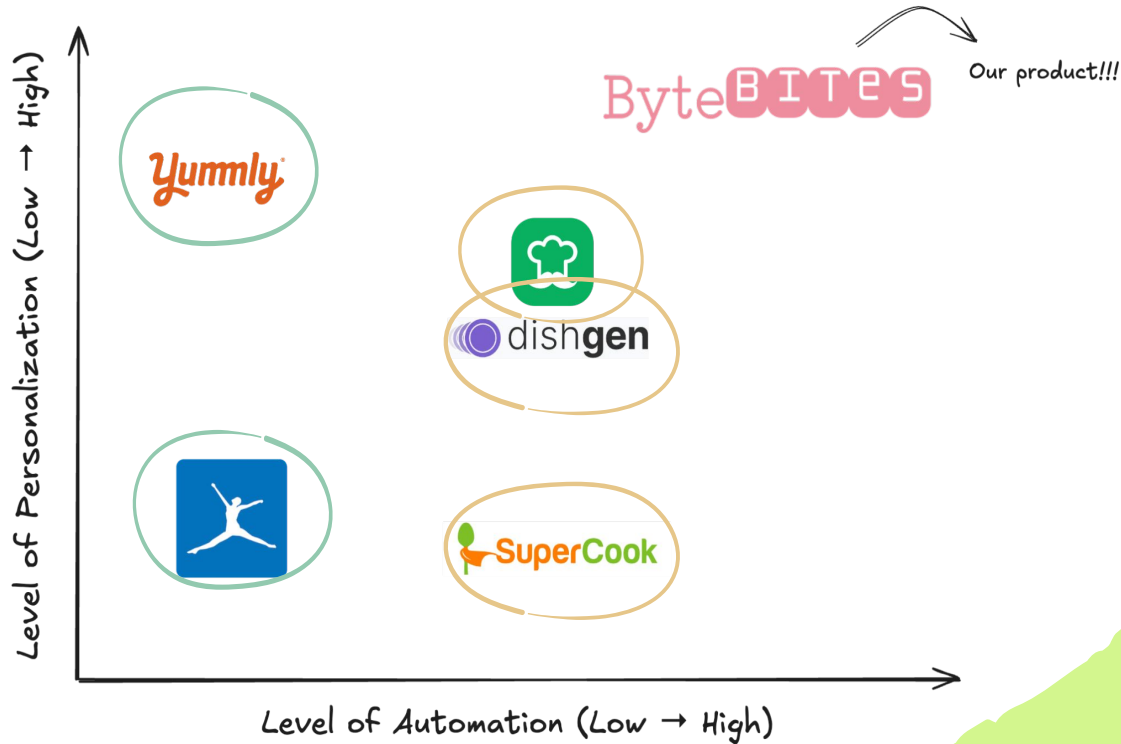
04

## User-Driven Recipe Refinement

Incorporate user ratings with RLHF to improve recipe recommendation



# Competitive Position



03



Bytebites Demo



# O4

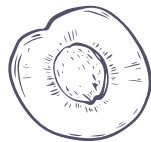
## Scalability and Efficiency

# Model Optimization & Scalability



## Data

We use recipe data from food.com containing **180K recipes** and **700K reviews**, reflecting 18 years of user interactions and uploads.



## Model

We finetune **facebook-opt-125m** model on the recipe dataset and we plan to use the **Llama3-8B** model in our final application.

**Fine-tuning**



Task specific

**PEFT  
(LoRA)**



Efficient Training

**RLHF**

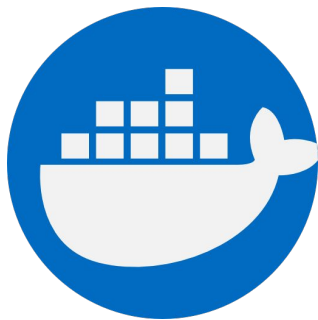


Tailored for user



Allows automatic scaling to accommodate different numbers of users and computing needs in the future.

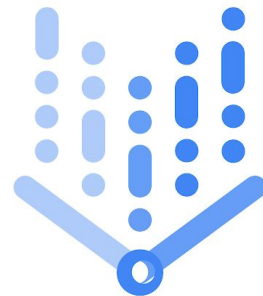
# Infrastructure Considerations



We package applications and their dependencies into containers, ensuring consistent environments across development, testing, and production.

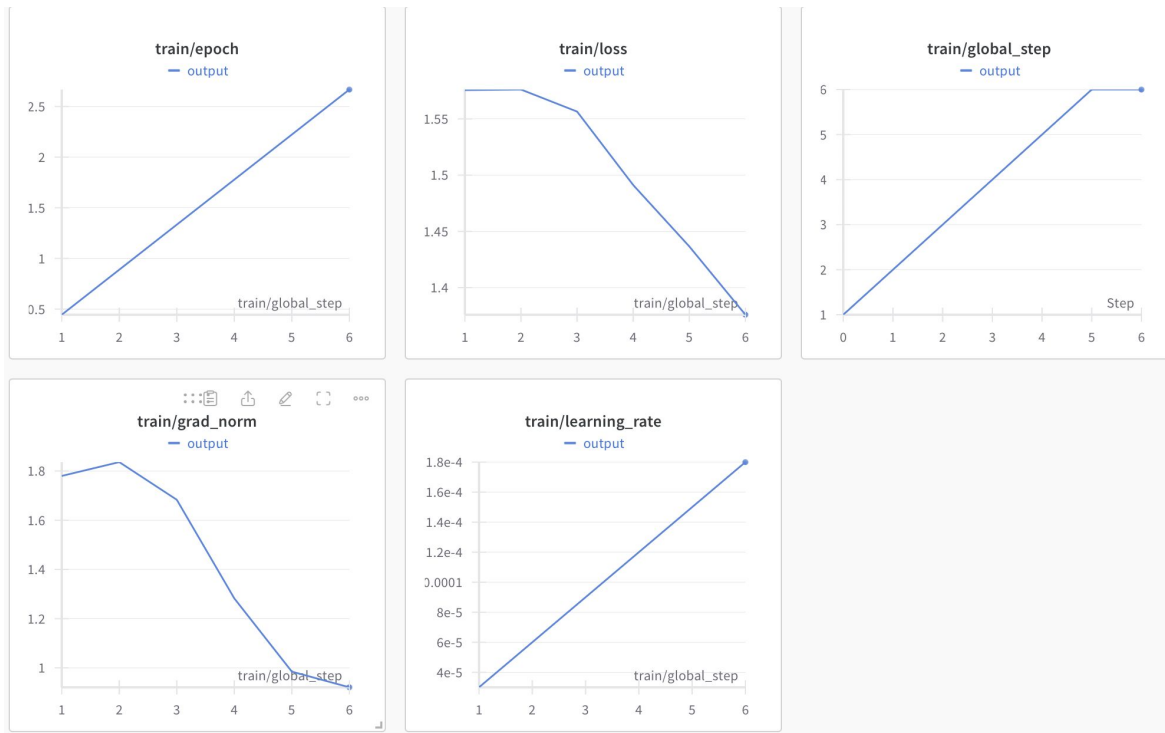
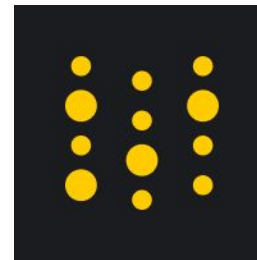


We use GCP to support various aspects of our application, from data storage to running ML algorithms. GCP ensures high availability and low latency for our use cases.



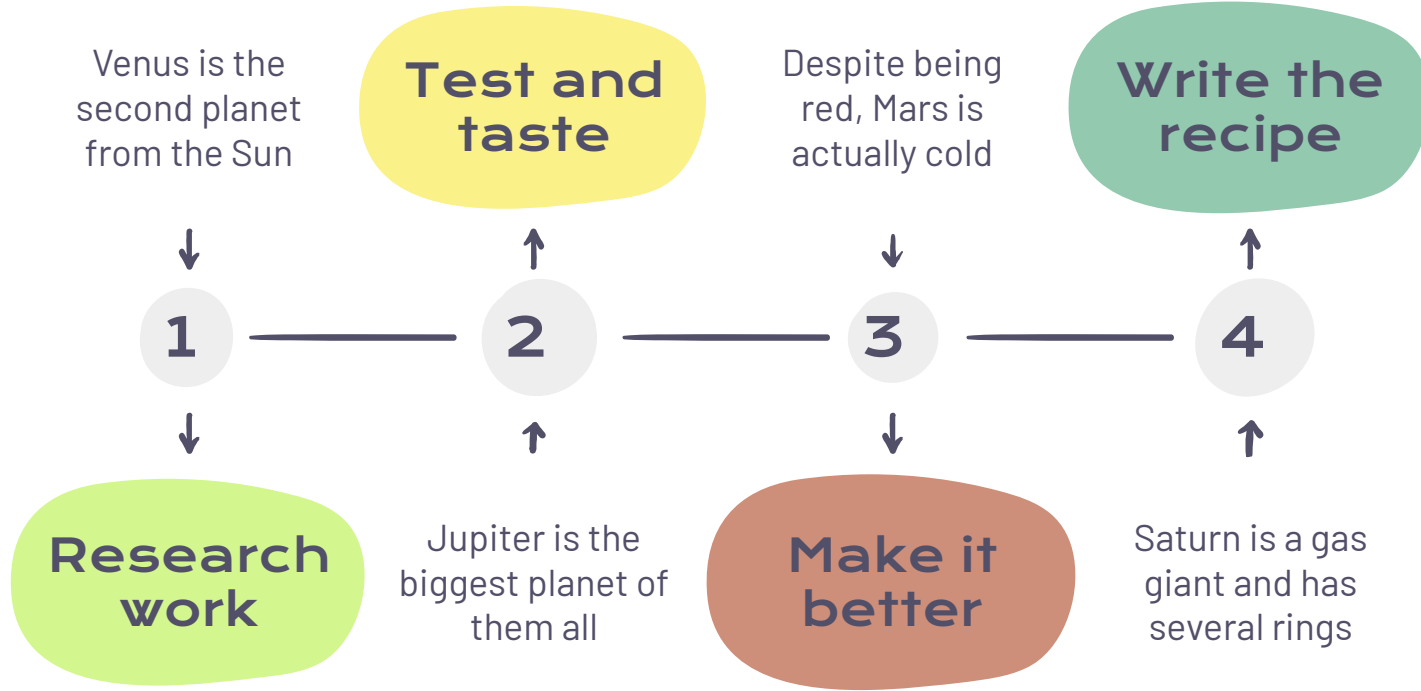
We use Vertex AI for building, deploying and managing our ML models. Vertex AI helps us handle large datasets and complex model training efficiently, as well as offering pipelines to efficiently manage our ML workflow.

# Performance Monitoring





# HOW TO DEVELOP RECIPES



# Technical Scalability

Discuss how your application can scale to meet growing demands.

1. GCP infrastructure: dynamically adjust our resources
2. architecture including cloud storage and computing solutions - support data-intensive processes like OCR and large language model (LLM) operations
3. Containerized deployment via docker.
4. Vertex AI: automatically scales for real-time ML workloads, ensuring high availability for our users



# Performance Optimization

Explain any optimizations implemented for efficiency (e.g., fine-tuning, infrastructure choices).

To reduce training costs, we select a medium-sized ML model as our base model. For optimized performance, we have fine-tuned the language model to specialize in ecipe generation. We use PEFT (LoRA) to optimize for efficient fine-tuning. We save the fine-tuned model weights so that the model can be loaded and directly deployed on Vertex AI for our application. This targeted fine-tuning enhances model accuracy and reduces latency, making interactions faster and more relevant to user needs.

Additionally, the application uses RAG (Retrieval-Augmented Generation) to handle complex queries and provide highly contextualized responses, significantly improving efficiency in generating personalized meal plans. We're also implementing caching mechanisms for frequently requested data and pre-computing certain steps in the recipe design pipeline to minimize runtime and improve response times.



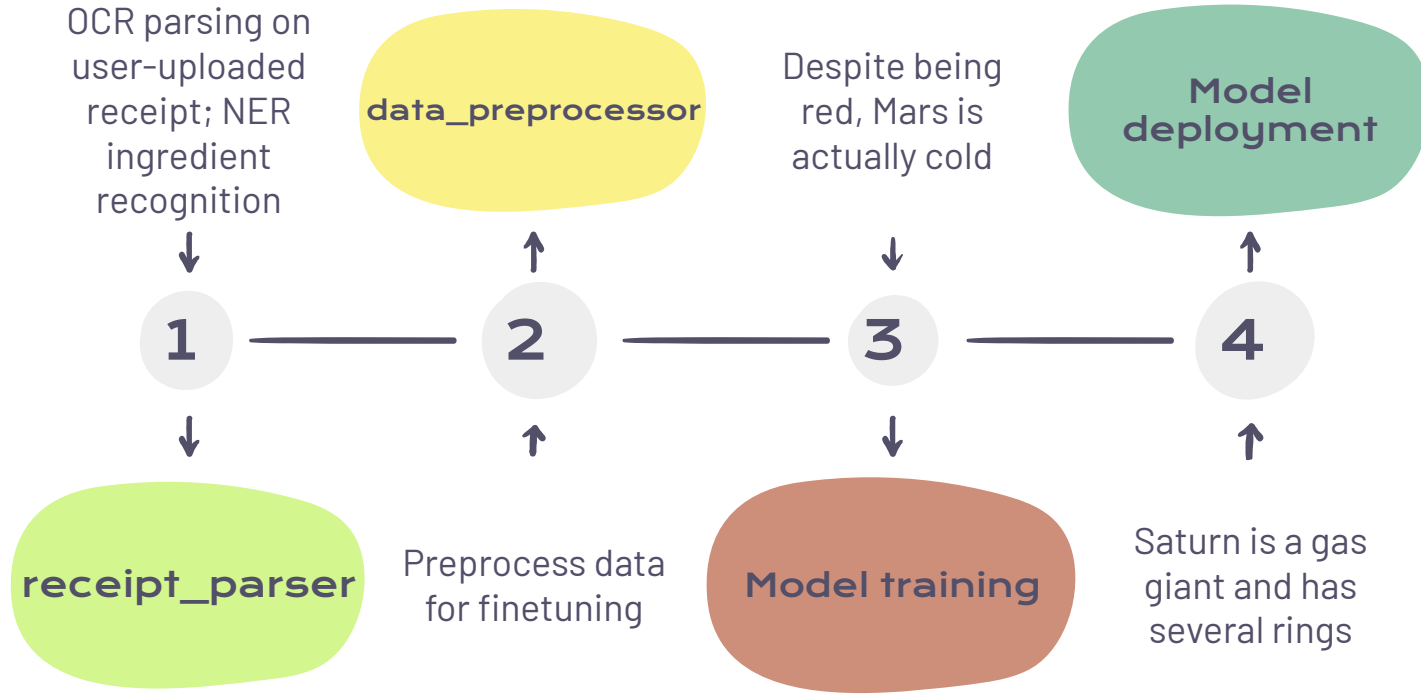
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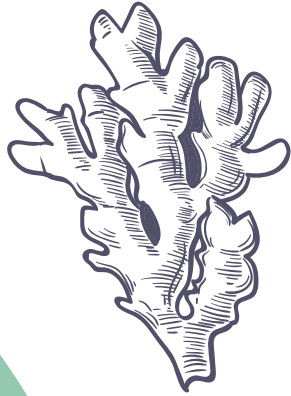
We will be using GCP services for robust cloud computing, storage, and ML model hosting.

- GCP Cloud Storage for secure data handling and version control
- Vertex AI for streamlined machine learning deployment, and Vertex AI Pipelines for efficient ML workflow management
- Docker for containerization, ensuring consistent and rapid deployment across environments



# ByteBites pipeline





04

## Future Development & Growth Potential

05

Future Development  
& Growth Potential



# Future Development Roadmap

## Personalization

Improve recipe suggestions based on individual tastes, dietary restrictions, and past behavior

## Community

Foster a community of cooking enthusiasts and encourage social interaction.

## Integration

Seamless interaction between the app and smart kitchen appliances.

## FAMILY

Saturn is a gas giant and has several rings



# Future Development Roadmap

## Personalization

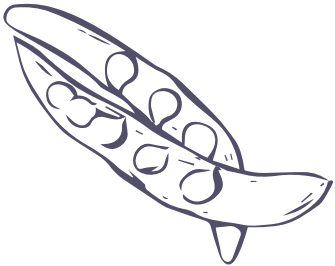
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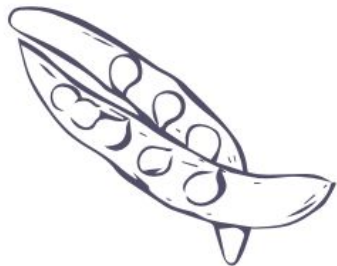
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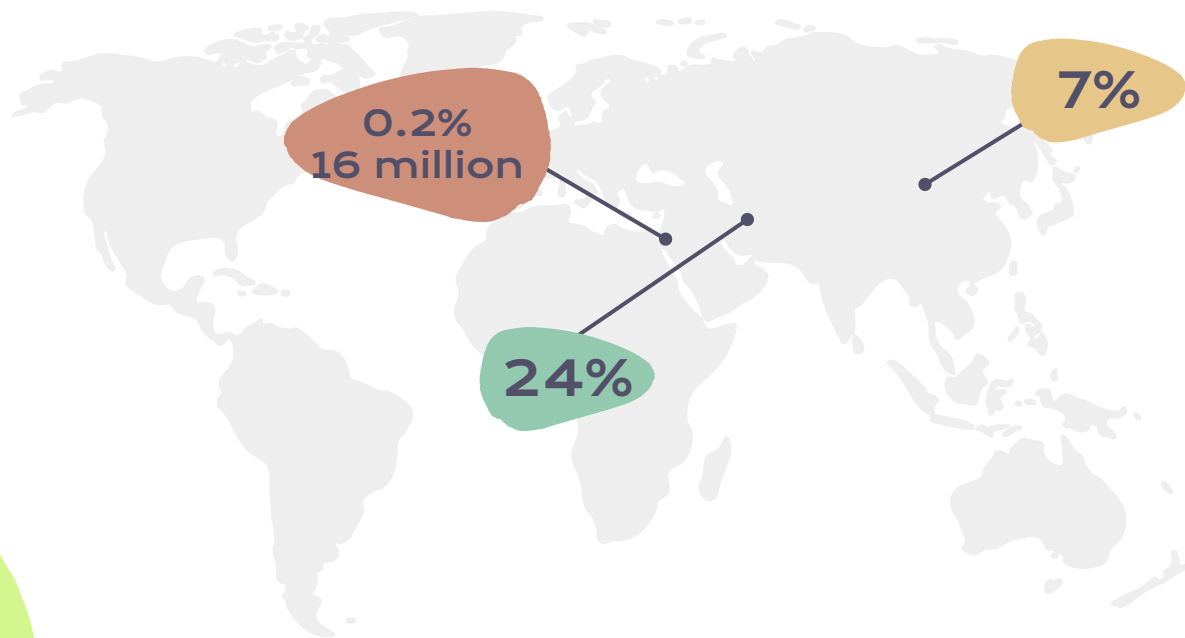
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# Expanding Globally Through Localization

Objective: To attract international users by tailoring the app's content to various languages and regional culinary preferences.



## Islam

Halal food: no alcohol, cblood, pork

## Buddhism

Vegetarianism

## Judaism

Kosher food: no port and shellfish

# Retail Partnership

Objective: Integrate with grocery retailers to enable direct ordering from the app, making shopping seamless and convenient.





# THANKS

DO YOU HAVE ANY QUESTIONS?

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