CalculEat

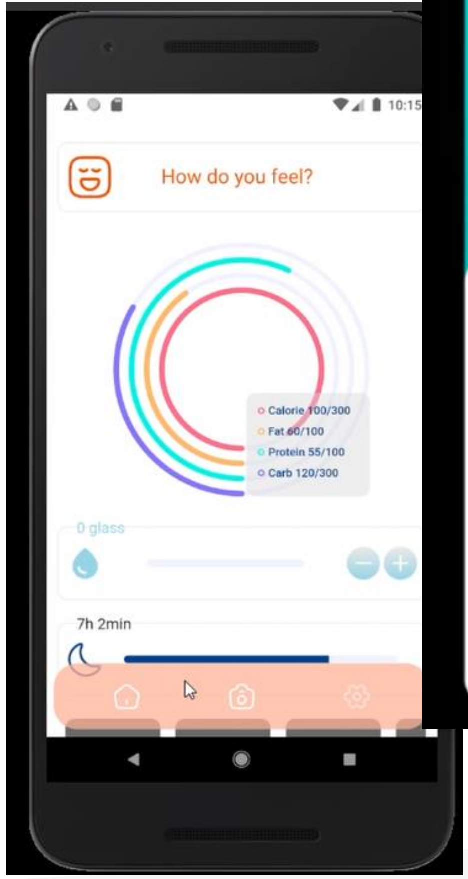
AI Based Health & Fitness App

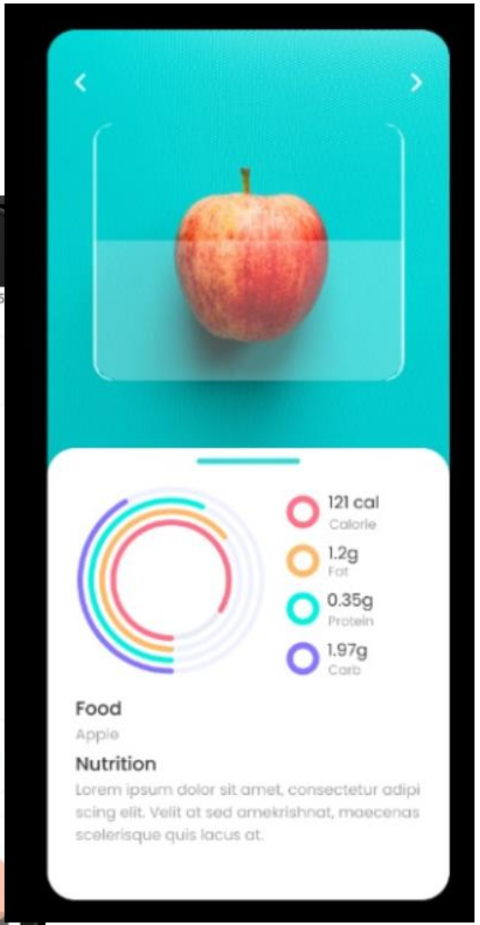
The Idea

Be healthy, track your foods

Project

- AI Based Calorie Calculator
- Easy to track your food & life
- Get consultancy from dieticians (goal)





Lorem ipsum dolor sit amet, consectetur adipi scing elit. Velit at sed amekrishnat, maecenas scelerisque quis lacus at.

Goals

- More reliable AI results,
- Listings of dieticians (for users),
- Listings of standard users (for dieticians),
- Dietician web app dashboard

Back-End

Database, REST API, Troubleshooting
by **Resul Bozburun**

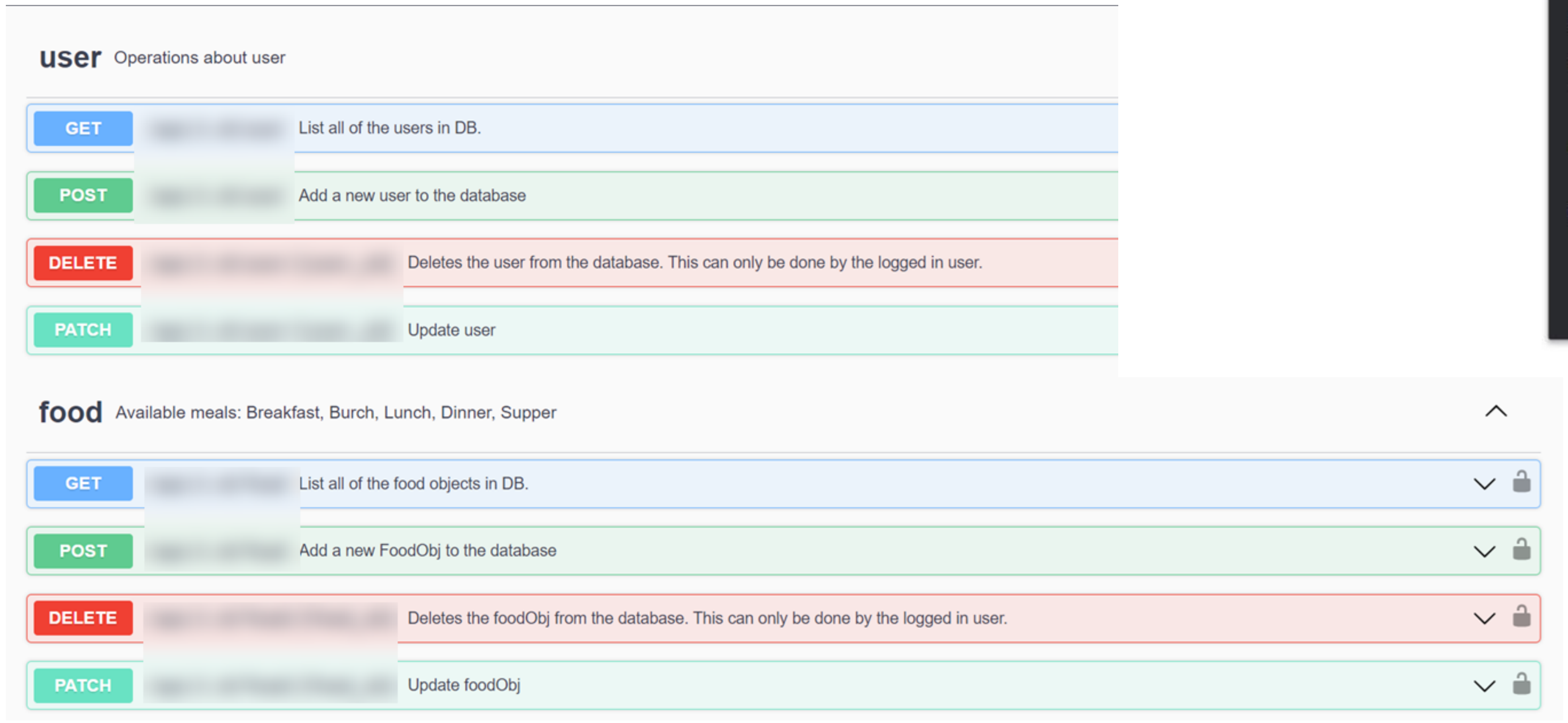
Technology Stack

- Documentation
- Containerization
- REST API

Database & Class Diagram

The application includes more than 7 tables. We’ve used PostgreSQL in database and containerized it via Docker.
The database is relational and includes some complex relations between the tables. (I cannot provide more details due to privacy)

Documentation (Swagger w/HTTP Basic Auth)



user Operations about user

GET List all of the users in DB.

POST Add a new user to the database

DELETE Deletes the user from the database. This can only be done by the logged in user.

PATCH Update user

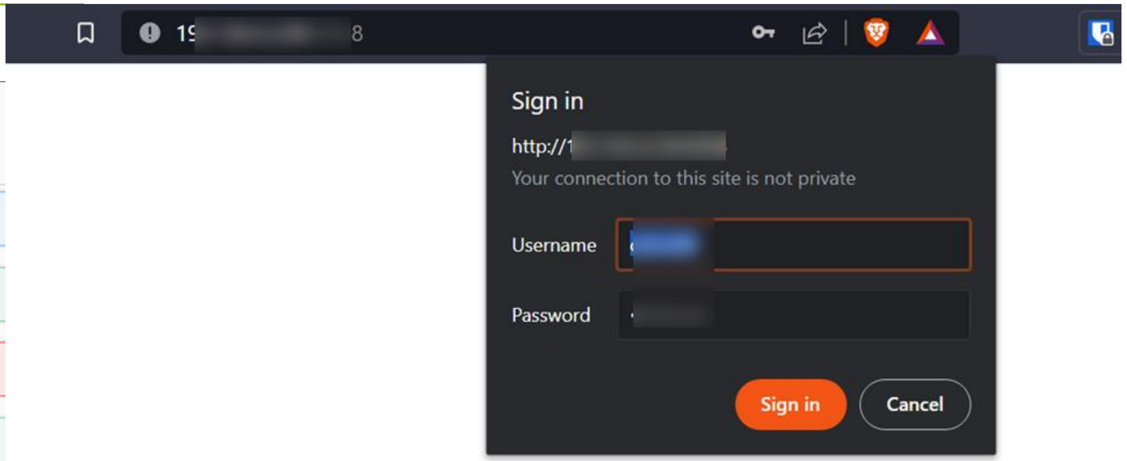
food Available meals: Breakfast, Burch, Lunch, Dinner, Supper

GET List all of the food objects in DB.

POST Add a new FoodObj to the database

DELETE Deletes the foodObj from the database. This can only be done by the logged in user.

PATCH Update foodObj



Sign in

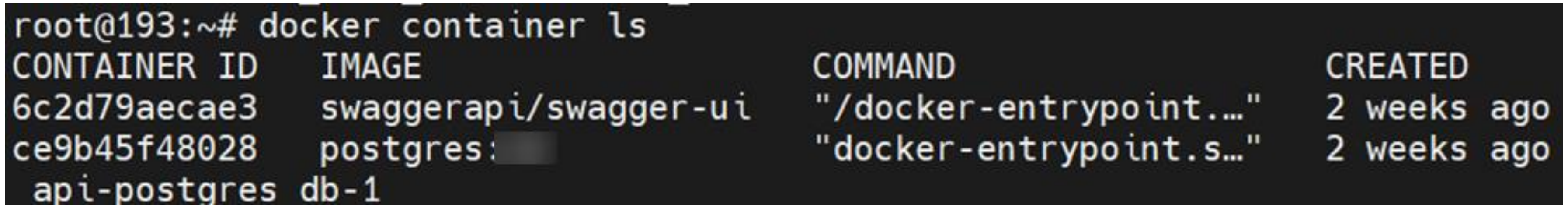
http://1

Your connection to this site is not private

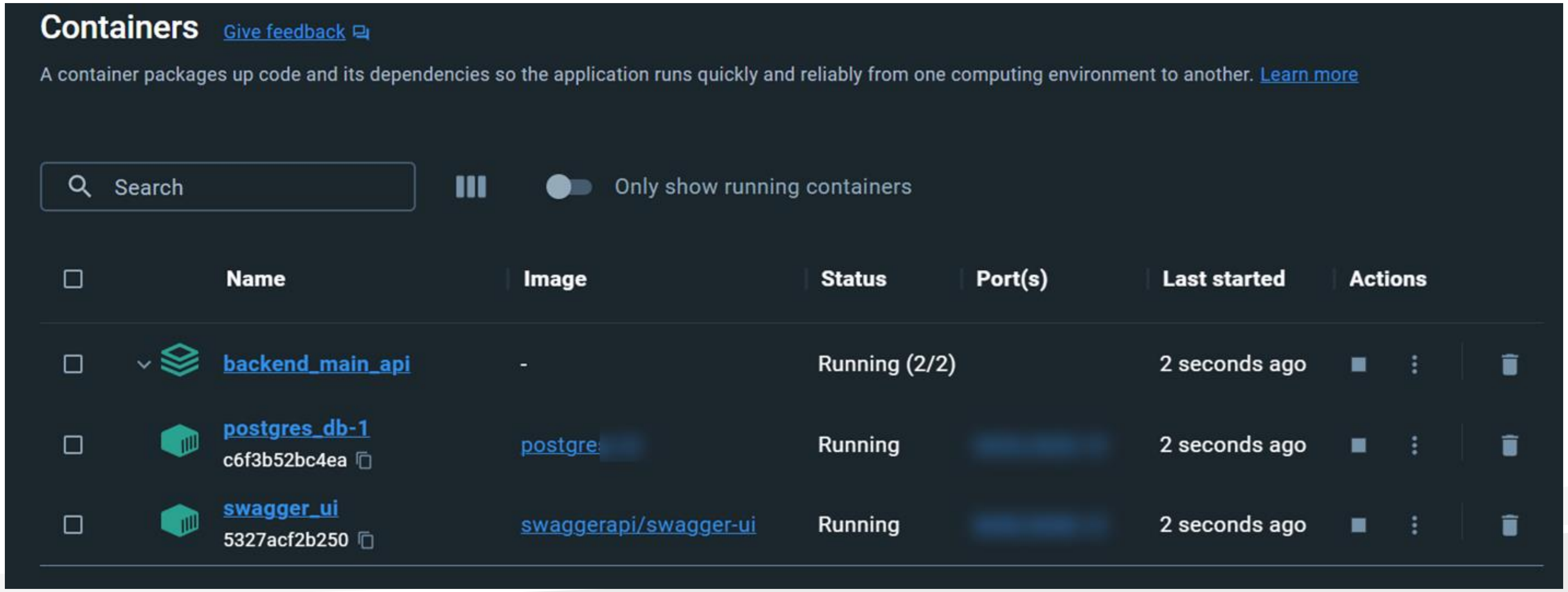
Username

Password

Containerization



```
root@193:~# docker container ls
CONTAINER ID   IMAGE                    COMMAND                  CREATED
6c2d79aecae3   swaggerapi/swagger-ui    "/docker-entrypoint.…"   2 weeks ago
ce9b45f48028   postgres:[redacted]      "docker-entrypoint.s…"   2 weeks ago
 api-postgres db-1
```



Containers Give feedback

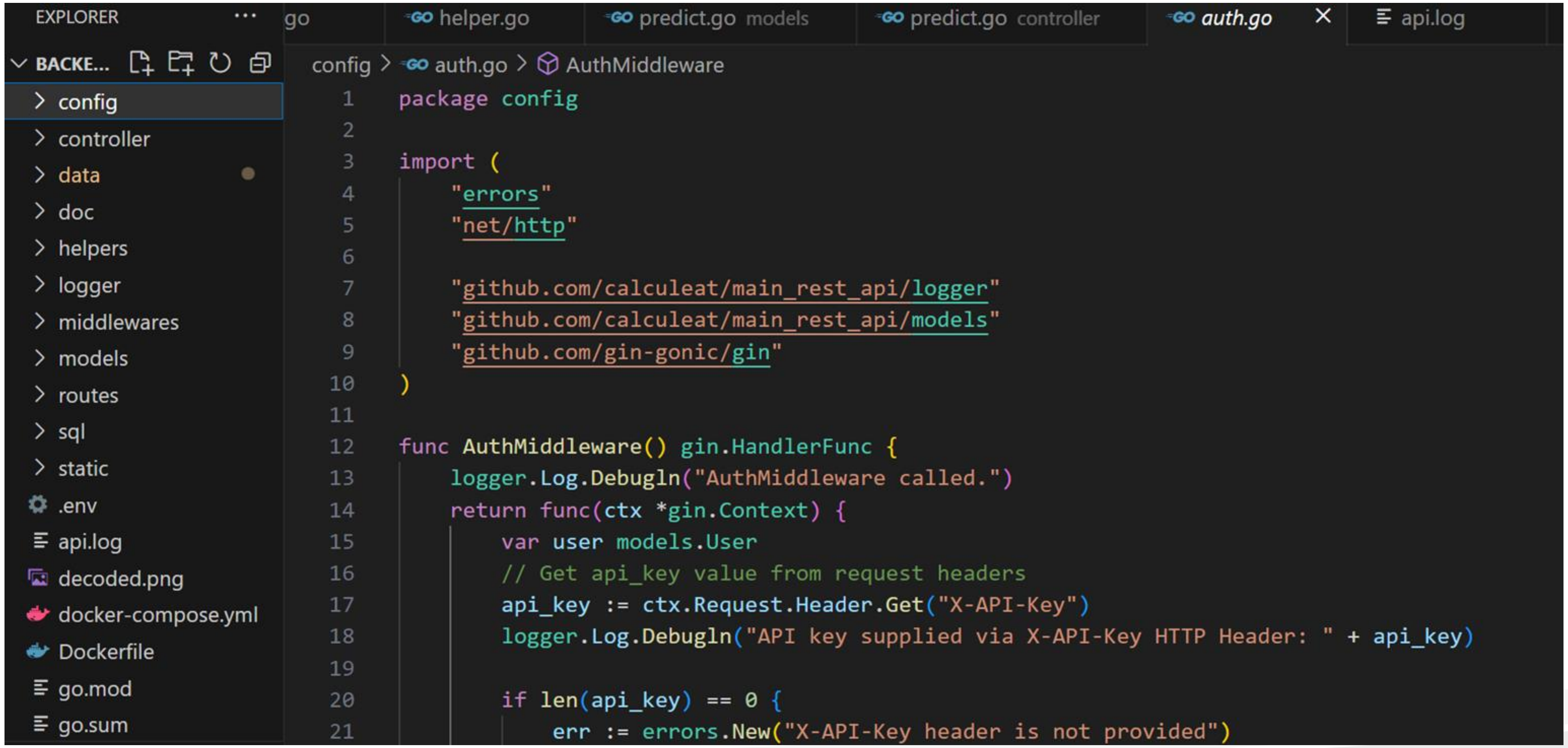
A container packages up code and its dependencies so the application runs quickly and reliably from one computing environment to another. Learn more

Search

Only show running containers

	Name	Image	Status	Port(s)	Last started	Actions
☐	backend_main_api	-	Running (2/2)		2 seconds ago	
☐	postgres_db-1 c6f3b52bc4ea	postgre[redacted]	Running	[redacted]	2 seconds ago	
☐	swagger_ui 5327acf2b250	swaggerapi/swagger-ui	Running	[redacted]	2 seconds ago	

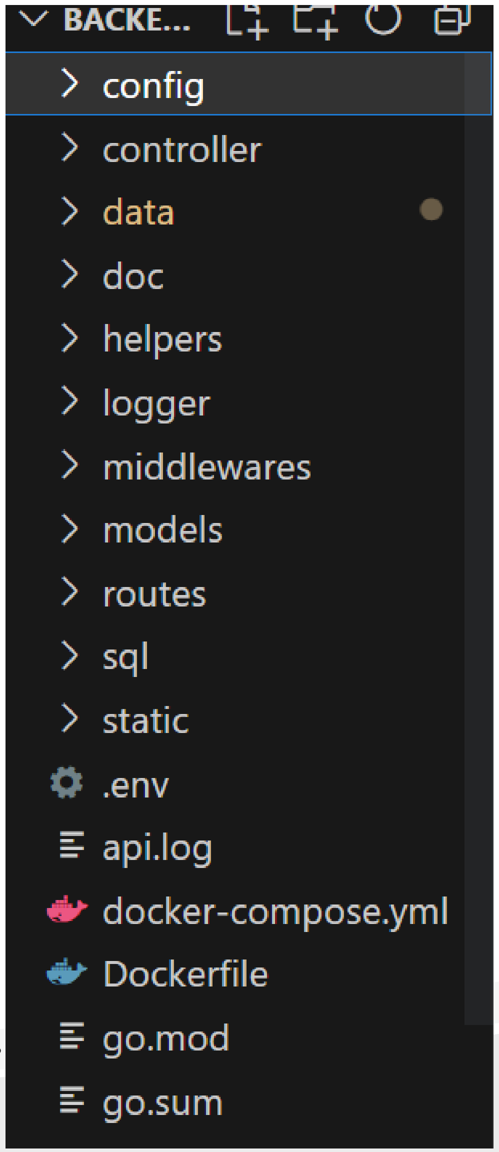
REST API (Golang Gin-Gonic)



```go
package config

import (
	"errors"
	"net/http"

	"github.com/calculeat/main_rest_api/logger"
	"github.com/calculeat/main_rest_api/models"
	"github.com/gin-gonic/gin"
)

func AuthMiddleware() gin.HandlerFunc {
	logger.Log.Debugln("AuthMiddleware called.")
	return func(ctx *gin.Context) {
		var user models.User
		// Get api_key value from request headers
		api_key := ctx.Request.Header.Get("X-API-Key")
		logger.Log.Debugln("API key supplied via X-API-Key HTTP Header: " + api_key)

		if len(api_key) == 0 {
			err := errors.New("X-API-Key header is not provided")
```

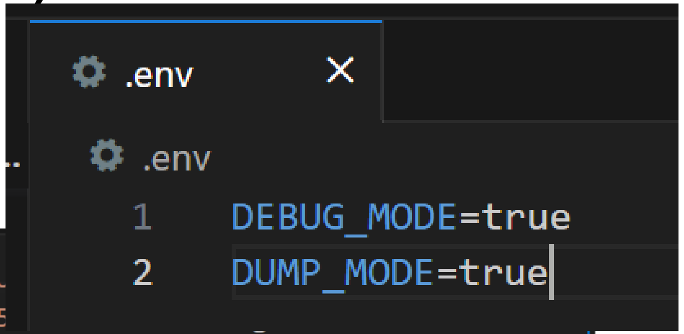
REST API (Packages, Files & Folders)

- **Config**: Implements db connection & authentication
- **Controller**: Implements controller for each model
- **Data**: Database files
- **Doc**: API Documentation & Postman Collection
- **Helpers**: Helper functions for API (that we don’t want to code multiple times)
- **Logger**: Logging package for debug & troubleshoot purpose
- **Middlewares**: Implements middleware functions like logging (auth middleware should be here in the future)
- **Models**: Implements models
- **Routes**: Implements routing rules for endpoints
- **Sql**: .sql scripts to generate and fill database initially
- **.env**: Environment variables
- **Api.log**: Log file for debugging purpose
- **Docker-compose.yml**: Docker container config for API Documentation & DB.
- **Dockerfile**: Implements API dockerization for the future (disabled for now)

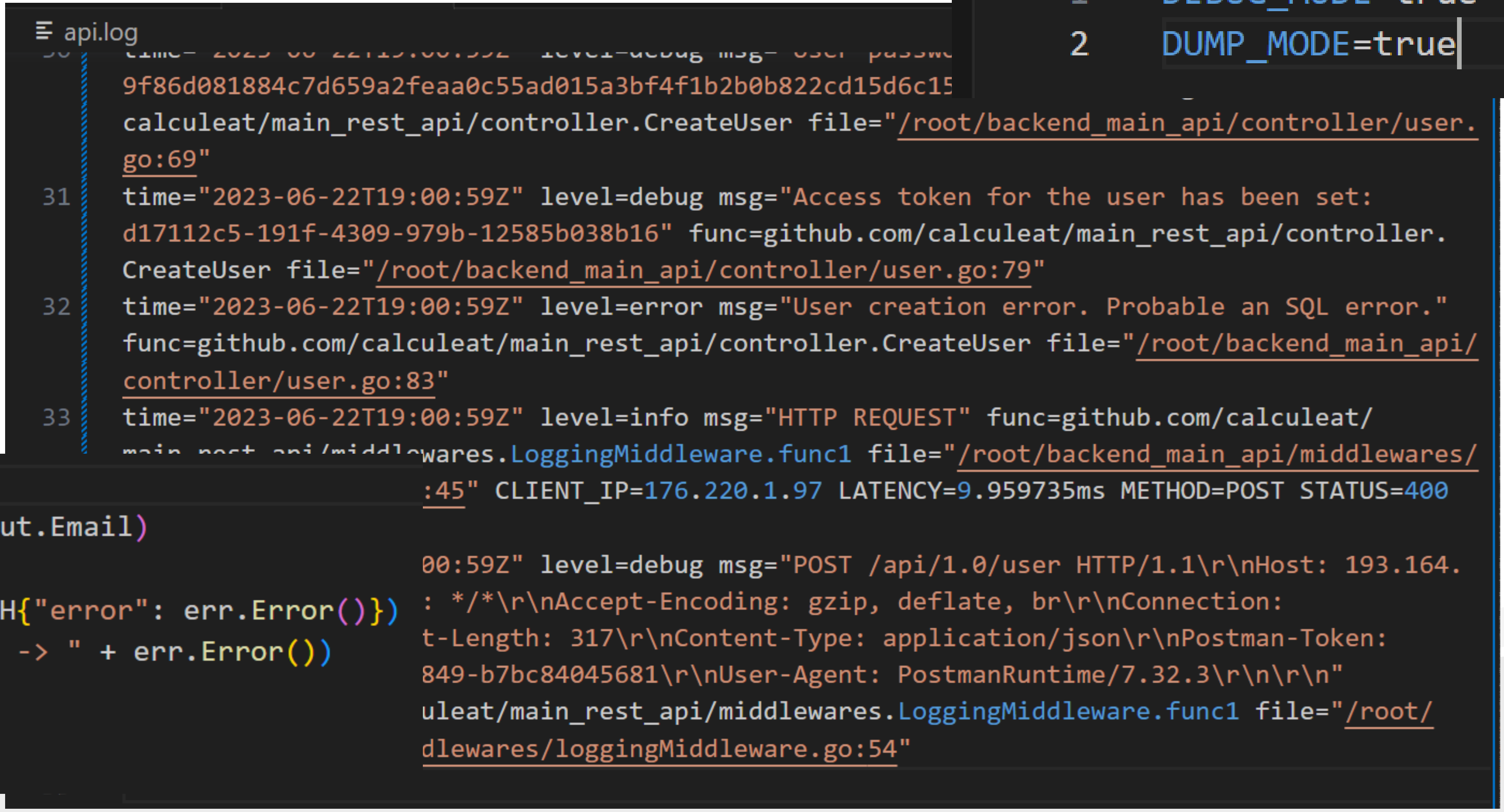


REST API (Debugging & Troubleshoot)

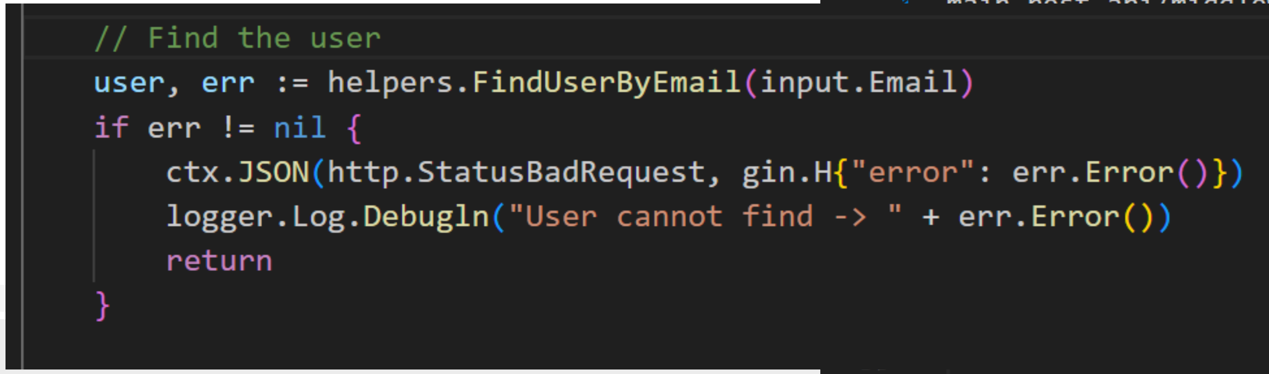
- **DUMP_MODE**
- **DEBUG_MODE**



```
DEBUG_MODE=true
DUMP_MODE=true
```



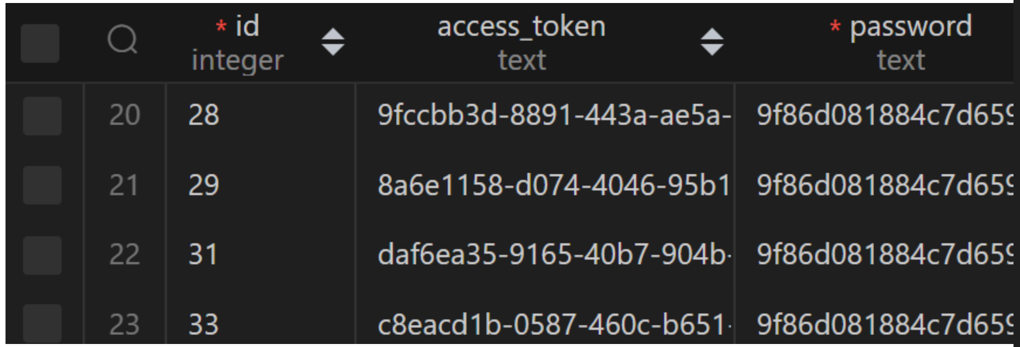
```
9f86d081884c7d659a2feaa0c55ad015a3bf4f1b2b0b822cd15d6c15
calculeat/main_rest_api/controller.CreateUser file="/root/backend_main_api/controller/user.
go:69"
time="2023-06-22T19:00:59Z" level=debug msg="Access token for the user has been set:
d17112c5-191f-4309-979b-12585b038b16" func=github.com/calculeat/main_rest_api/controller.
CreateUser file="/root/backend_main_api/controller/user.go:79"
time="2023-06-22T19:00:59Z" level=error msg="User creation error. Probable an SQL error."
func=github.com/calculeat/main_rest_api/controller.CreateUser file="/root/backend_main_api/
controller/user.go:83"
time="2023-06-22T19:00:59Z" level=info msg="HTTP REQUEST" func=github.com/calculeat/
wares.LoggingMiddleware.func1 file="/root/backend_main_api/middlewares/
:45" CLIENT_IP=176.220.1.97 LATENCY=9.959735ms METHOD=POST STATUS=400

00:59Z" level=debug msg="POST /api/1.0/user HTTP/1.1\r\nHost: 193.164.
: */*\r\nAccept-Encoding: gzip, deflate, br\r\nConnection:
t-Length: 317\r\nContent-Type: application/json\r\nPostman-Token:
849-b7bc84045681\r\nUser-Agent: PostmanRuntime/7.32.3\r\n\r\n"
uleat/main_rest_api/middlewares.LoggingMiddleware.func1 file="/root/
dlewares/loggingMiddleware.go:54"
```



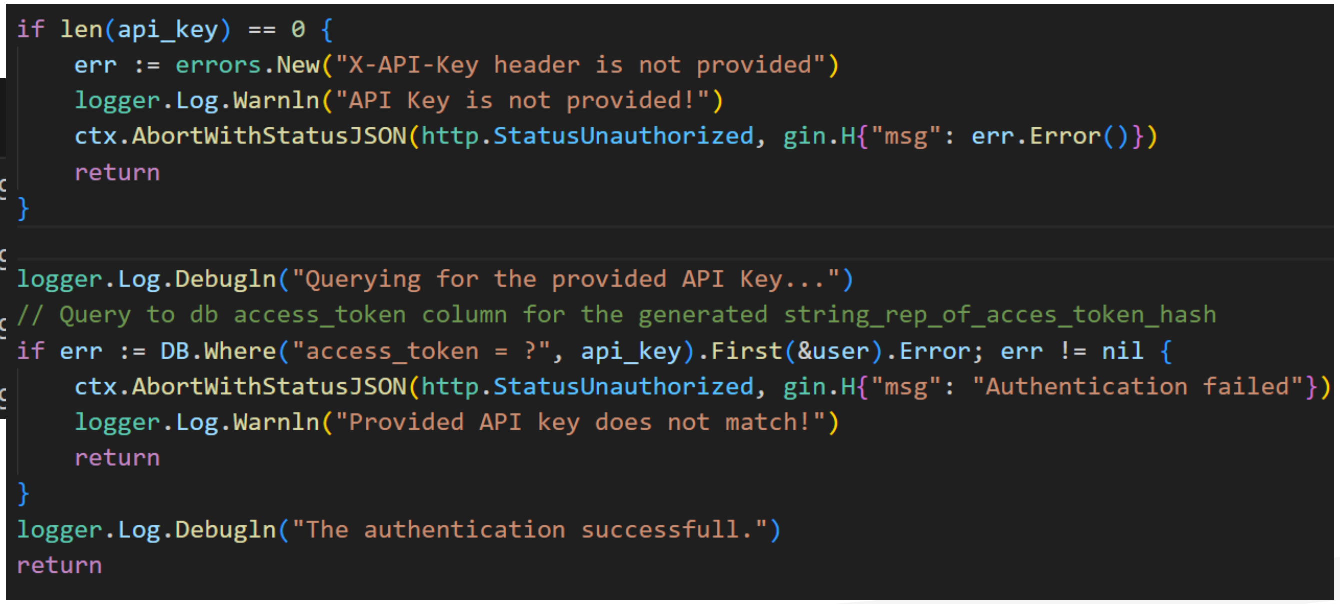
```go
// Find the user
user, err := helpers.FindUserByEmail(input.Email)
if err != nil {
    ctx.JSON(http.StatusBadRequest, gin.H{"error": err.Error()})
    logger.Log.Debugln("User cannot find -> " + err.Error())
    return
}
```

Security

- HTTP Auth for Swagger
- X-API-Key Header Auth for restricted endpoints -> API keys are UUID
- Passwords are SHA256 hashed



	* id integer	access_token text	* password text
20	28	9fccbb3d-8891-443a-ae5a-	9f86d081884c7d65
21	29	8a6e1158-d074-4046-95b1	9f86d081884c7d65
22	31	daf6ea35-9165-40b7-904b-	9f86d081884c7d65
23	33	c8eacd1b-0587-460c-b651-	9f86d081884c7d65



```
if len(api_key) == 0 {
    err := errors.New("X-API-Key header is not provided")
    logger.Log.Warnln("API Key is not provided!")
    ctx.AbortWithStatusJSON(http.StatusUnauthorized, gin.H{"msg": err.Error()})
    return
}

logger.Log.Debugln("Querying for the provided API Key...")
// Query to db access_token column for the generated string_rep_of_acces_token_hash
if err := DB.Where("access_token = ?", api_key).First(&user).Error; err != nil {
    ctx.AbortWithStatusJSON(http.StatusUnauthorized, gin.H{"msg": "Authentication failed"})
    logger.Log.Warnln("Provided API key does not match!")
    return
}
logger.Log.Debugln("The authentication successfull.")
return
```

Front-End

Mobile Application
by **Ezel Karadirek**

Technologies

Flutter

POSTMAN

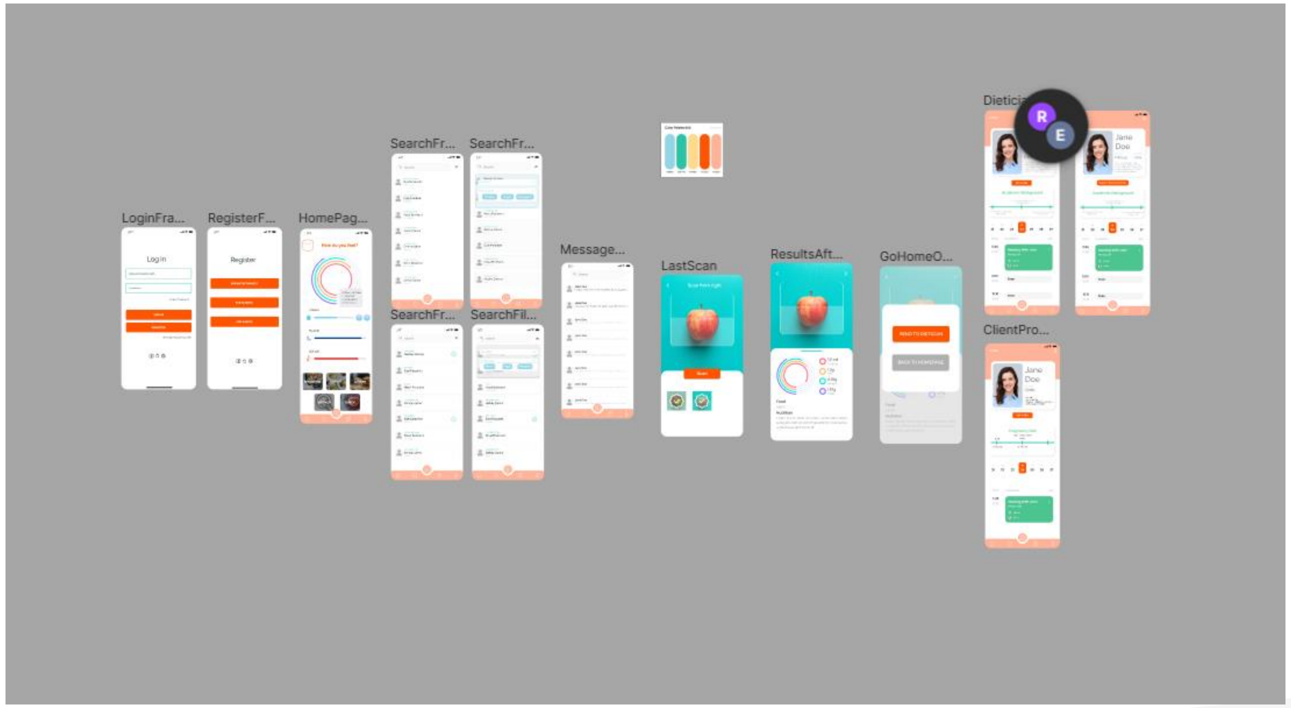
Figma

GitHub

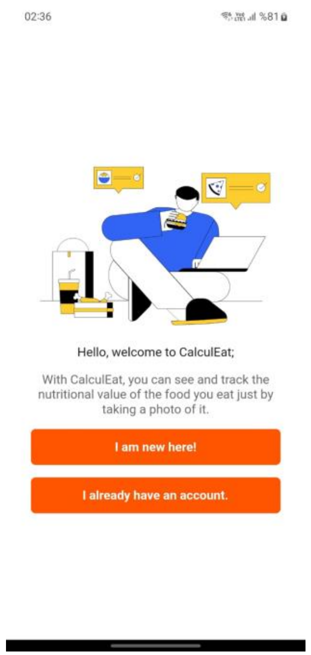
pub.dev

UI Design

We used Figma to make UI design.

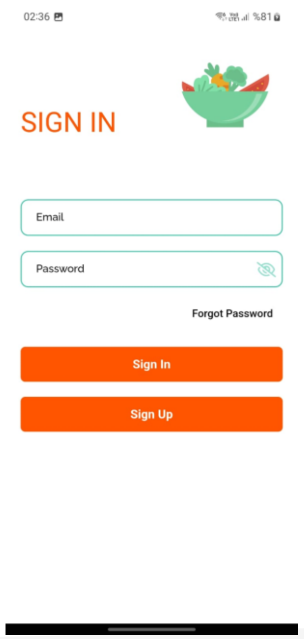


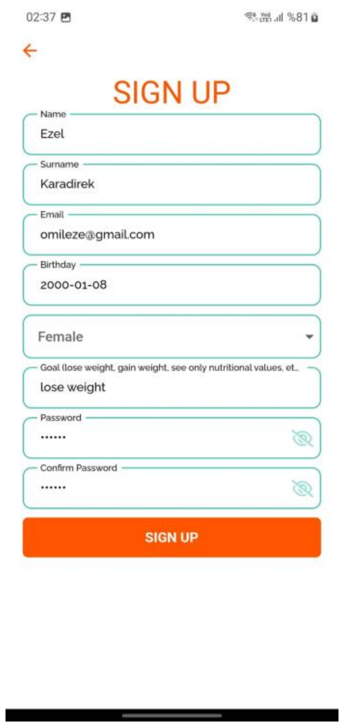
Some Pages



Hello, welcome to CalculEat;

With CalculEat, you can see and track the nutritional value of the food you eat just by taking a photo of it.





Name: Ezel

Surname: Karadirek

Email: omileze@gmail.com

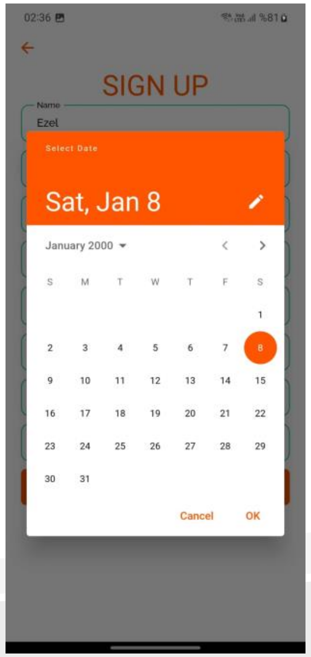
Birthday: 2000-01-08

Female

Goal (lose weight, gain weight, see only nutritional values, et...: lose weight

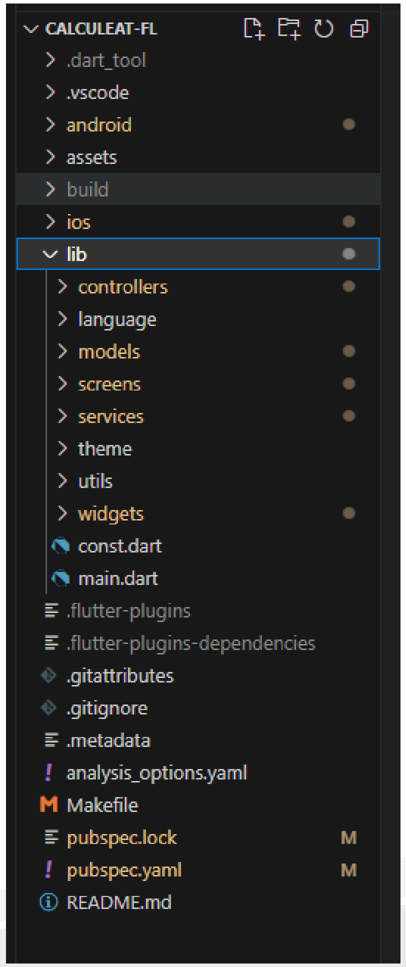
Password: ••••••

Confirm Password: ••••••



Classification

- The codes were categorized to make them easier to understand.
- **Controllers:** To ensure control of pages
- **Language:** For translation files
- **Models:** For models like the user, foods
- **Screens:** To pages
- **Services:** Ports for API, user, water, food etc.
- **Widgets:** For the very repetitive parts I use within the pages
- **Utils:** For features like localization, date editing



```
CALCULEAT-FL
  > .dart_tool
  > .vscode
  > android
  > assets
  > build
  > ios
  v lib
    > controllers
    > language
    > models
    > screens
    > services
    > theme
    > utils
    > widgets
    const.dart
    main.dart
  .flutter-plugins
  .flutter-plugins-dependencies
  .gitattributes
  .gitignore
  .metadata
  analysis_options.yaml
  Makefile
  pubspec.lock                      M
  pubspec.yaml                      M
  README.md
```

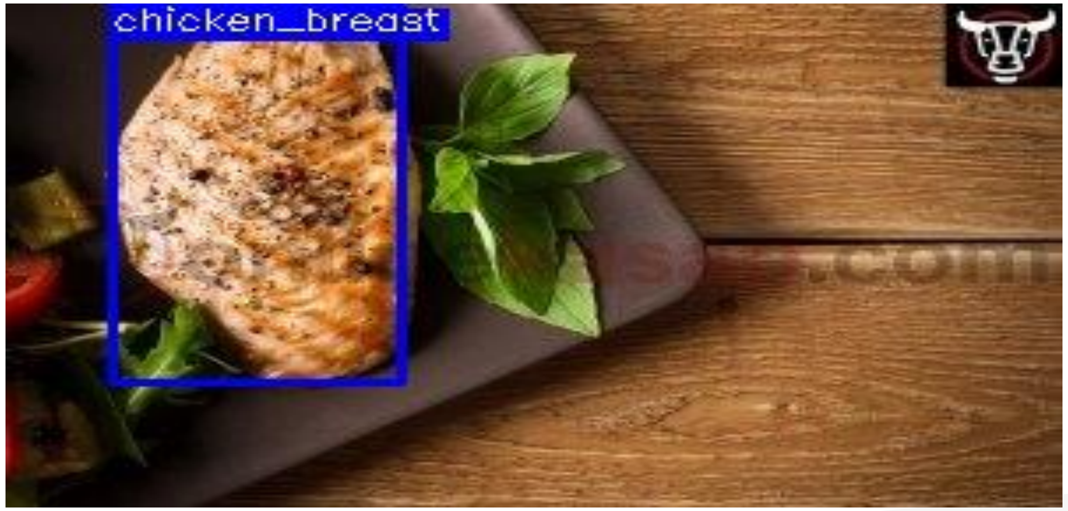
Artifical Intelligence

Computer Vision Side
by **Berkay Çamur**

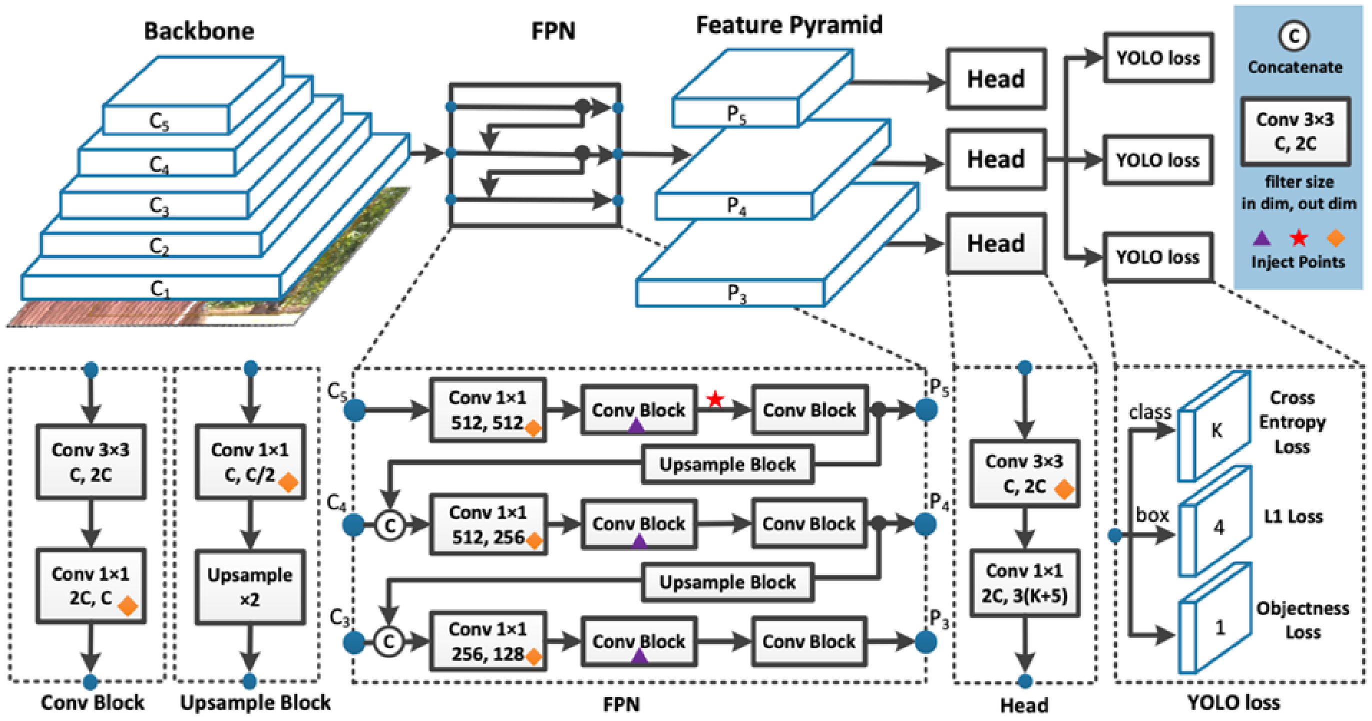
Artificial Intelligence Algorithm(CV)

We're using Yolov7-X model as the detection model which provided from(https://github.com/WongKinYiu/yolov7)

- Our detection model can create bounding boxes around food images already trained in the object detection model.



Yolov7-x Architecture



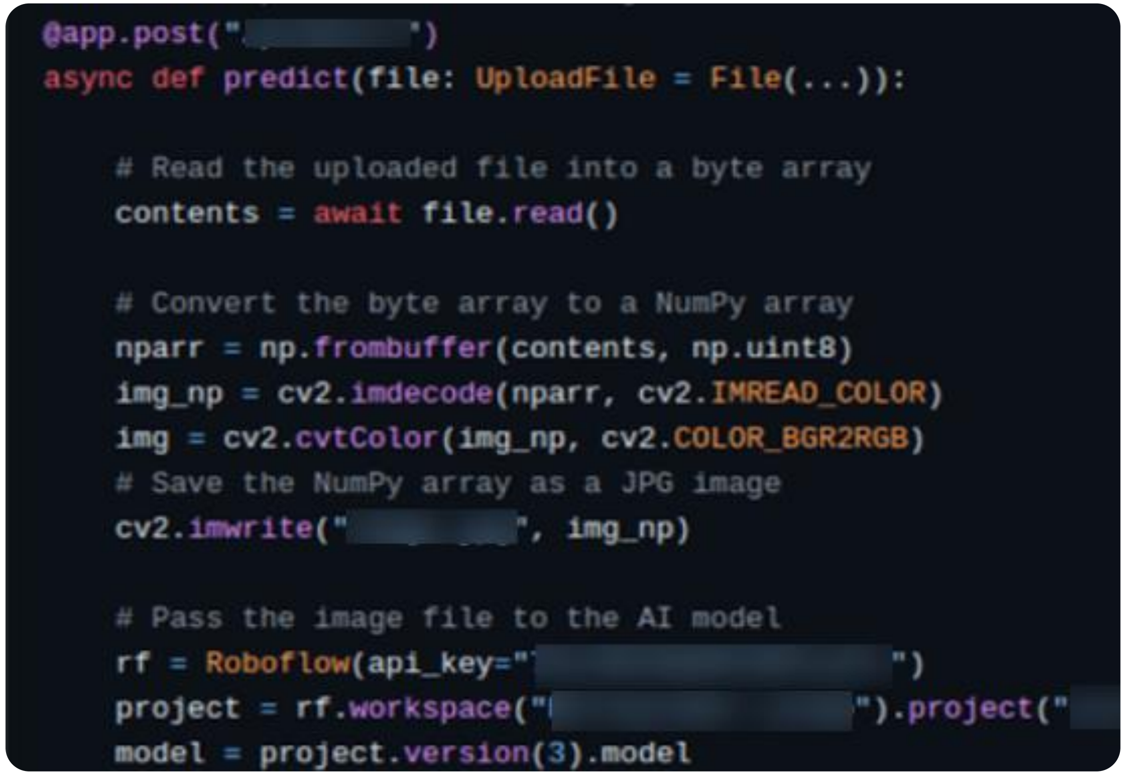
Yolov7-x is the object detection model that works faster than most of detection models and able to make healthier predictions since it's loss functions and easy calculation techniques

FastAPI

NumPy

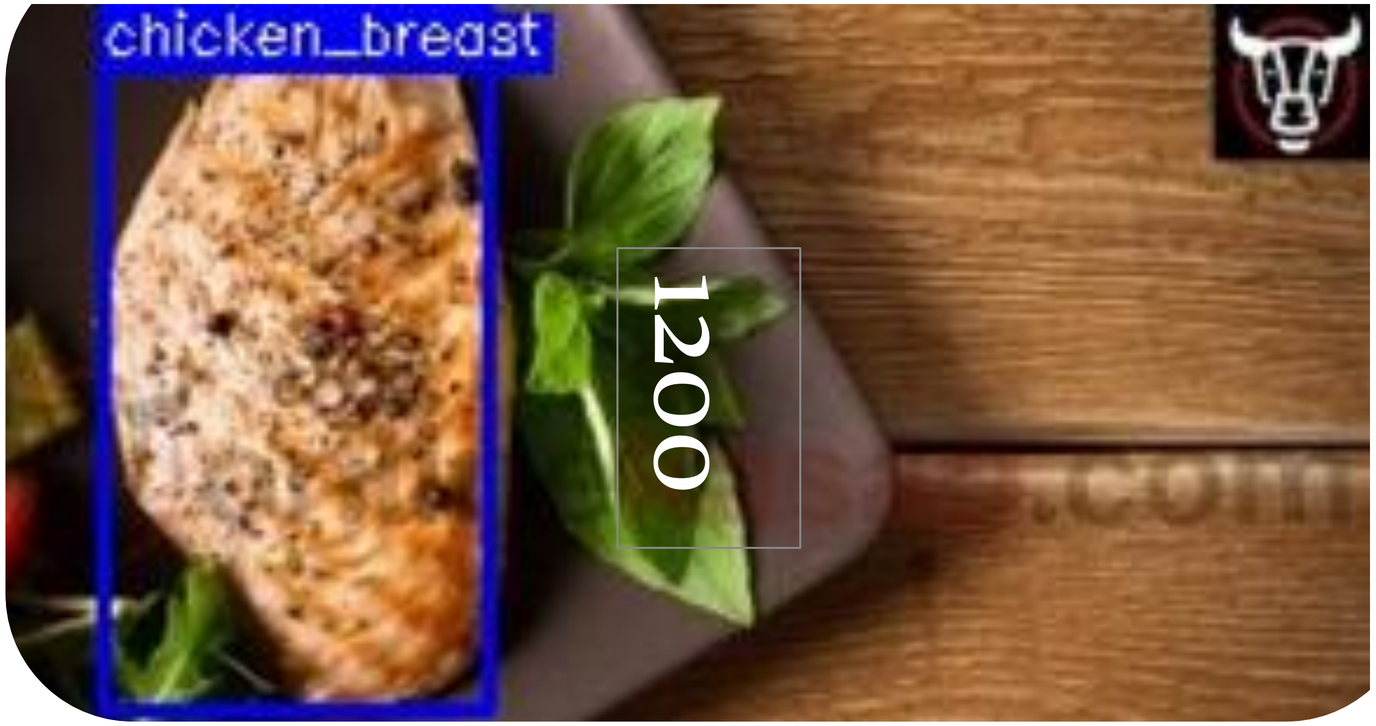
OpenCV

PyTorch



```
@app.post("[redacted]")
async def predict(file: UploadFile = File(...)):

    # Read the uploaded file into a byte array
    contents = await file.read()

    # Convert the byte array to a NumPy array
    nparr = np.frombuffer(contents, np.uint8)
    img_np = cv2.imdecode(nparr, cv2.IMREAD_COLOR)
    img = cv2.cvtColor(img_np, cv2.COLOR_BGR2RGB)
    # Save the NumPy array as a JPG image
    cv2.imwrite("[redacted]", img_np)

    # Pass the image file to the AI model
    rf = Roboflow(api_key="[redacted]")
    project = rf.workspace("[redacted]").project("[redacted]
    model = project.version(3).model
```

Calculation Technique of the AI



150

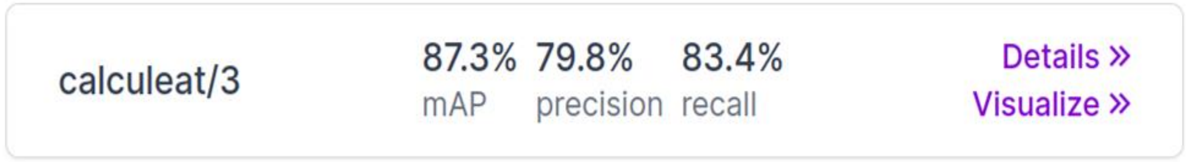
- Area = 18000
- Mean of Areas of 10 chicken breast prediction

1750

- Which means, this chicken breast is almost equal to average one chicken breast slice and it's calory is clear

Features of the AI Model

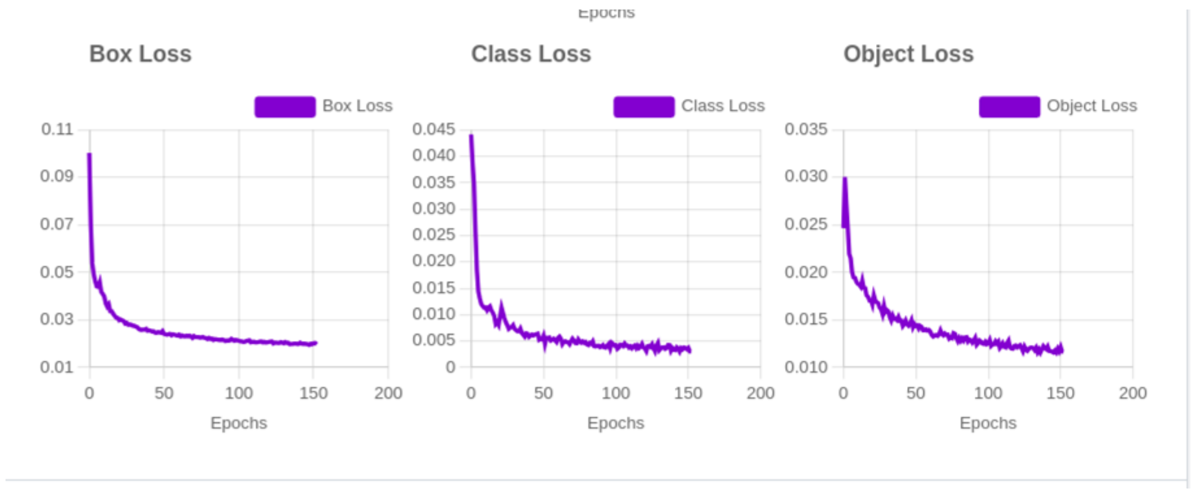
The current ai model has an accuracy score of more than 80%, and its precision and recall values also support this accuracy score.

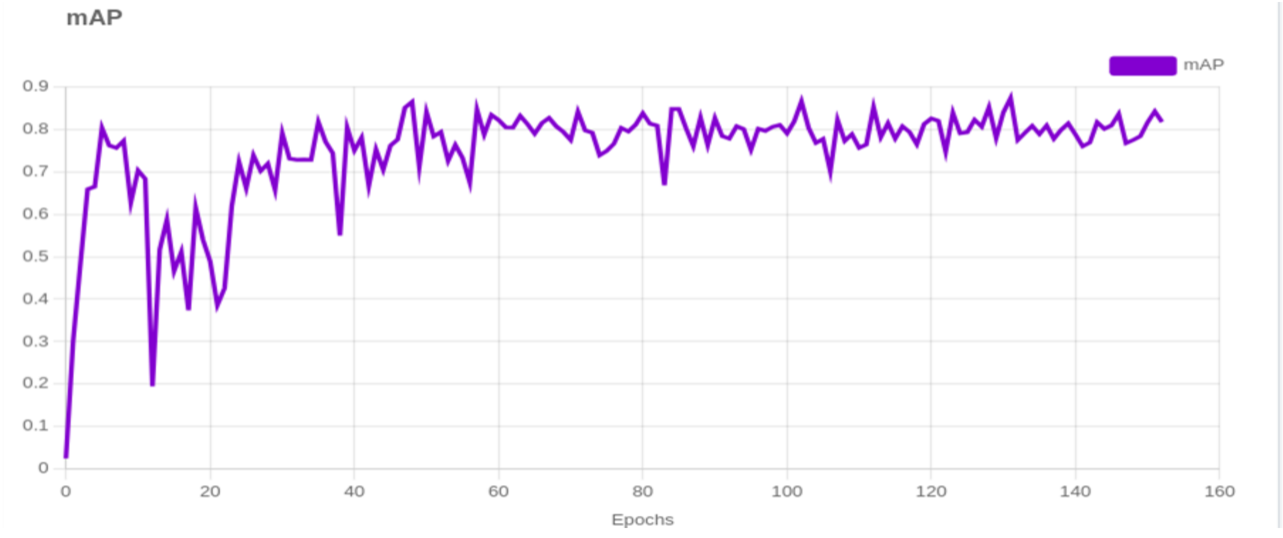


calculeat/3

87.3%	79.8%	83.4%
mAP	precision	recall

Details »
Visualize »





Feature of the Calculeat AI Model

Current AI model is trained with 10.000 images(with augmentations) and we just saw it's scores.

On the other hand, this AI model is depends on Roboflow which is the model and model label provider application. This dependency will be removed and when we have a server with gpu(probably jetson nano), we will use nvidia-triton server on this server instead of roboflow.

Thank you!

Questions & Answers