



# RESEARCH ON BODY TYPES & GAINZ iOS APP

By Hargun Singh Rana

CSE 6<sup>th</sup>

1817965

# Contents:

- Data Analysis & Machine Learning Model
- GainZ iOS App



# Data Analysis & Machine Learning Model:

- Data Collection
- Data Analysis
- Data Cleaning
- Data Preprocessing
- Classification Algorithms



# Data Collection:

- Participants were Students of LKCTC- School of Engineering.
- Data was collected by the means of Google Forms.
- Included Questions like Height, Weight, Age, Favorite Sport, No. of Meals a Day, etc.
- The goal around 200-250 participants, but only 163 had volunteered.
- The Private information like Name and Roll number were not inquired, in order to maintain Privacy of the Participants

PROJECT DATA

Questions Responses 163

LYALLPUR KHALSA COLLEGE TECHNICAL CAMPUS: SURVEY FOR PROJECT:

Greetings to the participants. This survey consists of some of the basic questions about yourself, like AGE, HEIGHT, WEIGHT, etc. Your personal information would not be harmed in any sense. In order to maintain your PRIVACY, your Name, Roll No and various other private information is NOT required.

By filling this survey you are becoming a volunteer for the MAJOR PROJECT of one of your SENIORS. We request to kindly fill RELEVANT and ACCURATE information in the form below so that we can proceed working on the project with ease. We hope to get relevant information from YOU, as in the coming years you might also require help from the other students of our College.

REGARDS

Who Are you ? \*

Student  
 Faculty

Department: \*

CSE  
 CE  
 ECE

# Data Cleaning:

- Raw data had values with complex strings for the participants interpretation.
- The values like Height and Weight were provided in string data type. They were converted to integer data type and in Meters and Kilogram units respectively.
- Other values like Fit, Skinny, Moderate, Low, etc, were converted lower case and according to the code requirement.

## Raw Data: Clean Data:

	type	department	Who	semester	section	gender	age	height	weight	Height (In Feet	Weight	Your CURRENT act_level	On an Average, how	On an Average, How	Where do you see your body in the coming times i.e	goal
0	NaN	CSE		6th	A	Male	21	1.8288	68	Gym	high moderate	fit	5	6	Get FIT	
1	Faculty	CSE		NaN	NONE	Male	36	1.7526	71	Football	low	fit	2	5	Get FIT	
2	Student	CSE		6th	NONE	Male	25	1.8034	52	Volleyball	low	skinny	4	6	Gain-weight	
3	Student	CSE		6th	A	Male	21	1.8034	60	Cricket	moderate	skinny	3	6	Gain-weight	
4	Student	CSE		6th	NONE	Female	20	1.5748	30	Racing	moderate	fit	3	7	Get FIT	
...	...	...		...	...	...	...	...	...	...	...	...	...	...	...	
158	Faculty	CSE		NaN	NONE	Male	33	1.7526	59	Football	low	fit	3	8	Get FIT	
159	Student	CSE		6th	B	Male	21	1.8796	76	Cricket	moderate	fit	3	5	Get FIT	
160	Student	CSE		6th	NONE	Male	19	1.7780	66	Cricket	very high	fit	3	7	Get FIT	
161	Student	CSE		4th	NONE	Male	20	1.6510	55	Cricket	moderate	skinny	3	6	Gain-weight	
162	Student	CSE		4th	A	Male	20	1.8542	55	Cricket	low	skinny	3	7	Get FIT	

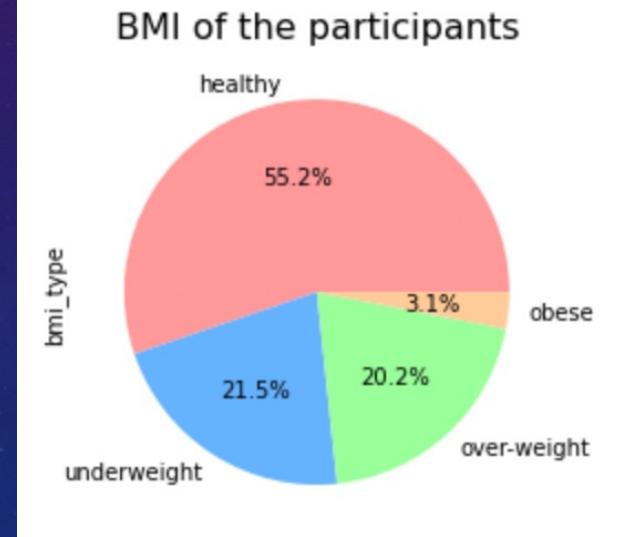
163 rows × 14 columns

4 2021/02/15 3:48:07 PM Student CSE 6th NONE Female 20 5 feet 2 inches 30 Racing moderate (light exercise sport 1-3 times per week) Fit 3 7 Get FIT

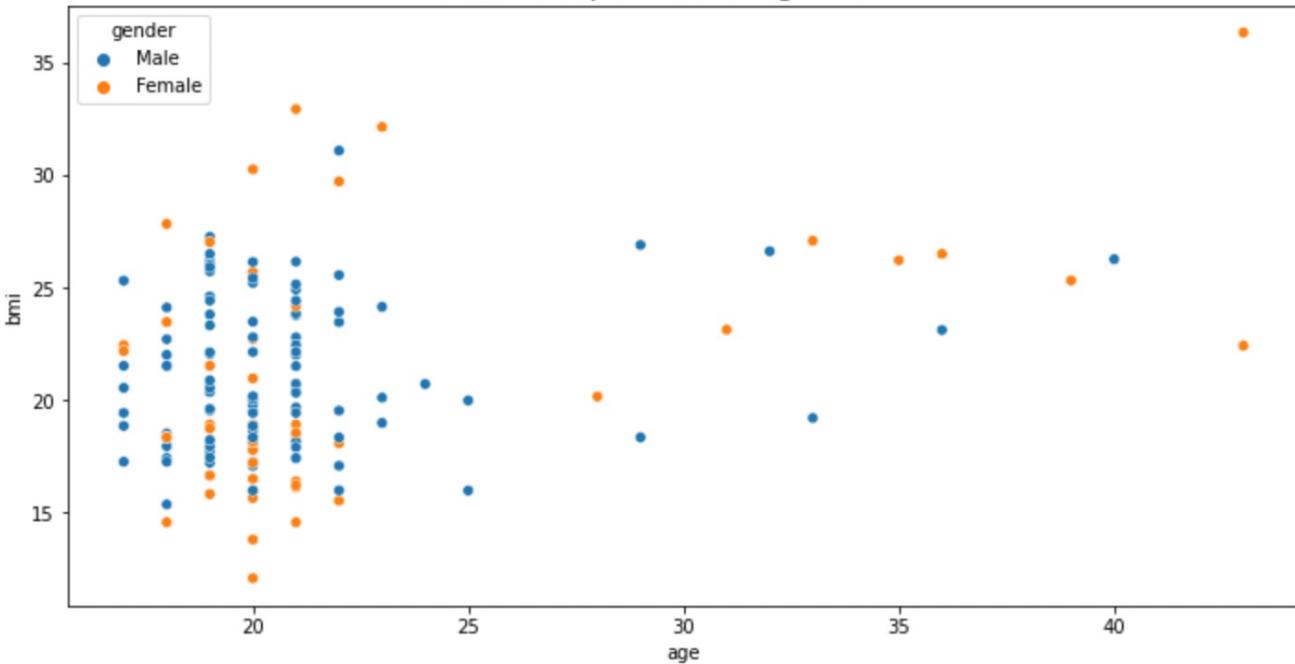
# BMI of the participants:

- Most of the Participants fall under the category of **Healthy**: **55.2%(90)**
- **21.5%** of the participants fall under the category of **Under-weight**
- **20.2%** of the participants fall under the category of **Over-weight**
- only **3%** fall under the category of **Obese**

```
healthy      90  
underweight  35  
over-weight  33  
obese        5  
Name: bmi_type, dtype: int64
```

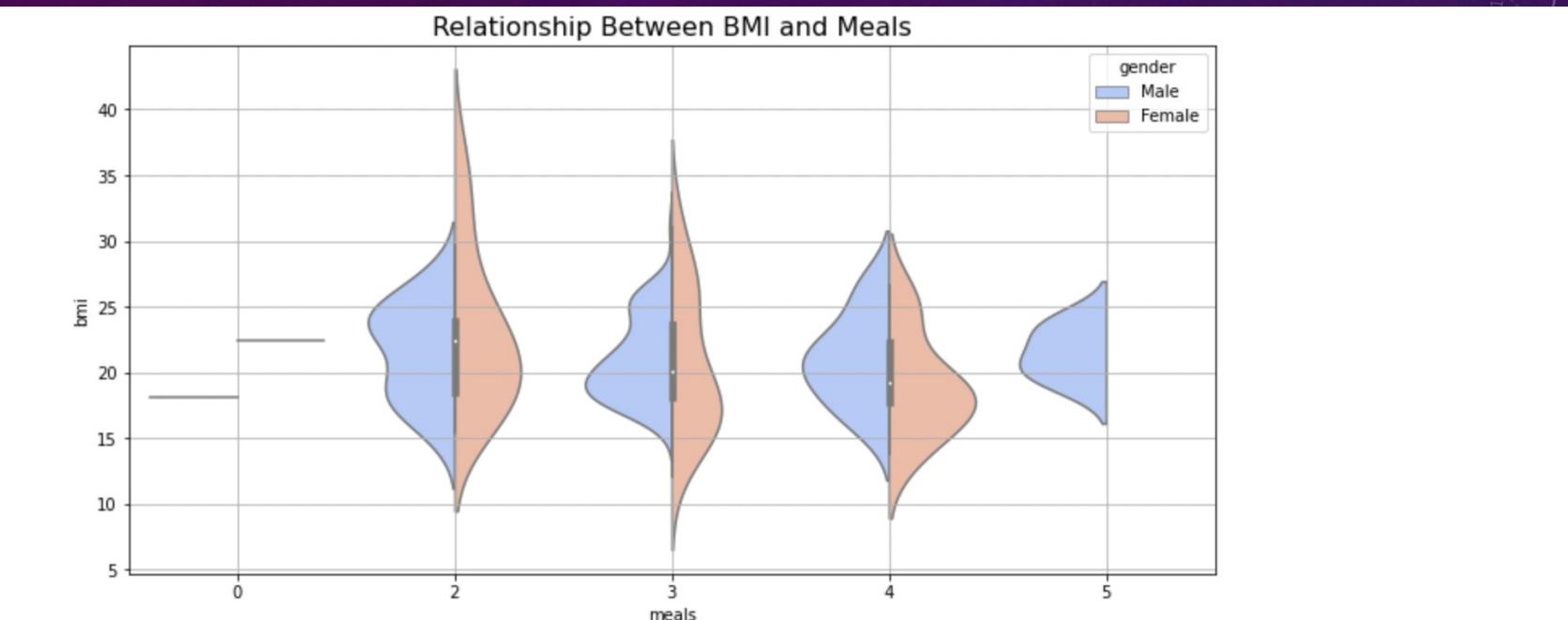


### Relationship Between Age and BMI



It is depicted from the Plot that:

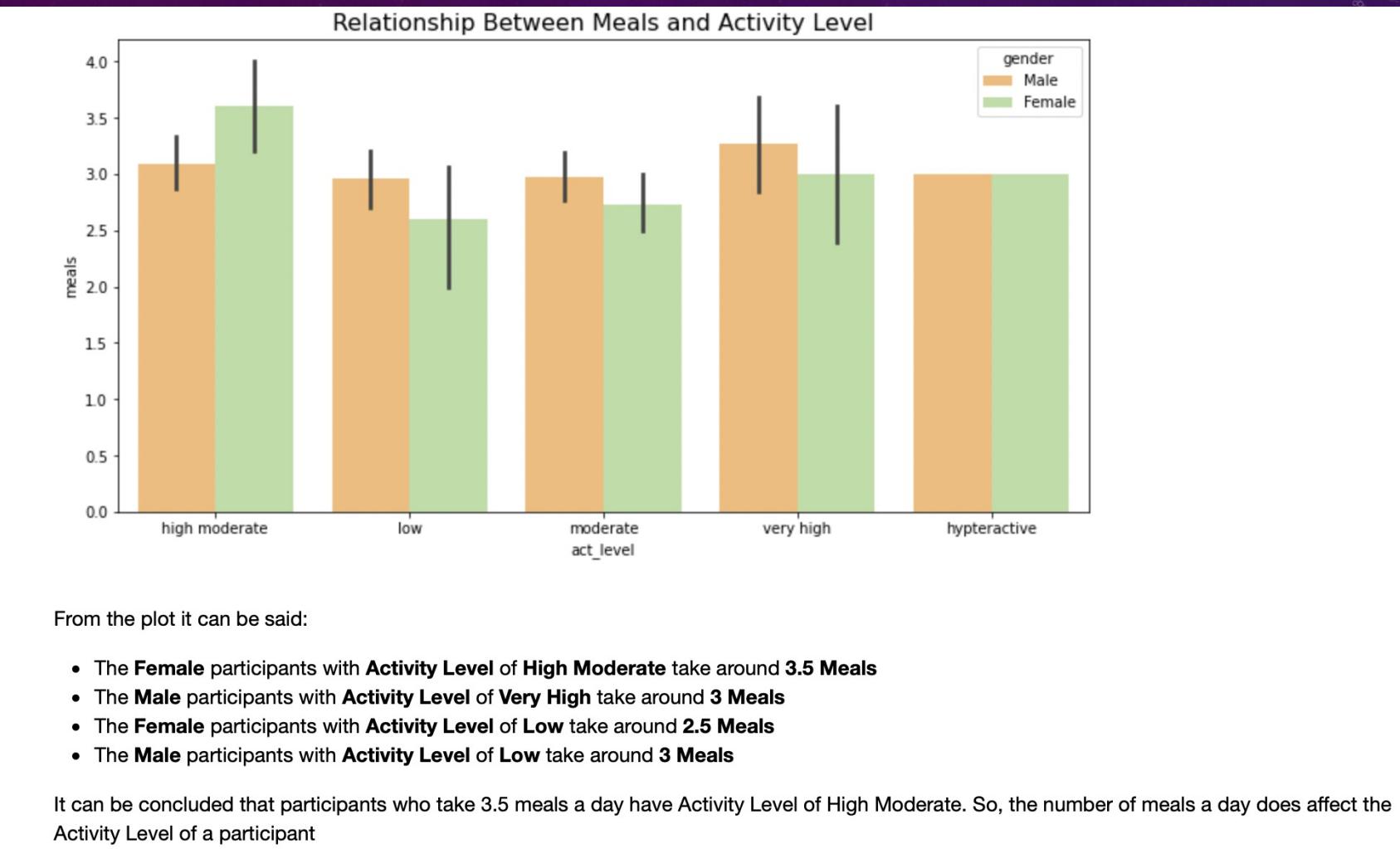
- Most of the participants fall under the age of **20-25 Years** with **BMI** within the range of **15 to 25**
- It is visible that most of the **Female** participants fall under the **BMI** range of **30 and above**
- From the Participants above the age of **25 years**, more of the females have **BMI** within the range of **15 to 25**



From the plot it can be said:

- Participants who were **Female** and take **4 Meals** a day, has BMI in range of **15 to 20**
- Participants who were **Male** and take **4 Meals** a day, has BMI in range of **20 to 25**
- Participants who were **Female** with **BMI** of range **30-40** take **2 or 3 meals** a day

It can be concluded that even after taking just 2-3 meals a day, few of the Female Participants have BMI in the range of 30-40. Most of the Male Participants have BMI in the range of 15-30. Also it can be said that the amount of Meals per day cannot define whether a Person is Under-Weight or Obese, but the Quality of Food.



# Result:

Number of participants whose current\_btype and goal varies from what they actually should be: 53 Participants, 32.52 %

	type	department	gender	bmi_type	current_btype	actual_current_btype	goal	goal_suggested
2	Student	CSE	Male	underweight	skinny	weak	Gain-weight	Gain-weight
8	Student	CSE	Male	underweight	skinny	weak	Gain-weight	Gain-weight
14	Student	ECE	Female	healthy	fit	skinny	Get FIT	Get FIT
17	Student	ECE	Female	healthy	fit	skinny	Get FIT	Get FIT
18	Student	ECE	Female	healthy	fit but also fat	skinny	Get FIT	Get FIT

# Data Pre-Processing:

- Two new features were added, BMI and BMI-Type.
- The data was pre-processed with handling of null values, Label and One-Hot Encoding of Categorical Features.
- The data was split into Train and Test Datasets. The Target Variables were current\_btype and goal.
- The numeric attributes values were Scaled using Standardization.

```
bmi=df.weight/df.height**2
```

```
df.insert(8,'bmi',bmi,allow_duplicates= True)
```

	type	department	semester	section	gender	age	height	weight	bmi	meals	...	None	Badminton	Basketball	Table Tennis	Chess	Swimming	Kho Kho
0	Student	CSE	6th	A	1	21	1.8288	68	20.331831	5	...	0.0	0.0	1.0	0.0	0.0	0.0	0.0
1	Faculty	CSE	NONE	NONE	1	36	1.7526	71	23.114938	2	...	0.0	1.0	0.0	0.0	0.0	0.0	0.0
2	Student	CSE	6th	NONE	1	25	1.8034	52	15.988923	4	...	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	Student	CSE	6th	A	1	21	1.8034	60	18.448757	3	...	1.0	0.0	0.0	0.0	0.0	0.0	0.0
4	Student	CSE	6th	NONE	0	20	1.5748	30	12.096798	3	...	0.0	0.0	0.0	0.0	0.0	0.0	1.0
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
158	Faculty	CSE	NONE	NONE	1	33	1.7526	59	19.208188	3	...	0.0	1.0	0.0	0.0	0.0	0.0	0.0
159	Student	CSE	6th	B	1	21	1.8796	76	21.512096	3	...	1.0	0.0	0.0	0.0	0.0	0.0	0.0
160	Student	CSE	6th	NONE	1	19	1.7780	66	20.877593	3	...	1.0	0.0	0.0	0.0	0.0	0.0	0.0
161	Student	CSE	4th	NONE	1	20	1.6510	55	20.177555	3	...	1.0	0.0	0.0	0.0	0.0	0.0	0.0
162	Student	CSE	4th	A	1	20	1.8542	55	15.997405	3	...	1.0	0.0	0.0	0.0	0.0	0.0	0.0

163 rows x 39 columns

20 1.5748 30 12.096798 underweight Racing moderate

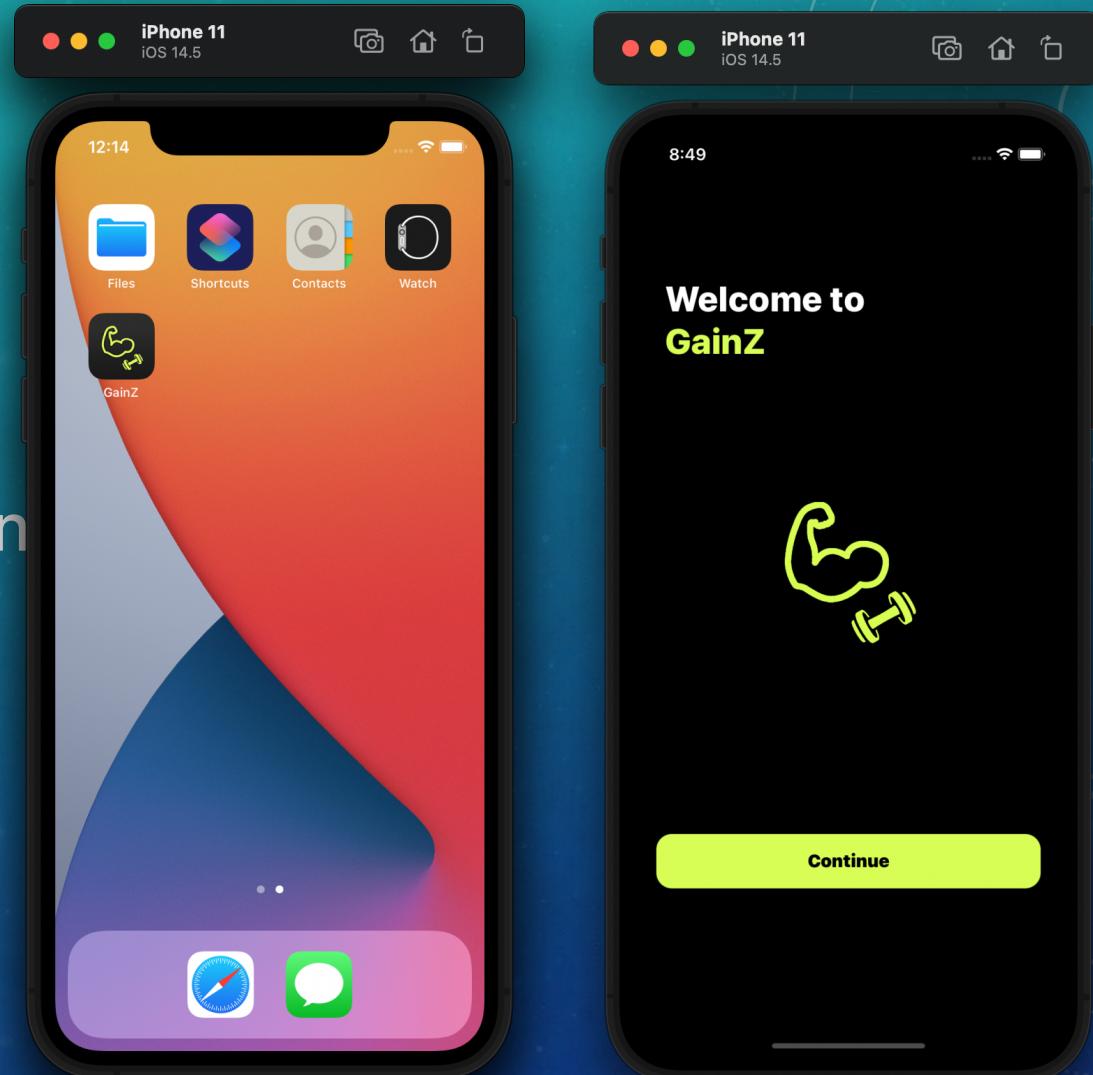
# Classifications Algorithms:

- Logistic Regression
- Decision Tree
- Random Forest
- Naïve Bayes
- Support Vector Machine (SVM)
- Artificial Neural Network

Logistic Regression: 87.879 %  
Decision Tree: 78.788 %  
Random Forest: 84.848 %  
Naive Bayes: 72.727 %  
Support Vector Machine: 75.758 %  
Artificial Neural Network: 90.909 %

# GainZ iOS App:

- Logo and Accent Color Designed
- Login/Register Page
- Firebase For Back-End Authentication
- ProfileView
- CaloriesView
- AboutView
- Firebase's Firestore Database



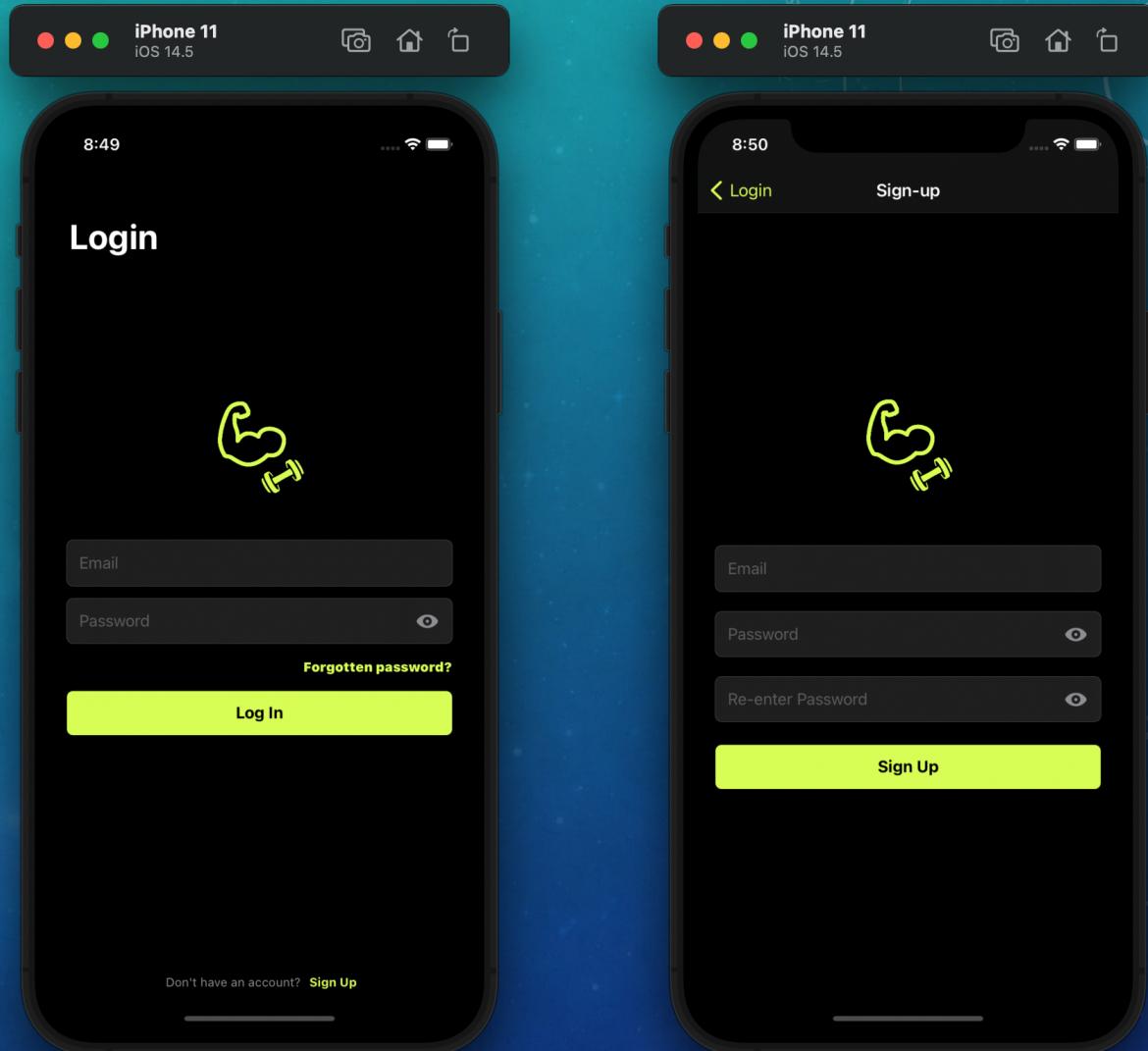
# Logo & Accent Color:

- Designed using Open Source Vectors.
- Software Used: Adobe Photoshop and Figma
- Implemented the Icon to the App Code



# Login/Register Page:

- It consists of Text Fields, Buttons, SF Symbols & Texts.
- Text Fields: "*Email*", "*Password*" and "*Re-enter Password*".
- Buttons: "*Log In*", "*Sign up*" and "*Forgotten password?*".
- SF Symbols: "*eye filled*" and "*eye filled slashed*" to indicate show or hide password.
- Texts: "*GainZ*", "*Sign Up*" and "*Don't have an Account?*"
- Native Dark Mode/Light Mode Shift



# Firebase for Back-End Authentication:

- A new user registered using the login page gets his credentials stored in the Firebase authentication system.
- Existing users can Log in with their Credentials.
- Only the Email is available in the server. The password is Encrypted within a Hashcode generated by Firebase
- The "Forgotten Your Password?" feature in the Log In page is used to change the encrypted password to a new one after verification from email.
- New feature to be added yet is of Log In with Third-Party Platforms like Google, Facebook and Apple.

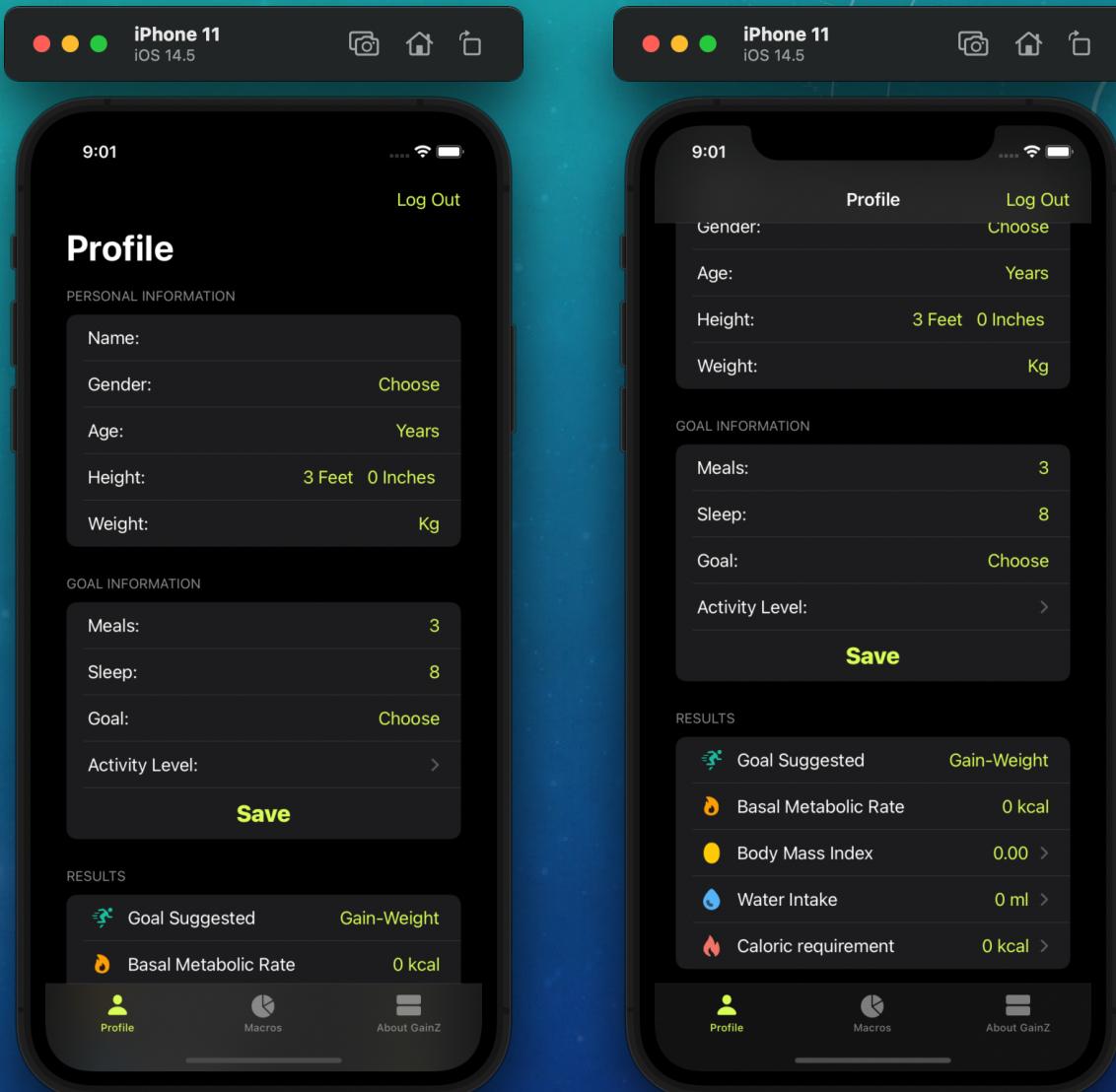
The screenshot shows the Firebase console's Authentication interface. On the left is a sidebar with Project Overview, Build (Authentication, Firestore, Realtime Database, Storage, Hosting, Functions, Machine Learning), Release & Monitor (Crashlytics, Performance, Test Lab...), Analytics (Dashboard, Realtime, Events, Conve...), Engage (Predictions, A/B Testing, Cloud Mes...), and Extensions. At the bottom are Spark (Free \$0/month) and Upgrade buttons. The main area is titled 'Authentication' and has tabs for Users, Sign-in method (which is selected), Templates, and Usage. Under 'Sign-in providers', there is a table with the following data:

Provider	Status
Email/Password	Enabled
Phone	Disabled
Google	Disabled
Play Games	Disabled
Game Center	Disabled
Facebook	Disabled
Twitter	Disabled
Github	Disabled
Yahoo	Disabled
Microsoft	Disabled
Apple	Disabled
Anonymous	Disabled

# Main Screen Views:

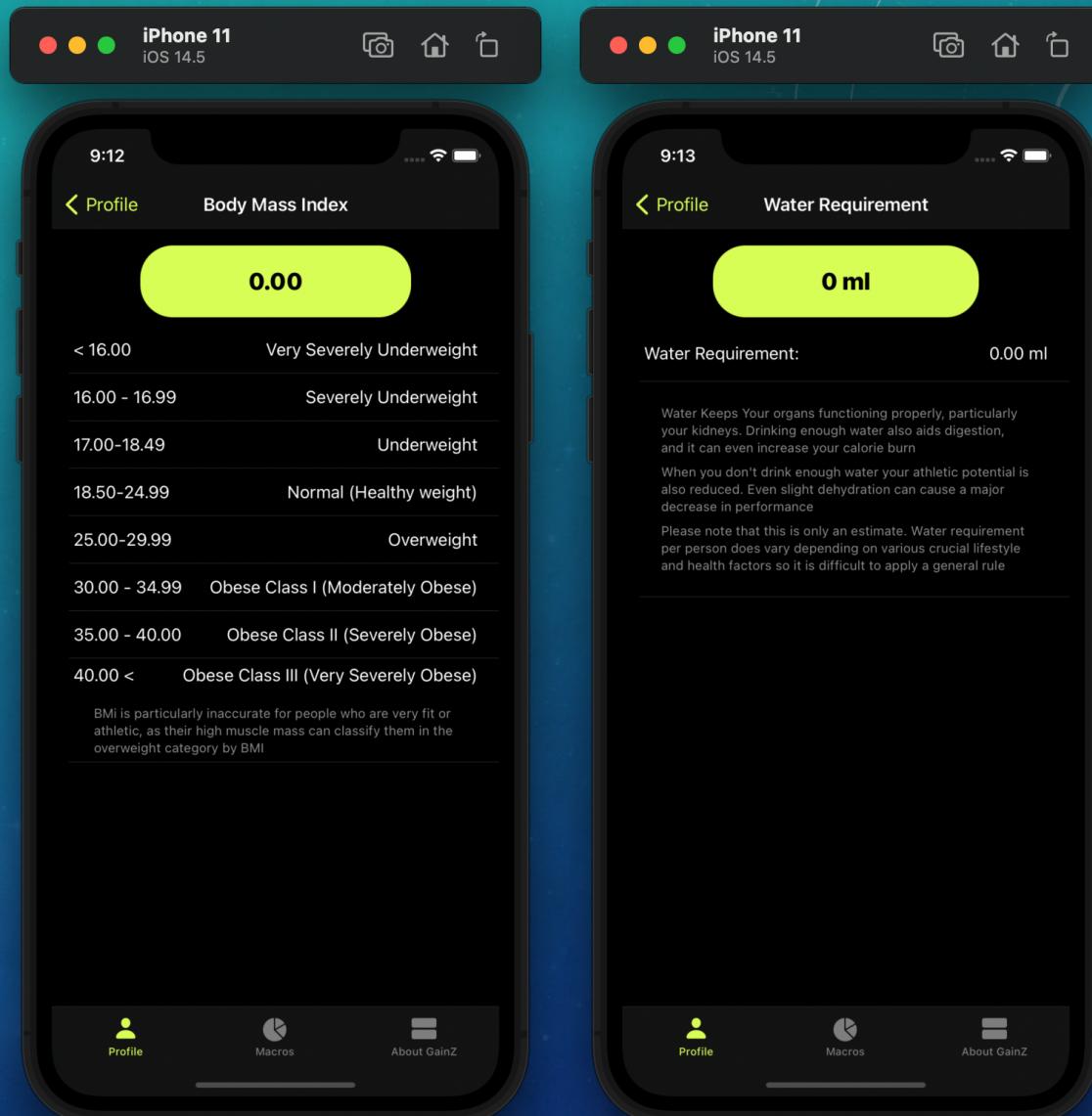
## ProfileView:

- Personal Information Section: Name, Gender, Age, Height and Weight
- Goal Information Section: Meals, Sleep, Goal and Activity Level
- Results Section: Goal Suggested, BMR, BMI, Water Intake and Caloric Requirement
- Save Button is used to store data into the Firestore Database
- Log-Out Button to get back to the Authentication View



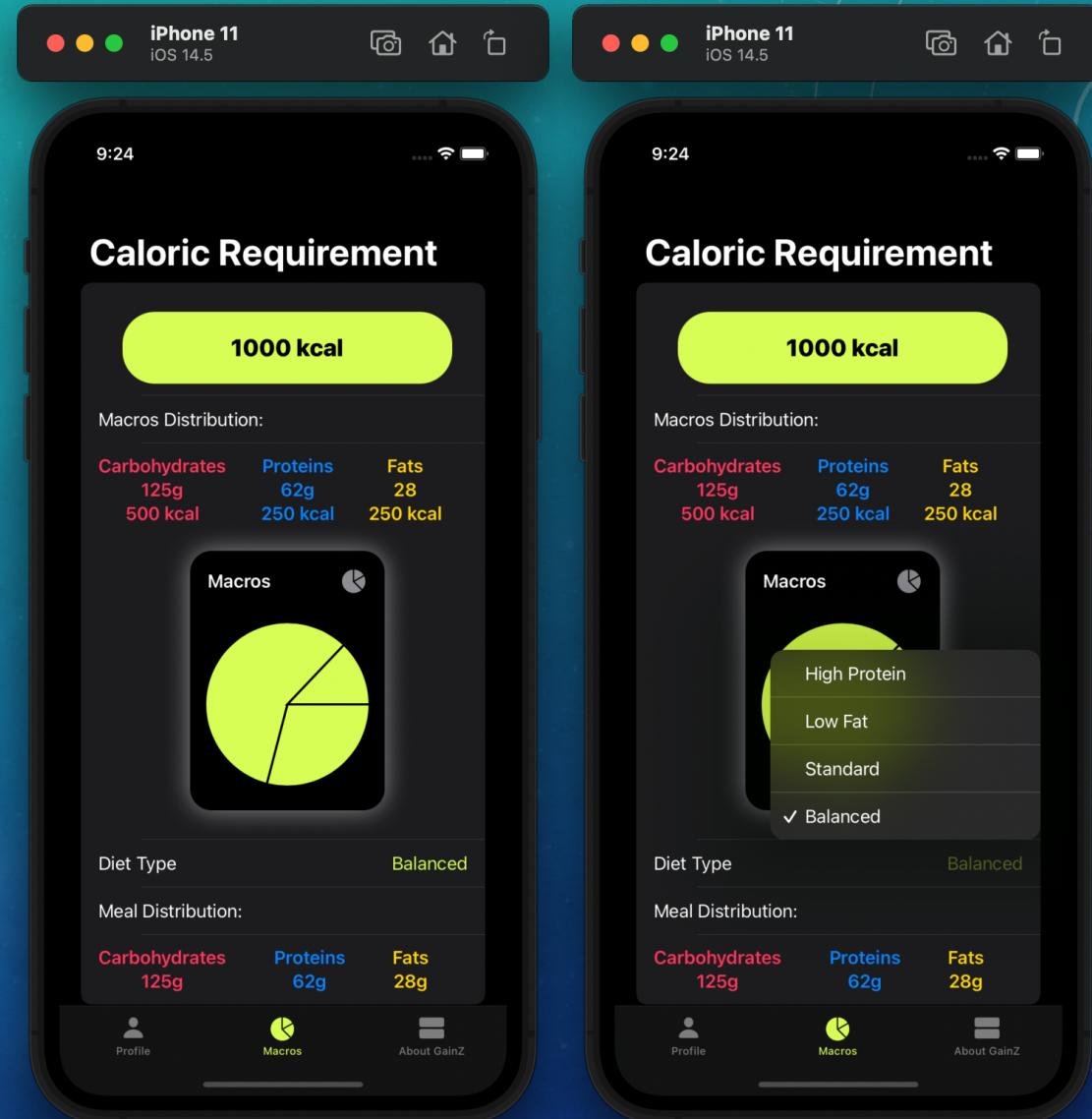
# BMI View & WaterIntake View:

- The calculated BMI and Water-Intake is shown here
- The description of each is given
- The back profile button can be used to go back to the previous ProfileView



# Calories View:

- The Calculated Caloric Requirement is given
- The Macros are split according to the type of diet specified, by default it is Balanced
- The amount of Carbohydrates, Protein and Fats Required per day are given
- The Pie chart represents the Ratio of the Macro Nutrients



# Firestore DataBase:

- When the Save button is Pressed the data gets stored in the Firestore DataBase

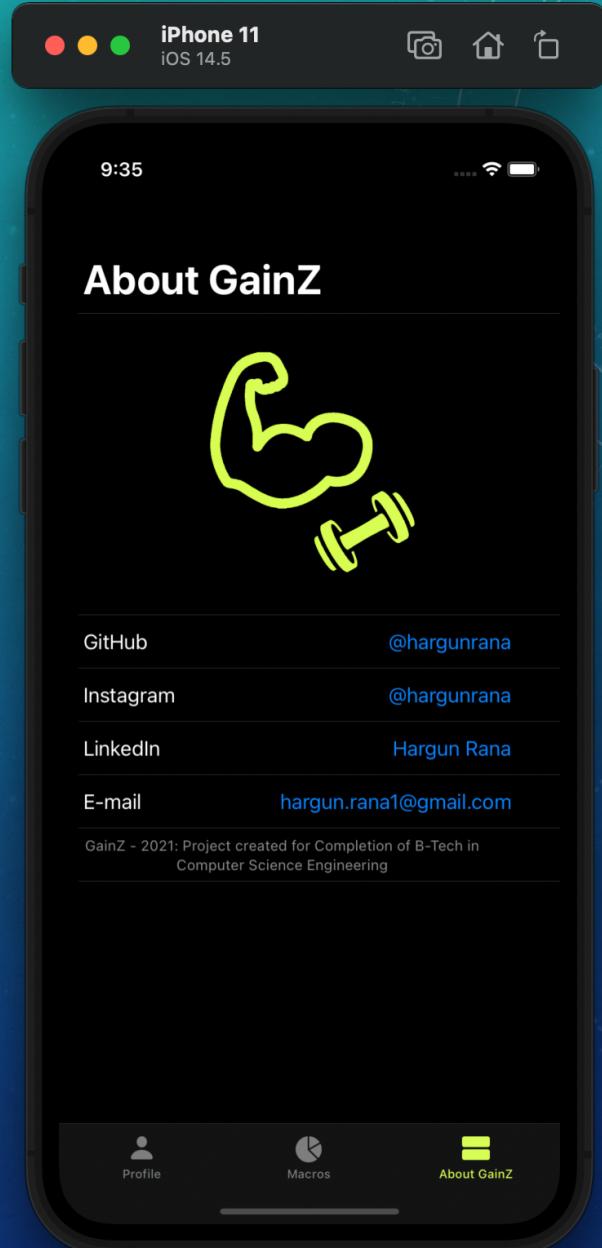
The screenshot shows the Cloud Firestore interface for a project named "diet app". The "Data" tab is selected. A document in the "Users" collection is displayed, with its ID being "I8ZPZ1F30mrbql4UevnG". The document contains the following fields and their values:

Activity Level:	"High Moderate"
Age:	"21"
Gender:	"Male"
Goal:	"Increase Weight"
Height in Inches:	"0"
Height in feet:	"6"
Name:	"Hargun Slngk Rana"
Weight:	"68"

At the bottom of the screenshot, it says "Cloud Firestore location: nam5 (us-central)".

# About View:

- This view contains some basic information and hyperlinks to the various platforms
- Github, Instagram, LinkedIn and Email are mentioned here



# Thank You

