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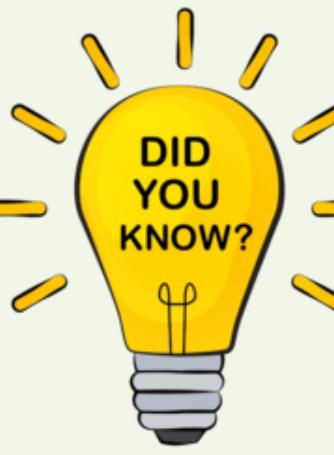
# TRUST YOUR GUT:



*Personalized Nutrition Powered by Your Biology*

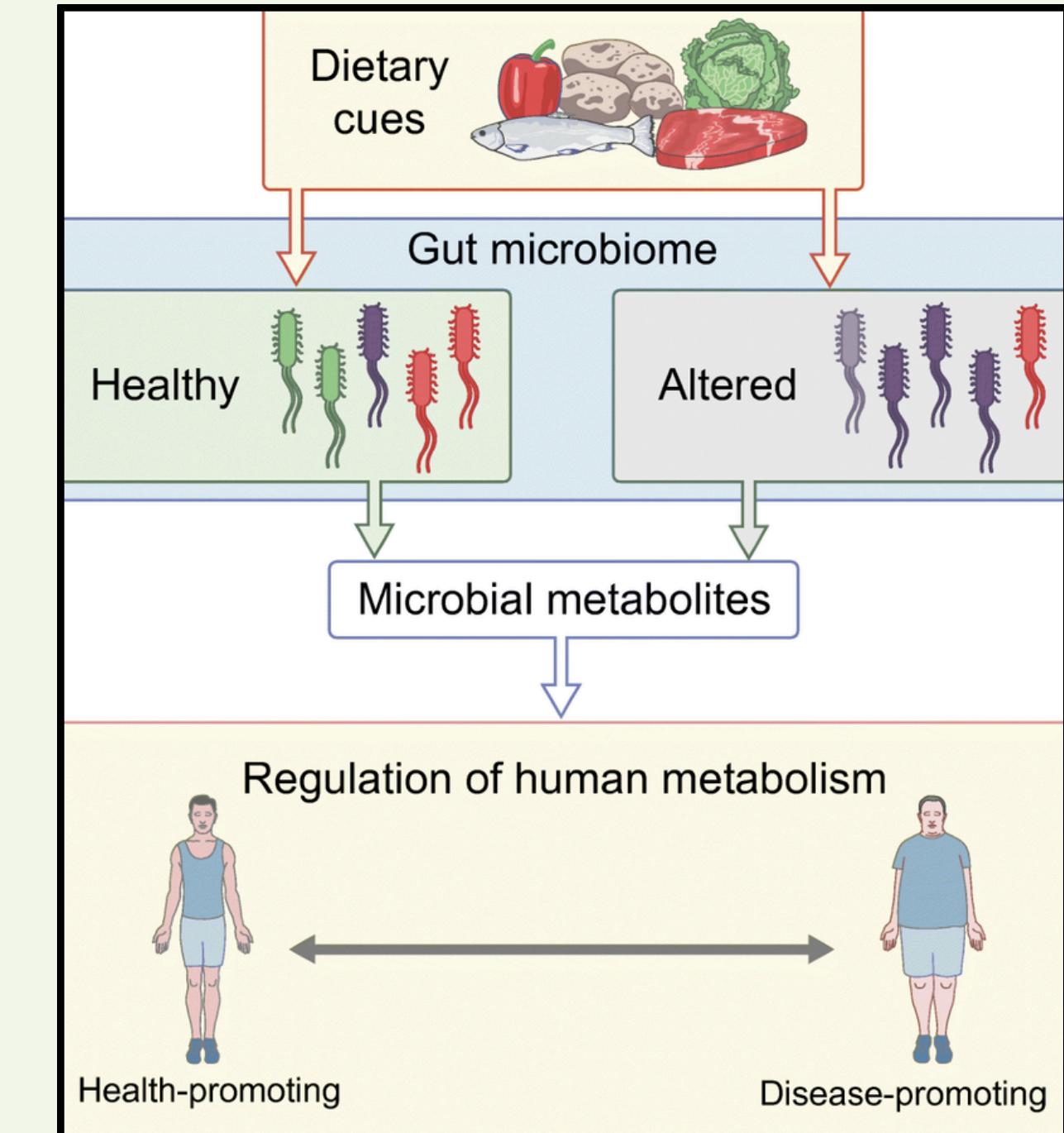
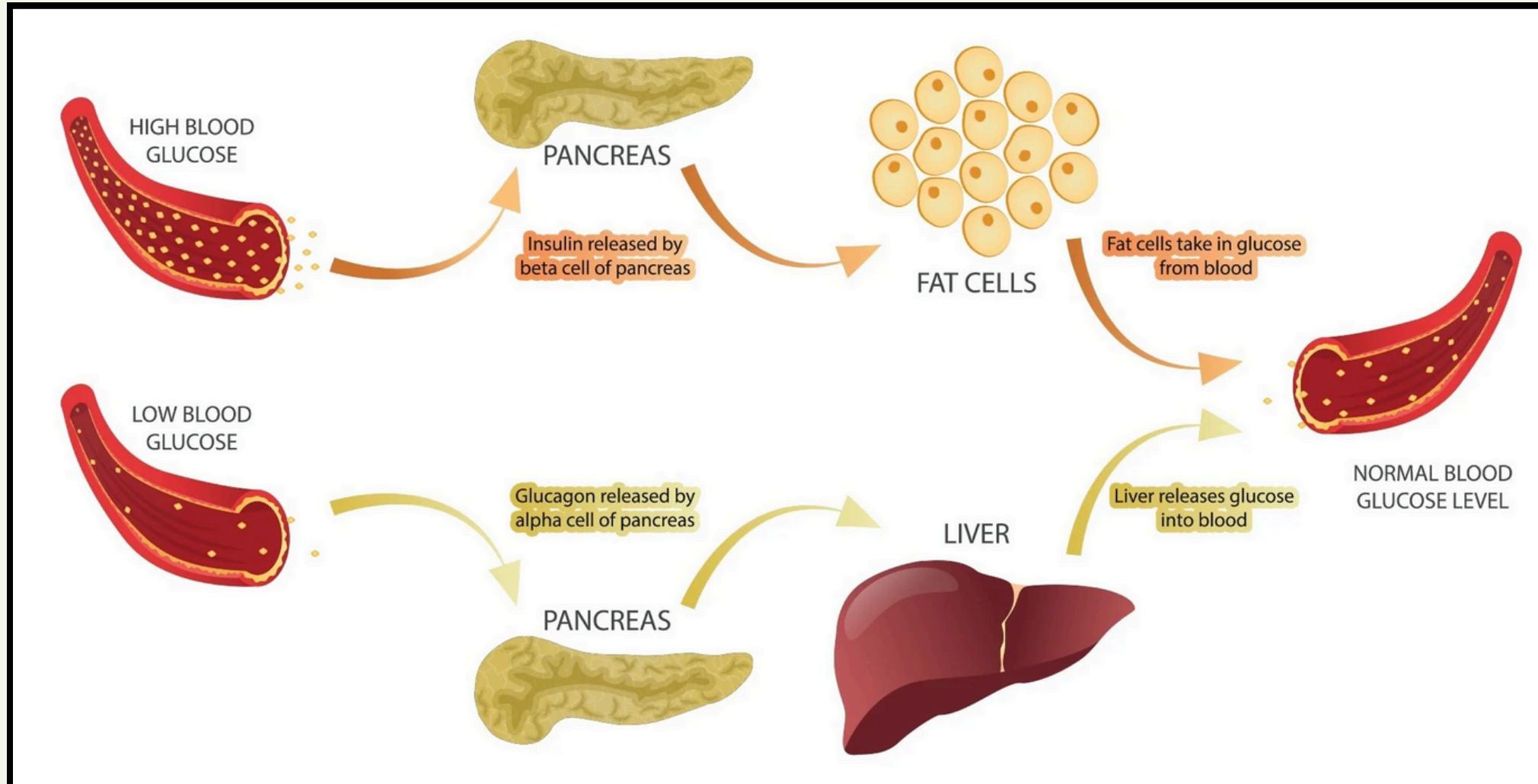
By Joudy Sabbagh, Ahmad el Jazaerli, Hamza Atout





# PERSONALIZED NUTRITION: A BIOLOGICAL NECESSITY

Same Food, Different Body, Different Outcome...



Carb rich meal → Quick rise in blood sugar and high spike  
Balanced meal → Slower rise in blood sugar and low spike

# PRESENTING: NUTRITIONIQ

Goal: Predict your glucose spike and determine how suitable the food is for your body

## 1. MEAL DATA

Evaluates macronutrients, sugar risk, and carb load to understand your body's response.

## 2. MICROBIOME DATA

*integration with EHR*

Learns how your gut bacteria influence digestion, metabolism, and glucose response.

## 3. CLINICAL DATA

*integration with EHR*

Uses fasting glucose, insulin levels, BMI, and lifestyle data to personalize recommendations.

## BUSINESS VALUE

Targets a fast-growing market: valued at US \$14 billion (2024) and forecast to exceed US \$35 billion by 2030 ( $\approx 15\% \text{ CAGR}$ ).

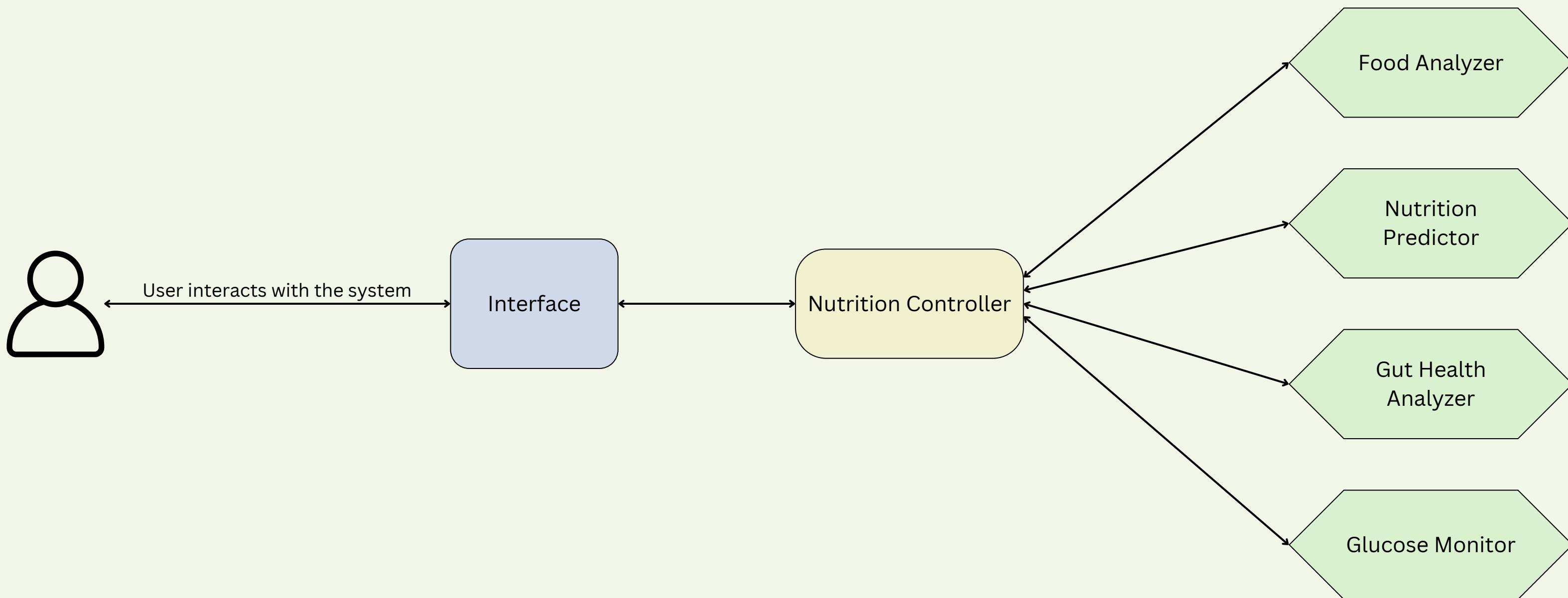
Diabetes absorbs almost \$1 trillion in global healthcare outlays each, and helping people be aware of their glucose spikes has major cost saving benefits.



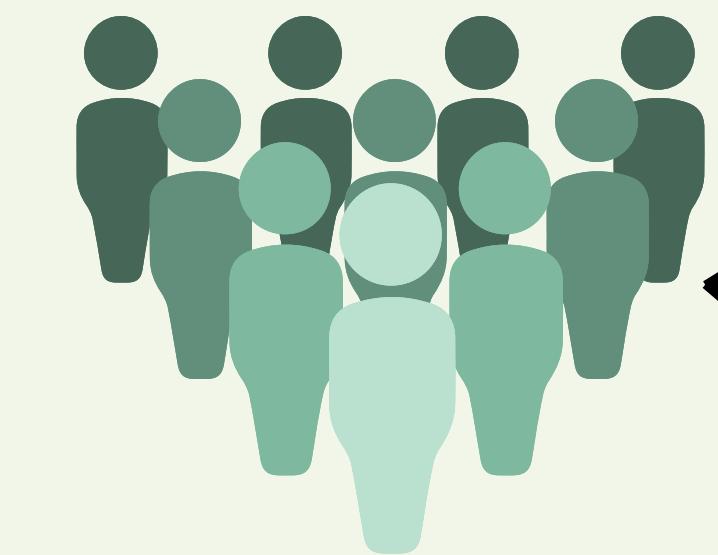
# SYSTEM OUTLINE



# OVERALL PIPELINE



# DATA COLLECTION



Study on 45 participant

**Meal Log**  
*food picture, timestamp*

**Microbiom Data**  
*gut bacteria present or not*

**Clinical Data**  
*age, gender, weight, height, BMI, fasting insulin,  
fasting glucose...*

**Continuous Glucose Monitoring**  
*glucose level recorded every minute*

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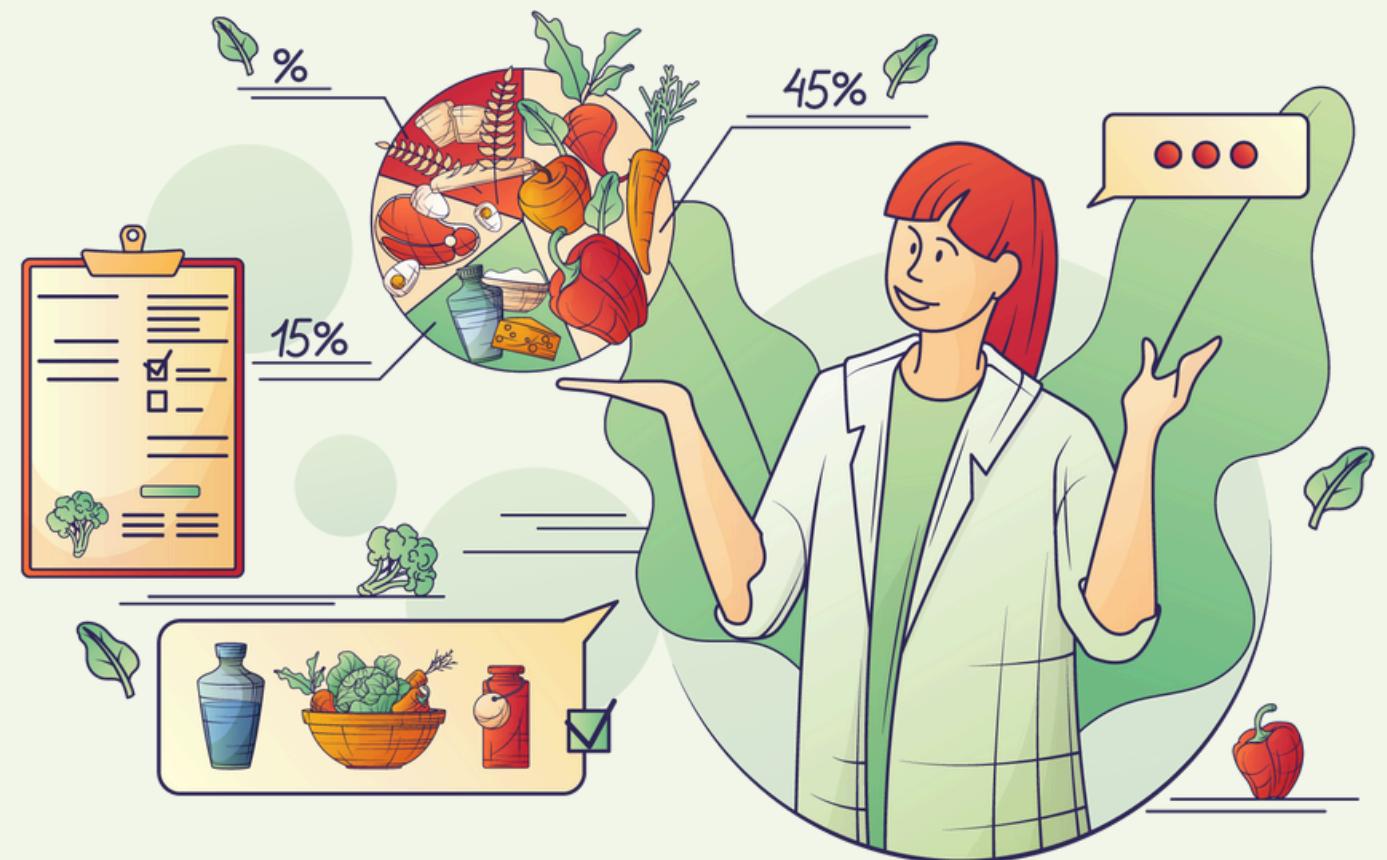
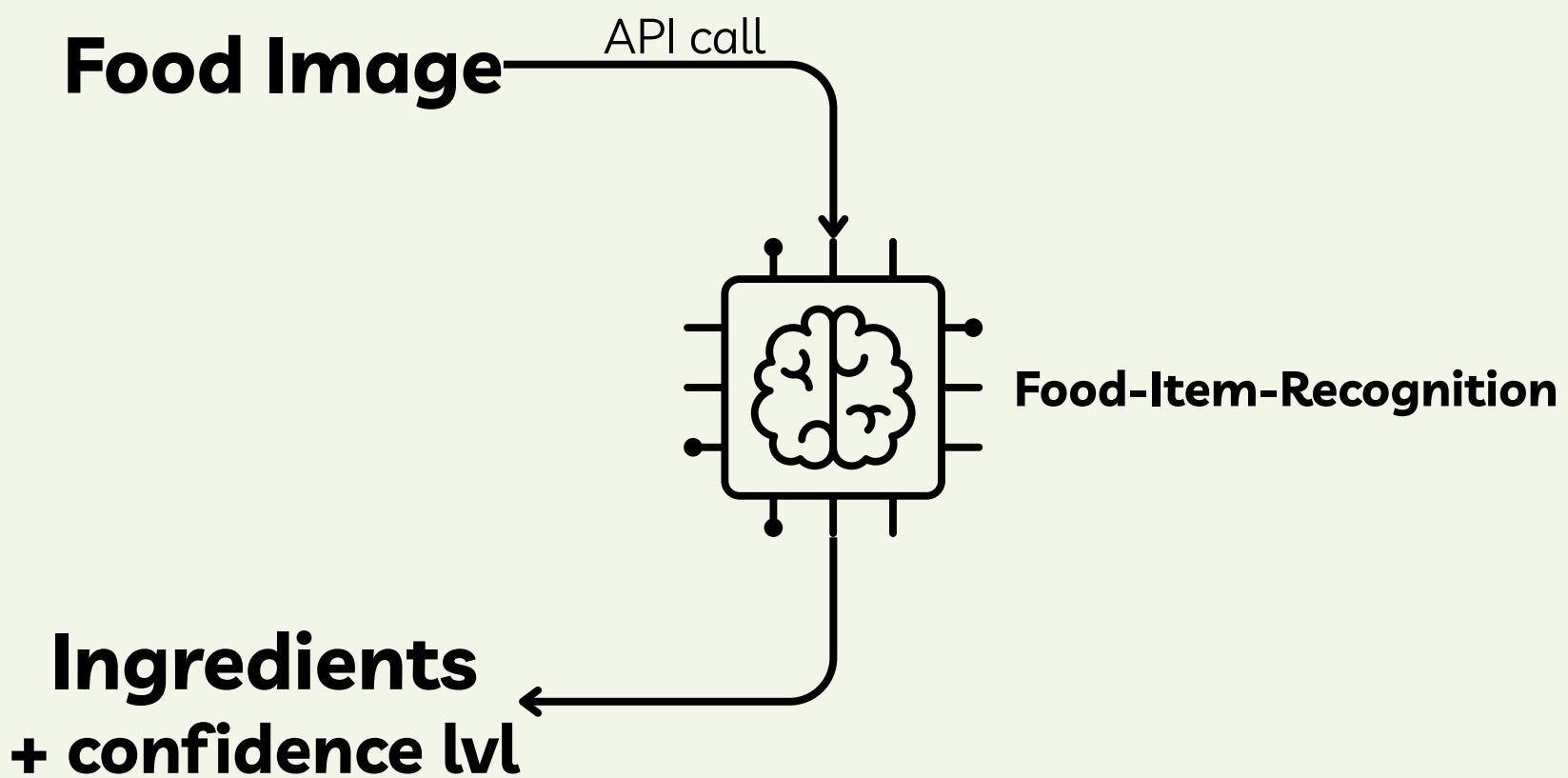


# IEP 1 - FOOD ANALYZER

## Step 1: Retrieve ingredients



**Food-Item-Recognition model**  
Detects and classifies over 500 types of food items from images.

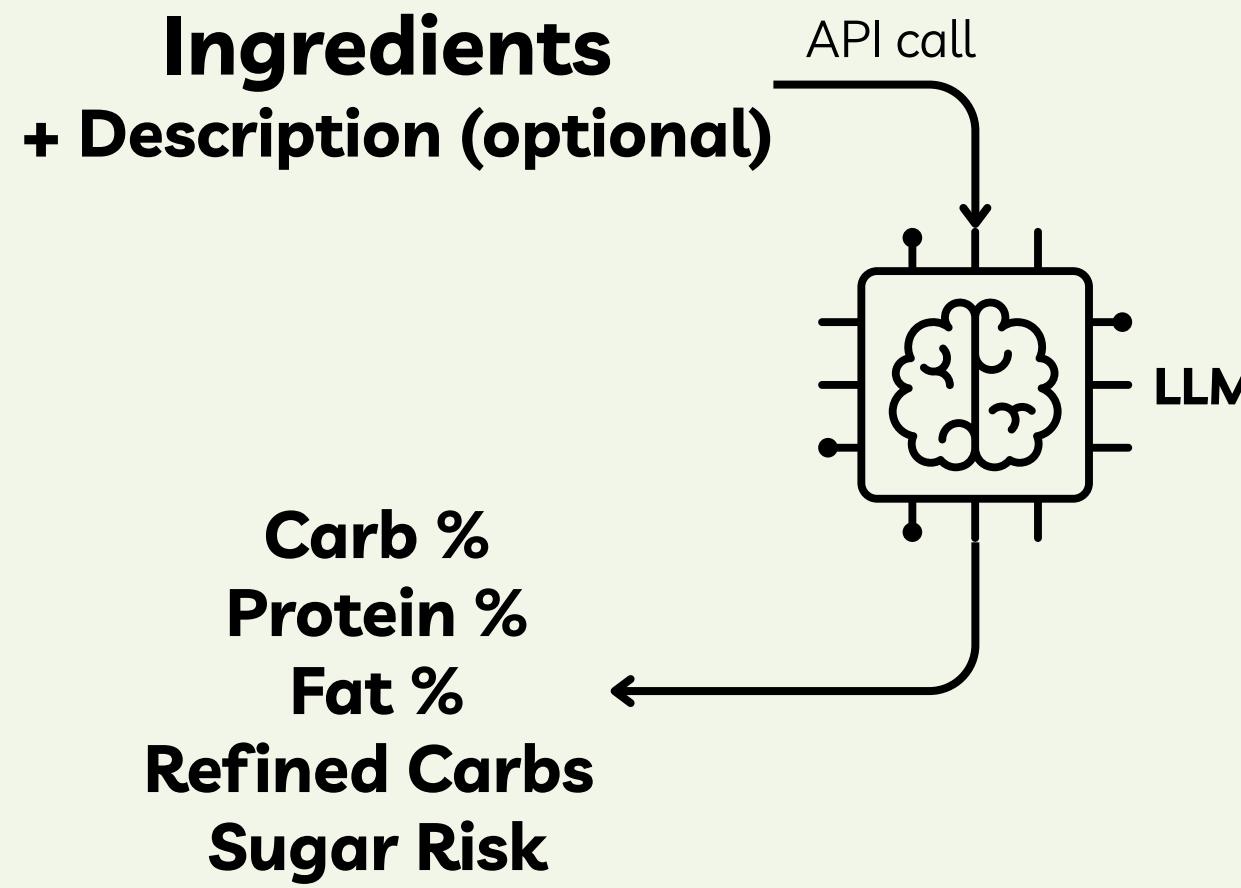


## IEP 2 - NUTRITION PREDICTOR

### Step 2: Predict Nutritional Value



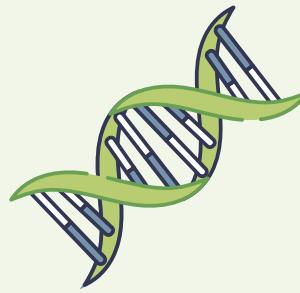
# ChatGPT



### Large Language Model

Understand complex food descriptions and context, using reasoning to infer nutritional values from natural language inputs.





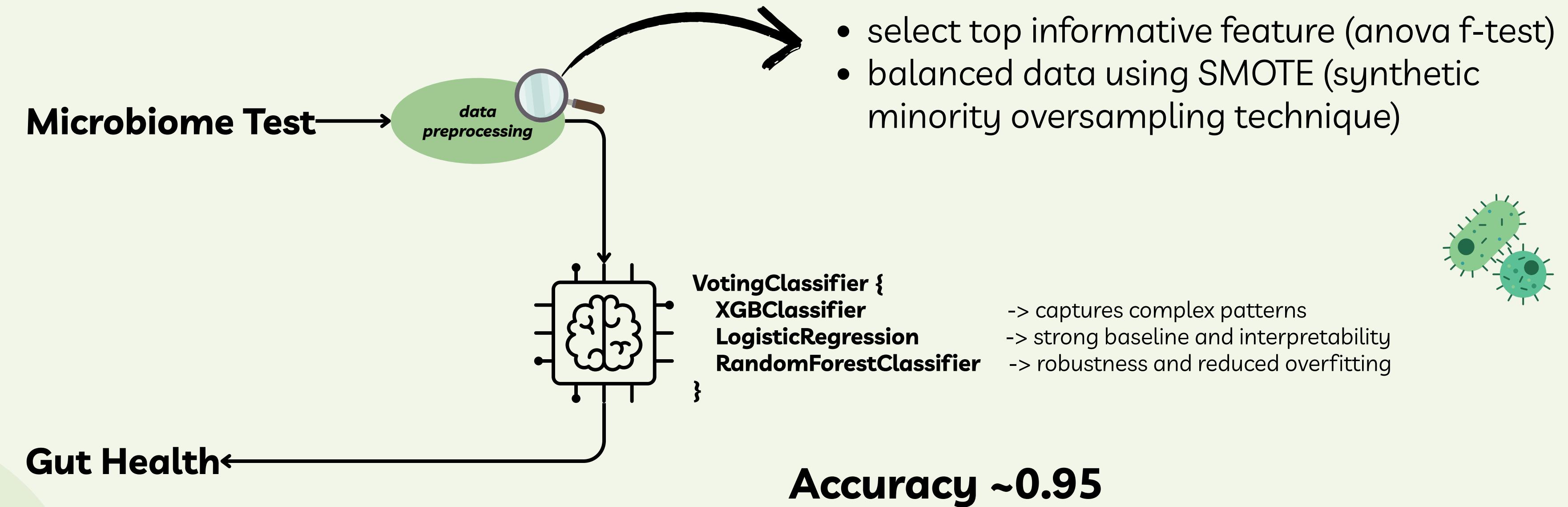
## IEP 3 - GUT HEALTH PREDICTOR

### Predicting gut health from microbiom



*always good to know*

Microbiom is more than 1900 Bacteria !



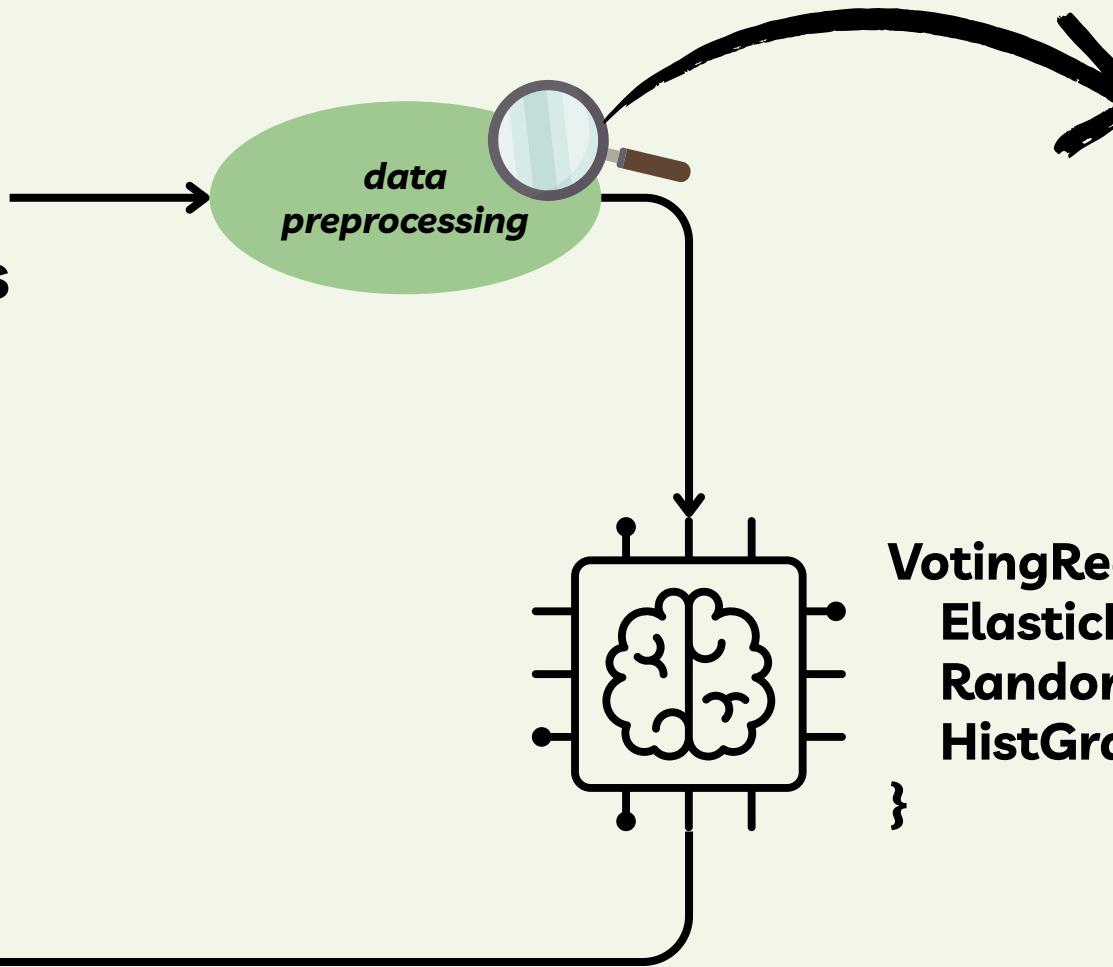
# IEP 4 - GLUCOSE PREDICTOR

## Predict the glucose spike given your biology



Need to understand the link between microbiome and glucose spike...

**Microbiome Test  
+ Clinical data  
+ Macronutriments**

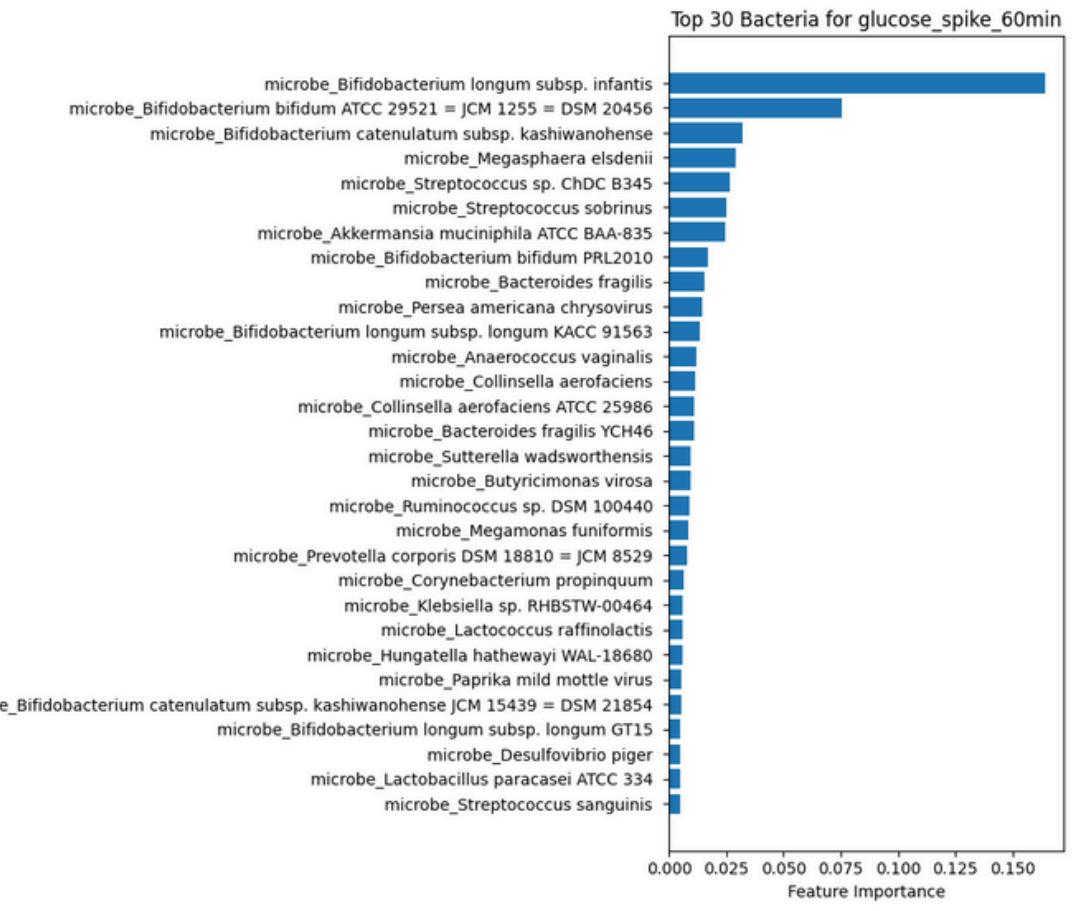


**VotingRegressor {  
ElasticNet  
RandomForestRegressor  
HistGradientBoostingRegressor  
}**

- > handles multicollinearity and regularization
- > robustness and reduced overfitting
- > captures complex patterns efficiently

**Glucose Spike**

**Maximize accuracy** → find optimal parameters



*How much of the variation in the target can my model explain?*

# MLFLOW

## Finding the best parameters

VotingRegressor\_v3

Overview	Model metrics	System metrics	Traces	Artifacts
Description	No description			
Details				
Created at	04/23/2025, 01:26:59 PM			
Created by	joudy			
Experiment ID	0			
Status	Finished			
Run ID	3061fa3f5c3f4864a8a3218a41c919c9			
Duration	13.4s			
Datasets used	—			
Tags	Add tags			
Source	model.py	57fb78d		
Logged models	sklearn			
Registered models	—			
Registered prompts	—			

Parameters (9)

Parameter	Value
enet_alpha	0.03
enet_l1_ratio	0.85
hgb_lr	0.02
hgb_max_depth	6
hgb_max_iter	500
rf_estimators	300
rf_max_depth	12
rf_min_samples_leaf	4
version	v3

Metrics (2)

Metric	Value
r2	0.3119280571212346
rmse	28.034905731173616

Default ⓘ Provide Feedback Add Description

Runs Evaluation Experimental Traces

Time created State: Active Datasets Sort: Created Columns

Run Name Created Dataset Duration Source Models

VotingRegressor\_v3 2 minutes ago - 13.4s model.py glucose\_model v1

VotingRegressor\_v2 2 minutes ago - 9.7s model.py sklearn

VotingRegressor\_v1 2 minutes ago - 13.9s model.py sklearn

Metrics (2)

Metric	Value
r2	0.2714044039107273
rmse	28.848646790119794

Metric Value

1 r2 0.2714044039107273

2 rmse 28.848646790119794

Metrics (2)

Metric	Value
r2	0.3119280571212346
rmse	28.034905731173616

Metric Value

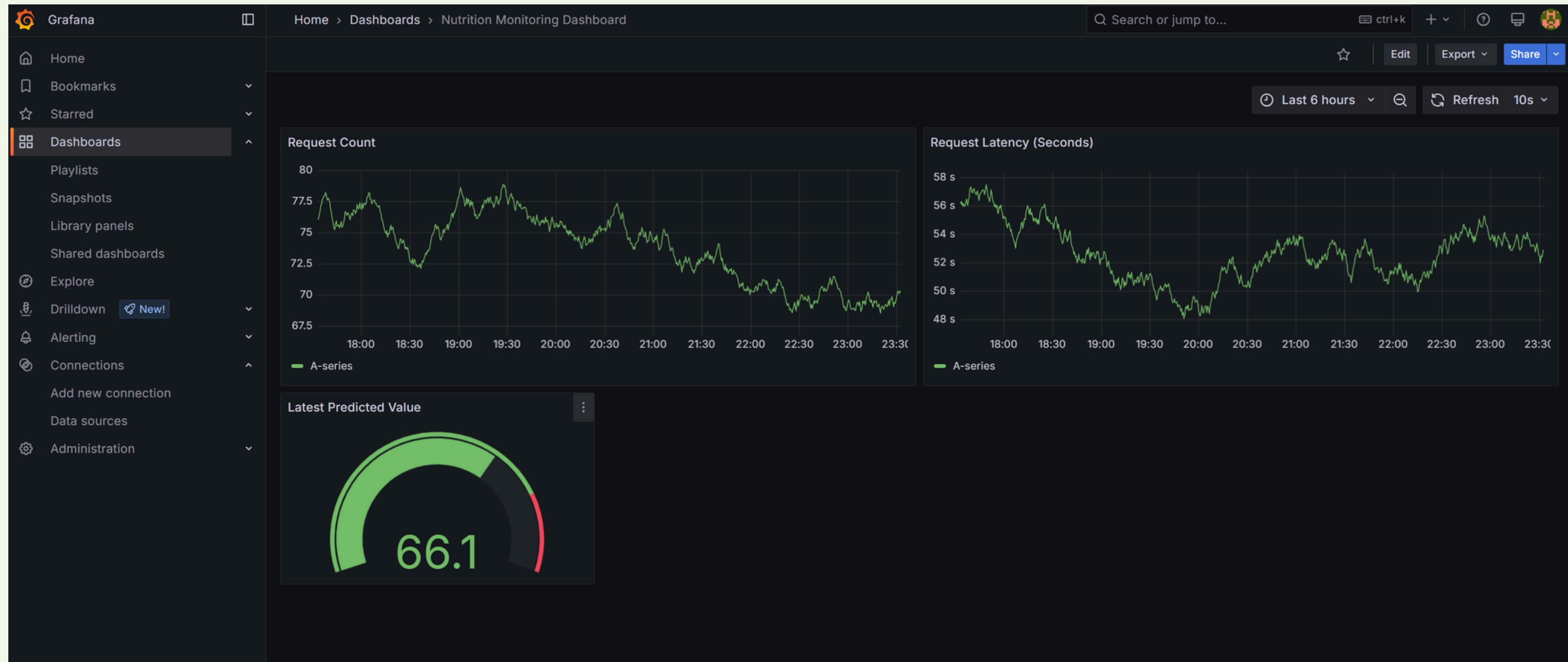
1 r2 0.2613733999049037

2 rmse 29.04655607738032

Metrics (2)

Metric	Value
r2	0.2613733999049037
rmse	29.04655607738032

# PROMETHEUS AND GRAFANA





# DATA STORAGE USING AWS



Amazon  
S3

We stored our dataset  
on AWS S3



We Created and Managed  
6 docker images

Respecting user priv

Dataset/

Objects Properties

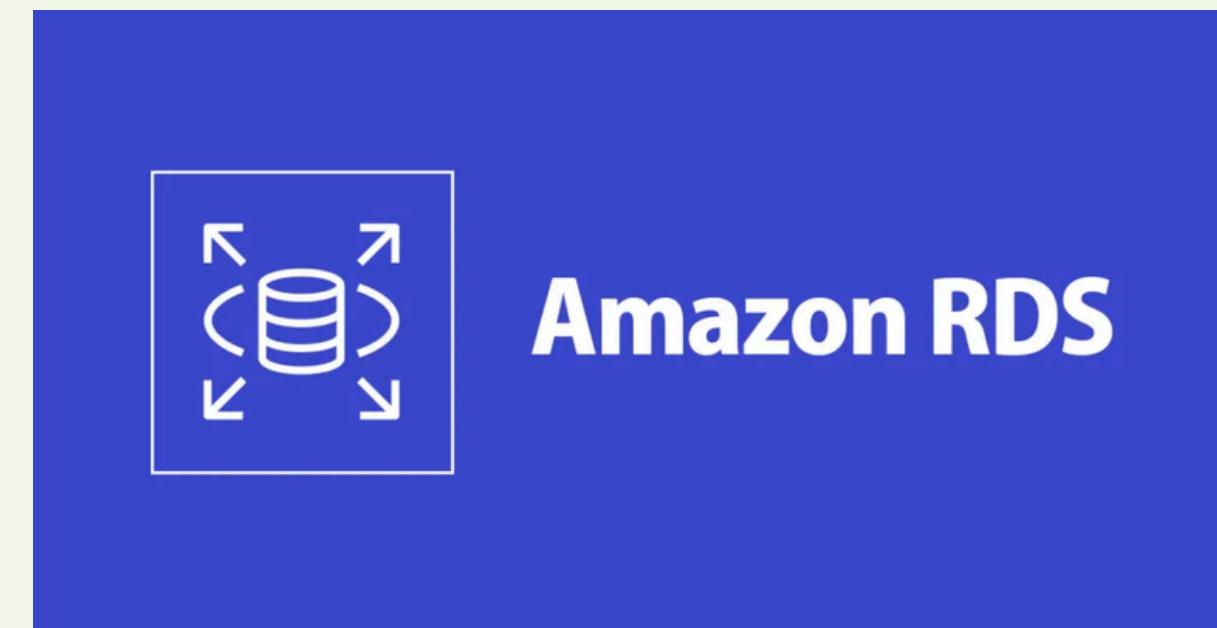
Objects (25)

Copy S3 URI Copy URL Download Open Actions Create folder Upload

Objects are the fundamental entities stored in Amazon S3. You can use [Amazon S3 inventory](#) to get a list of all objects in your bucket. For others to access your objects, you'll need to explicitly grant them permissions. [Learn more](#)

Name	Type	Last modified	Size	Storage class
CGMacros/	Folder	-	-	-
cleaned_clinical_data.csv	csv	April 25, 2025, 00:48:23 (UTC+03:00)	2.3 KB	Standard
cleaned_gut_health.csv	csv	April 25, 2025, 00:48:23 (UTC+03:00)	651.0 B	Standard
cleaned_microbes_and_gut.csv	csv	April 25, 2025, 00:48:24 (UTC+03:00)	221.6 KB	Standard
combined_features_glucose.csv	csv	April 25, 2025, 00:48:25 (UTC+03:00)	98.5 KB	Standard

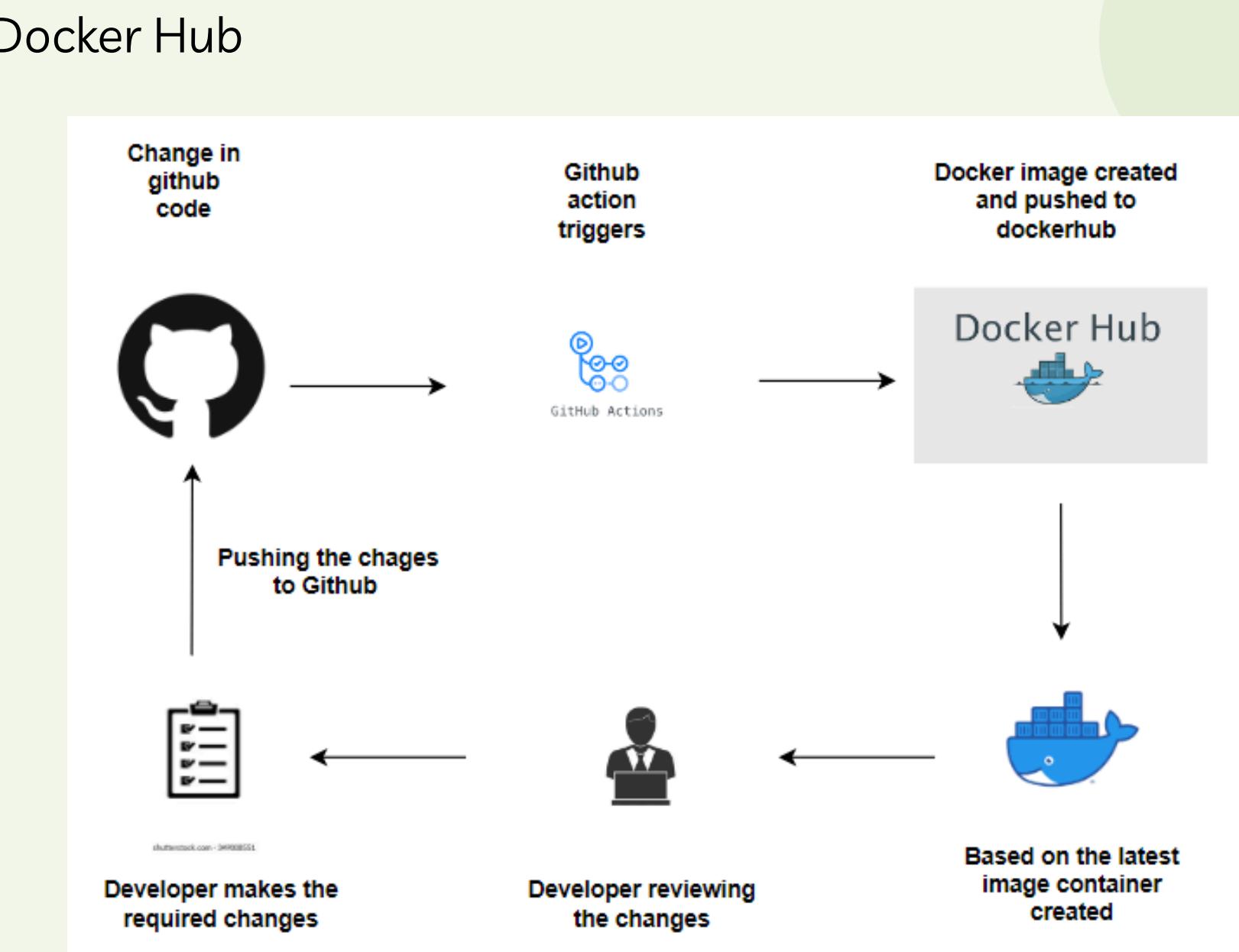
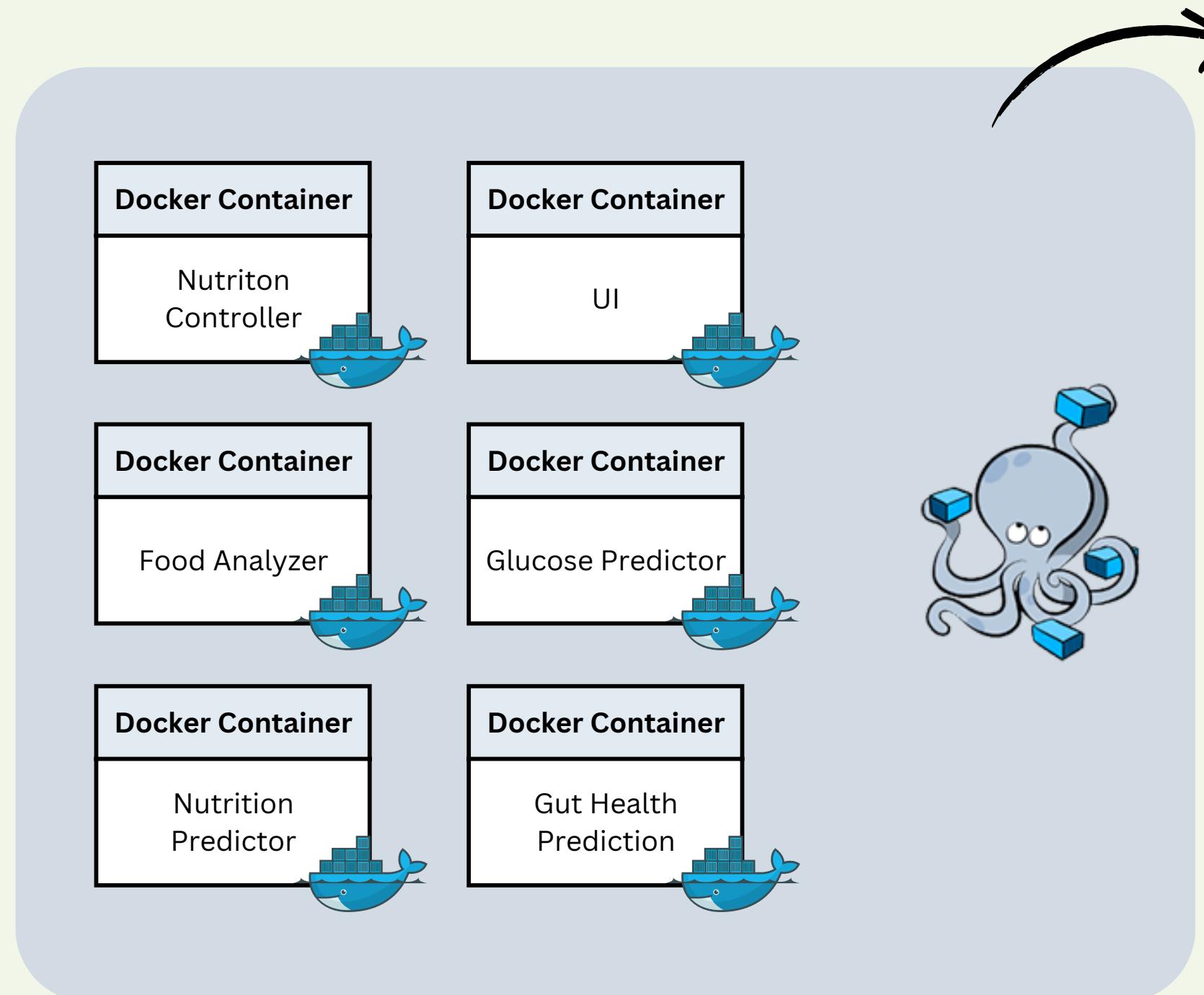
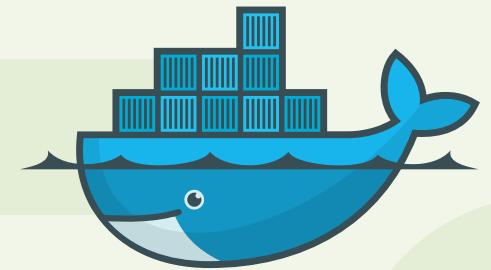
We hosted our database  
on AWS RDS  
(Relational Database Service)



Amazon RDS



# DOCKERIZED APPLICATION | CI-CD



## FUTURE WORK



### Risk Prediction Model

evaluates long-term health risks (e.g., diabetes or metabolic syndrome) based on the user's dietary habits, glucose spikes, and microbiome data.

### Chatbot for Personalized Recommendations

interact with users, providing personalized nutrition meal recommendations and health advices



### Integration with Hospital (EHR)

establish a connection with the Electronic Health Records (EHR) system to automatically gather clinical data and microbiome test results, enabling more accurate and personalized recommendations.



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# ANY QUESTIONS?

Thank you for listening

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