A Project Report on

FitGeek: Modelling ML Based Recommendation System for fitness and wellness

Submitted in partial fulfillment of the requirements for the award of the degree of

Bachelor of Engineering

in

Information Technology

by

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Under the Guidance of

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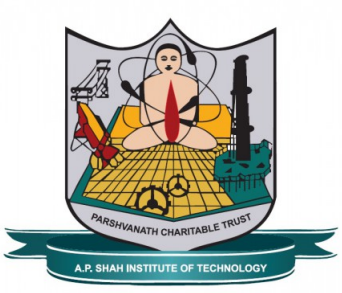

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Approval Sheet

This Project Report entitled ***"FitGeek: Modelling ML Based Recommendation System for fitness and wellness",*** submitted by ***Shreya Mahajan(20104001), Saniya Dutta(20104041), Anish Bhosale(20104033)*** is approved for the partial fulfillment of the requirenment for the award of the degree of ***Bachelor of Engineering*** in ***Information Technology*** from ***University of Mumbai***.

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CERTIFICATE

This is to certify that the project entitled ***"FitGeek: Modelling ML Based Recommendation System for fitness and wellness"*** , submitted by ***"Shreya Mahajan (20104001), Saniya Dutta (20104041), Anish Bhosale (20104033))*** for the partial fulfillment of the requirement for award of a degree ***Bachelor of Engineering*** in ***Information Technology***, to the University of Mumbai, is a bonafide work carried out during academic year 2023-2024.

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Declaration

We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included, We have adequately cited and referenced the original sources. We also declare that We have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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Date:

Abstract

FitGeek, a groundbreaking wellness platform, transcends the boundaries of traditional fitness websites, offering a revolutionary and transformative experience meticulously crafted to empower individuals on their journey toward achieving optimal health and peak physical fitness. This exceptional platform goes far beyond one-size-fits-all solutions, providing meticulously tailored wellness recommendations that align perfectly with each user's unique needs, preferences, and goals. FitGeek serves as a dedicated companion, expertly guiding users every step of the way, ensuring that their actions are in perfect harmony with their specific objectives, thereby magnifying the effectiveness of their fitness endeavors. What sets FitGeek apart is its unwavering commitment to fostering continuous learning and personal growth among its users. By delivering the most current trends, cutting-edge research findings, and industry-best practices in the realm of wellness, FitGeek keeps users impeccably well-informed and perpetually up-todate. It stands as an unparalleled resource, equipping individuals with the knowledge needed to make informed, life-changing decisions about their health and fitness. FitGeek is more than just a digital destination; it encapsulates an entire way of life. It encourages and inspires users to embrace the full spectrum of their well-being, take firm control of their health, and lead lives that are not only healthier but also brimming with happiness and vitality. Through its unique and highly personalized approach, steadfast guidance, and an unwavering commitment to continuous learning, FitGeek represents a paradigm shift in the world of fitness platforms, achieving remarkable progress in promoting holistic well-being for all.

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List of Abbreviations

HTML :	HyperText Markup Language
CSS :	Cascading Style Sheets
ML :	Machine Learning
AI :	Artificial Intelligence
SVM :	Support Vector Machine
NLP :	Natural Language Processing
K-NN :	K-Nearest Neighbors
API :	Application Programming Interface

Chapter 1

Introduction

In the contemporary fitness landscape, health enthusiasts often encounter daunting challenges: the perilous pitfall of unreliable internet information and the economic constraints hindering access to proper guidance. Recognizing these obstacles, FitGeek steps forward as the beacon of a transformative solution. At FitGeek, we understand the aspirations of fitness enthusiasts and the hurdles they face in their quest for a healthier lifestyle. We have meticulously crafted a platform that empowers fitness geeks with knowledge and dynamic animated exercises, effectively bridging the chasm between misinformation and economic barriers. Our mission is clear: to make fitness more accessible, safer, and attainable for everyone, regardless of their background or circumstances. In a world where digital information overload often leads to confusion, FitGeek stands as a reliable source of accurate guidance. We recognize the need for a trustworthy platform where users can confidently pursue their fitness goals, free from the shackles of misinformation. FitGeek offers precisely that—a sanctuary of authentic, reliable information right at the users' fingertips. Central to FitGeek's ethos is the belief in the power of knowledge. We empower our users to make informed decisions about their fitness journey. On our platform, users can delve into targeted workouts, honing in on specific muscle groups, and master corresponding exercises through detailed animations. FitGeek serves as a guiding light, illuminating the path to fitness success with clear, precise, and expert-backed information. FitGeek's vision extends beyond just individual empowerment; it encompasses a commitment to creating an inclusive fitness community. By bridging the gap between unreliable fitness information and the economic constraints that often hinder access to proper guidance, FitGeek ensures that the journey

to fitness is traversable by all. Our platform stands as a testament to the idea that with the right knowledge and resources, anyone can embark on a fitness journey confidently and safely. Join us at FitGeek, where empowerment meets expertise, and let us guide you toward a healthier, happier, and more fulfilling life. Together, we redefine the standards of fitness accessibility and reliability, fostering a community where everyone can thrive.

1.1 Motivation

The motivation behind FitGeek is deeply rooted in the recognition of the challenges faced by health enthusiasts on their fitness journeys. In a world inundated with vast amounts of information, often conflicting and unreliable, it has become increasingly difficult for individuals to discern accurate guidance from the abundance of misinformation. FitGeek's motivation is to be the guiding light in this age of digital overload.

One of FitGeek's primary objectives is to serve as a beacon of accuracy and reliability. We aim to provide meticulously curated, evidence-based information that empowers users to make well-informed decisions about their health and fitness. In doing so, we seek to dismantle the barriers of uncertainty that often hinder individuals on their fitness path. FitGeek's mission is to ensure that every fitness enthusiast can navigate their journey with confidence, free from the confusion and frustration that can result from unreliable sources.

1.2 Problem Statement

The contemporary fitness landscape presents a myriad of challenges for health enthusiasts worldwide. Two overarching issues cast a shadow over the pursuit of well-being: the proliferation of unreliable and often contradictory information on the internet and the economic barriers that limit access to proper fitness guidance. These issues pose substantial roadblocks to individuals seeking to embark on a safe, effective, and fulfilling fitness journey.

The first problem revolves around the abundance of misinformation in the digital age. With the internet serving as a breeding ground for content, individuals often encounter conflicting advice and dubious claims about fitness and health. This information overload leads to confusion, frustration, and uncertainty, making it difficult for people to make informed

decisions about their well-being. The lack of reliable sources has resulted in a crisis of trust and credibility, leaving health enthusiasts grappling with the question: "Whom can I trust?"

The second problem is rooted in the economic disparities that impede access to fitness resources. Traditional fitness programs, personal trainers, and expert guidance often come with substantial price tags, leaving many individuals, particularly those from economically disadvantaged backgrounds, without access to quality fitness education. This financial disparity perpetuates inequalities in health and well-being, limiting the opportunity for everyone to benefit from the knowledge required for a healthier lifestyle.

1.3 Objectives

- **Affordable and Accessible Fitness Guidance:** Our primary mission is to break down economic barriers and ensure that fitness guidance is accessible to individuals from all socioeconomic backgrounds. By offering a wealth of resources at no cost, we aim to democratize fitness education and make it available to everyone.

- **Comprehensive Exercise Instructions:** We are dedicated to providing users with a holistic fitness experience. Our platform offers comprehensive exercise instructions that include clear guidance, animated demonstrations, and precise timing. Additionally, it provides personalized workout plans tailored to individual goals and fitness levels. This ensures that users can perform exercises with confidence and accuracy, leading to effective and enjoyable workouts.

- **Healthcare Updates and Awareness:** Staying informed about the latest healthcare updates and critical health topics is crucial for well-being. FitGeek is committed to keeping users well-informed about these updates and raising awareness of essential health issues, empowering them to make informed decisions about their health.

- **Remote Access to Exercises and suitable workout plans:** We understand the importance of convenience in today's fast-paced world. FitGeek as well as HealthGeek offers users the convenience of remote access to exercise routines through a web platform. This enables users to work on their fitness goals from the comfort of their homes or any location of their choice.

- **Hydration Calculator:** Proper hydration is fundamental to well-being. HealthGeek integrates a hydration calculator, allowing users to monitor and maintain their hydration levels with ease. This feature ensures that users can stay on top of their water intake for optimal health. Additionally, HealthGeek provides a tentative drinking schedule based on individual factors such as activity levels, body weight, and environmental conditions. This helps users establish a routine for hydration throughout the day, promoting sustained well-being.

- **Disease Prediction Tools:** Health risks, such as diabetes and stress-related conditions, are a growing concern. HealthGeek incorporates disease prediction tools that leverage machine learning. These tools help users assess their risk factors and take preventive measures. Additionally, we provide personalized recommendations to address individual health needs, promoting proactive health management.

- **Mental Well-Being Emphasis:** Mental health is as crucial as physical health. HealthGeek prioritizes mental well-being by including stress level assessments and easy access to various mental health practices. Users can evaluate their stress levels using the Perceived Stress Scale (PSS) and access resources for relaxation, meditation, and stress management. This fosters a holistic approach to well-being, enabling users to identify their stress levels as low, moderate, or high, and take appropriate measures to address them.

- **Tailored Diet Recommendations:** Diet plays a pivotal role in one's fitness journey. FitGeek tailors diet recommendations based on users' unique body statistics. These personalized diet plans take into account individual goals, dietary restrictions, and health considerations, ensuring that users receive dietary guidance that suits their specific needs.

1.4 Scope

- Enhanced Fitness Progress: Our system employs AI-powered recommendations that adapt as users make progress, ensuring their workout plans are continually optimized for the best results. (Suitable for fitness enthusiasts at all levels)

- Calorie Intake Tracker and Analysis: We implement sophisticated algorithms to analyze calorie intake in relation to individual goals and dietary preferences, providing users with valuable insights into their nutrition. (Ideal for those looking to manage their calorie intake)

- Personalized Diet Plans: With the incorporation of nutritional analysis, our platform tailors diet plans to each user, ensuring they receive balanced and personalized dietary recommendations. (Beneficial for individuals seeking customized diet guidance)

- Hydration Calculator: Our innovative hydration calculator determines daily water intake requirements based on user profiles, activity levels, and environmental conditions, helping users stay adequately hydrated. (Useful for anyone looking to manage their hydration)

- Stress Level Assessment: We provide stress assessment tools, which can include surveys and integration with wearable devices, to accurately measure users' stress levels and offer appropriate guidance. (Valuable for those interested in monitoring and managing their stress)

- Mental Health Practices: Our platform integrates a range of mental health practices, including mindfulness and meditation exercises, and offers guided sessions and resources to enhance users' mental well-being. (Beneficial for individuals seeking to improve their mental health)

Chapter 2

Literature Review

[1] Dipankar Das and Shiva Murthy Busetty have developed a cutting-edge fitness application focused on automatic indoor exercise recognition and comfort analysis, achieving a remarkable 95.3 percent accuracy in activity recognition and 99.4 percent accuracy in repetition counting. This innovative system not only automates exercise identification but also provides real-time feedback on form and technique, enhancing both convenience and safety for users. However, potential challenges include the system's cost implications, particularly if wearable devices are required, and the influence of device quality and user technique on accuracy, underlining the importance of users' adherence to best practices and investment in quality equipment for optimal results.

In 2022, Ajitesh Sharma and Yatin Pandey worked on the design and implementation of a [2] fitness management website. Their project aimed to create a comprehensive platform with features such as online workout music, online payment options, and a questionnaire with AI assistance. While these features enhanced user experience, the project recognized that building a fitness website could be complex and expensive.

In 2022, Chi Zhang and Xiaoli Hu conducted research on the prediction of new media communication related to fitness culture and its influencing factors. Their study focused on [3] fitness video communication on the platform Bilibili. The research revealed that several factors played a significant role in the effectiveness of fitness video communication. These factors included the choice of themes, the use of subtitles, video duration, the size of the fan base, the gender of the video uploader, and the nationality of the content creator. Notably, the study found that fitness videos with themes related to weight loss and those with subtitles

tended to have lower effectiveness in communication on Bilibili.

In 2020, Parinaz Bulky's project focused on developing a sensor-based system for weight training. The system employed Inertial Measurement Units (IMUs) and utilized algorithms such as [4] Linear Discriminant Analysis (LDA) and Support Vector Machine (SVM). While the system effectively monitored weight training activities, it required external hardware devices for operation, potentially adding complexity and cost to its implementation.

In 2020, Ching-Ting Hsu's research project aimed to implement an Internet of Things (IoT) architecture for public fitness equipment to enhance physical fitness. The architecture provided ecient exercise routines and personalized prescriptions, potentially benefiting public fitness facilities. [5] However, implementing IoT architecture for public fitness equipment could come with challenges, including expenses related to installation and maintenance, as well as the need for users to possess technical knowledge for effective utilization.

Summary of the papers mentioned above:

In Table 2.1, a comprehensive summary of the referenced papers is provided, encapsulating their key findings, methodologies, and contributions. This tabulated overview serves as a succinct reference point, offering readers a quick understanding of the scope and significance of each paper within the context of the broader research landscape.

YEAR	AUTHOR	TITLE	OUTCOME	DRAWBACK
2022	Ajitesh Sharma; Yatin Pandey	Design and implementation of fitness management website	Member will have various attractive features on the website like online music for workout, online payment, also a questionnaire having feature with AI.	Developing a fitness SPA is a complex and expensive task with security and scalability issues, as well as business challenges such as marketing, and customer support.
2022	Chi Zhang; Xiaoli Hu	Prediction of New Media Communication of Fitness Culture and Its Influence Factors	Factors influencing fitness video communication on Bilibili include theme, duration, fan base, gender, and nationality.	Fitness videos on Bilibili with weight loss themes and videos with subtitles have lower communication effectiveness.
2020	Parinaz Bulky	A multipurpose sensor-based system for weight training	Device monitors weight and user activities by using IMU, LDA and SVM	Requires external hardware devices.
2020	Ching-Ting Hsu	Implementation of IoT Device on Public Fitness Equipment for Health Physical Fitness Improvement	IoT architecture for public fitness equipment improves physical fitness by providing efficient exercise and personalized prescriptions.	IoT architecture for public fitness equipment may be expensive to install and maintain and require technical knowledge to use effectively.
2017	Dipankar Das; Shiva Murthy Busetty	Strength Training: A Fitness Application for Indoor Based Exercise Recognition and Comfort Analysis	Automatic indoor exercise and comfort analysis system with 95.3 accuracy for activity recognition and 99.4 accuracy for repetition count.	Automatic indoor exercise recognition and comfort analysis system may be expensive and have accuracy issues depending on quality of devices and the user's technique.

Table 2.1: Summary of related papers

Chapter 3

Project Design

3.1 Existing System

Before the development of FitGeek, individuals relied on fragmented resources and traditional fitness methods to manage their wellness journey. The existing system lacked integration, personalization, and accessibility, leading to inefficiencies and limited effectiveness in achieving fitness goals. Users had to navigate through multiple platforms, such as fitness websites, forums, and mobile apps, to gather information on workouts, nutrition, and mental health. This disjointed approach made it challenging to access comprehensive and reliable guidance. Generic workout plans and nutrition advice failed to address the diverse needs and preferences of users. Without personalized recommendations, individuals struggled to find routines and dietary choices that aligned with their goals, fitness levels, and health conditions. Manual tracking of workouts, nutrition intake, and mental health activities was time-consuming and prone to errors. Without real-time feedback and progress monitoring, users found it difficult to stay motivated and track their improvements accurately.The absence of a supportive community environment deprived users of peer motivation, guidance, and accountability. Without forums or social features, individuals lacked opportunities for interaction, encouragement, and knowledge sharing. Privacy and data security were significant concerns in the existing system. Users hesitated to share personal health information due to the risk of data breaches or misuse by third parties.

3.2 Proposed System

The innovative platform, FitGeek, aims to redefine the approach to fitness and well-being by offering a cutting-edge, integrated wellness solution. Leveraging advanced technology, FitGeek provides personalized fitness guidance, convenient access to accurate information, and comprehensive health resources, thus revolutionizing users' fitness journeys.

In terms of architecture, FitGeek is designed with scalability in mind to ensure seamless user experiences across various devices. Comprising a user-friendly frontend interface, a robust backend server, and a secure database, the system facilitates smooth data flow and real-time updates through RESTful APIs.

While FitGeek focuses primarily on physical well-being, another component, HealthGeek, extends its scope to encompass a broader range of health factors, including mental health, dietary preferences, water intake calculation, and other aspects crucial to overall health.

With an emphasis on user experience, FitGeek boasts an intuitive, visually appealing interface developed using modern web technologies. The responsive design ensures consistent usability across desktops, tablets, and smartphones. The platform's dashboard serves as a centralized hub, offering personalized workout plans, nutrition guides, mental health resources, and progress tracking tools. Clear navigation menus and interactive elements enhance user engagement, guiding them seamlessly through the platform's features.

FitGeek's content section is a treasure trove of knowledge. Articles, videos, and infographics curated by health experts keep users informed about the latest healthcare updates, fitness trends, and wellness practices. It includes the following features:

- **Personalized Fitness Plans:** Tailored workout routines and diet recommendations based on individual goals and preferences.
- **Interactive Exercise Demos:** High-quality animations demonstrating correct exercise techniques for safe and effective workouts.
- **Nutrition Guidance:** Access to a nutrition database, recipes, and grocery lists for informed dietary choices.
- **Hydration Calculator:** A tool providing personalized hydration recommendations based on activity levels environmental conditions and other conditions.

- **Health and Wellness Content:** Curated articles, videos, and infographics on fitness, nutrition, mental health, and wellness trends.
- **Diabetes Prediction:** Predictive algorithms assessing health data, offering personalized recommendations and preventive measures.
- **Stress Determination Toolkit:** Stress assessment tool using the Perceived Stress Scale, meditation exercises, relaxation techniques, and mental health practices.
- **Progress Tracking:** Visual charts and analytics to monitor progress in workouts, nutrition, and mental health activities.

3.2.1 Critical Components of System Architecture

The critical components of the FitGeek system architecture align with its objectives and scope, ensuring that the platform effectively delivers its intended features and functionalities. Based on the provided content, the critical components of the system architecture can be summarized as follows:

- **Frontend Interface:** The frontend interface serves as the user's gateway to accessing FitGeek's features and functionalities. It facilitates affordable and accessible fitness guidance by providing a user-friendly interface that is easy to navigate and use. Offers comprehensive exercise instructions, healthcare updates, and mental well-being resources to users. Enables remote access to exercise routines, ensuring convenience for users accessing the platform from different locations. Integrates features such as the hydration calculator, stress level assessment tools, and mental health practices for holistic wellness management.
- **Backend Server:** The backend server handles user requests, manages data, and executes business logic. It supports Machine Learning powered recommendations for enhanced fitness progress, personalized diet plans, and stress level assessments. Implements sophisticated algorithms for calorie intake tracking and analysis, nutritional analysis, and hydration calculation. Ensures scalability, security, and performance to accommodate user growth and maintain system reliability.

- **Secure Database:** The secure database stores and manages user data, including personal information, fitness metrics, and health records. It supports data analysis and machine learning algorithms for disease prediction, personalized recommendations, and progress tracking.

- **Machine Learning Algorithms:** Machine learning algorithms play a crucial role in providing personalized recommendations, predictive analysis, and user insights. Algorithms such as K-Nearest Neighbors (K-NN), Support Vector Machine (SVM), and Content-Based Filtering are utilized for tasks such as disease prediction, diet recommendation, and exercise recommendation. Natural Language Processing (NLP) techniques are applied for stress level assessment and mental health practices.

3.3 System Diagrams

3.3.1 Activity Diagram

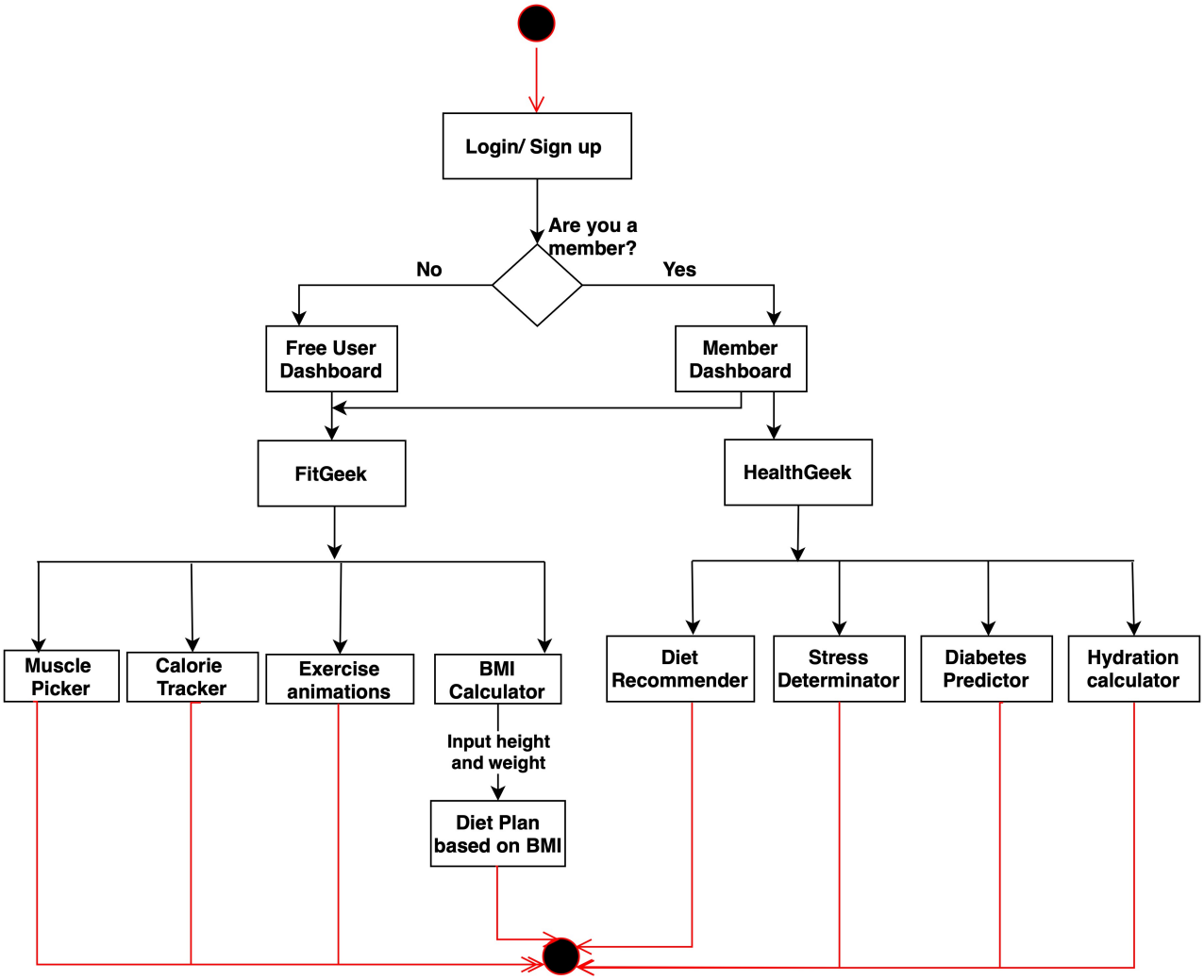


Figure 3.1: Activity Diagram

In FitGeek, both free users and membership users are directed to sign in or log in upon accessing the platform. Once logged in, they gain access to a wealth of user-accessible features tailored to enhance their fitness and wellness journey. From personalized fitness plans and nutrition guidance to mental health resources and community engagement features, FitGeek ensures that all users, whether free or subscribed, can fully immerse themselves in the platform's offerings.

3.3.2 Use Case Diagram

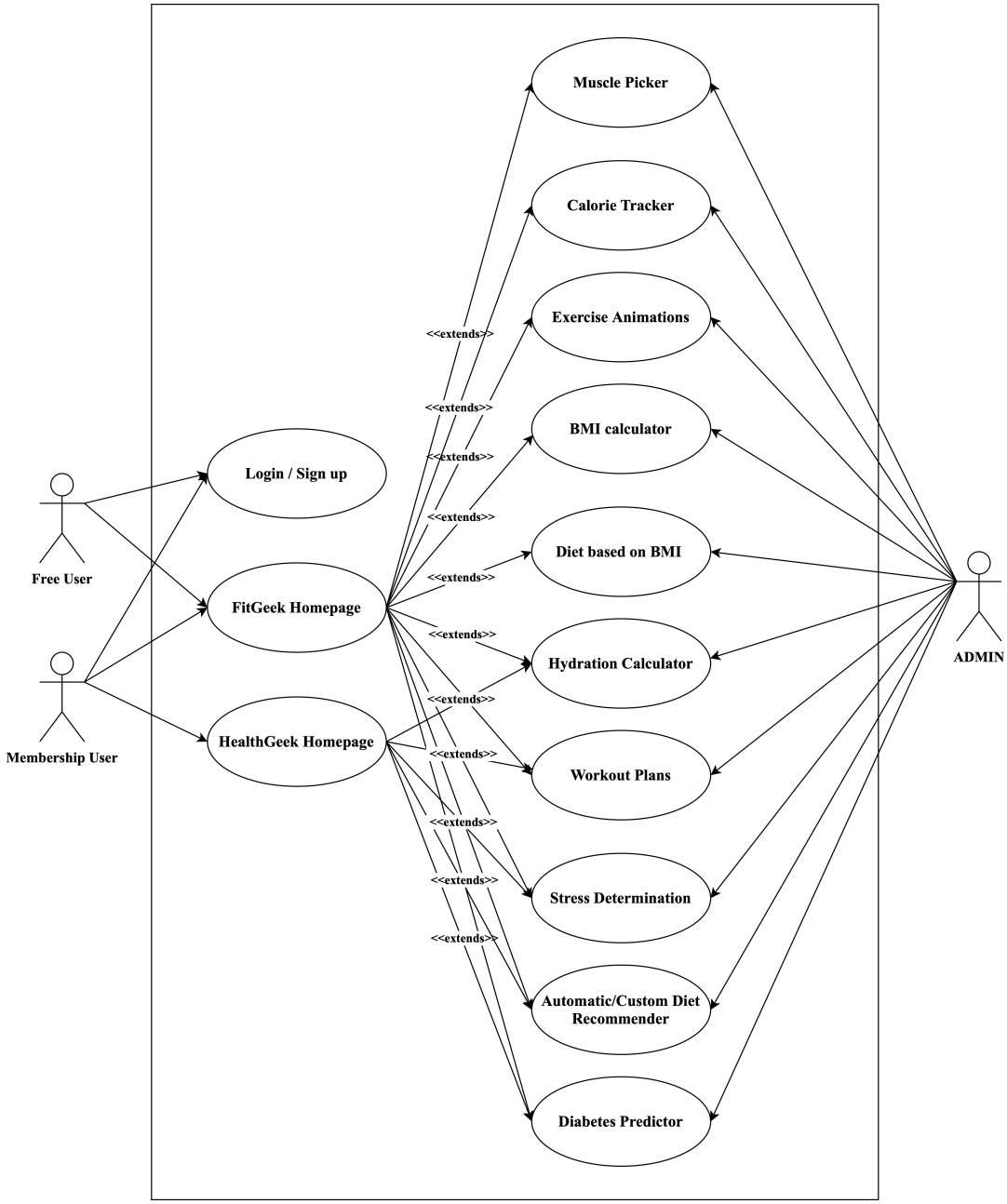


Figure 3.2: Use Case Diagram

A use case diagram illustrates the interactions between actors and a system, showing how users or external systems interact with the system to achieve specific goals. Actors represent users or external entities, while use cases represent the functionalities provided by the system. These diagrams are essential for capturing and communicating the system's functional requirements visually. The use case diagram describes various user actions and

features within the FitGeek and HealthGeek platforms:

User Actions:

- **Sign Up (FitGeek):** Users can register and create a FitGeek account to access fitness and wellness features.

FitGeek Features:

- **Picker:** Users can select exercises, diets, and wellness options.
- **Appointments:** Schedule appointments with fitness experts and nutritionists.
- **Tracker:** Monitor exercise progress and calorie tracking.
- **Exercises:** Access a library of exercise routines.
- **Diet based on BMI:** Receive personalized diet recommendations based on BMI.

HealthGeek Features:

- **Stress Level Predictor:** Predict and manage stress levels.
- **Diabetes Predictor:** Assess the risk of diabetes.
- **Diet Recommender:** Receive personalized diet plans.
- **Exercise Recommender:** Get exercise recommendations for specific health goals.
- **Hydration Calculator:** Calculate daily hydration requirements.

Admin: Admins have administrative privileges to manage users and content.

3.3.3 Sequence Diagram

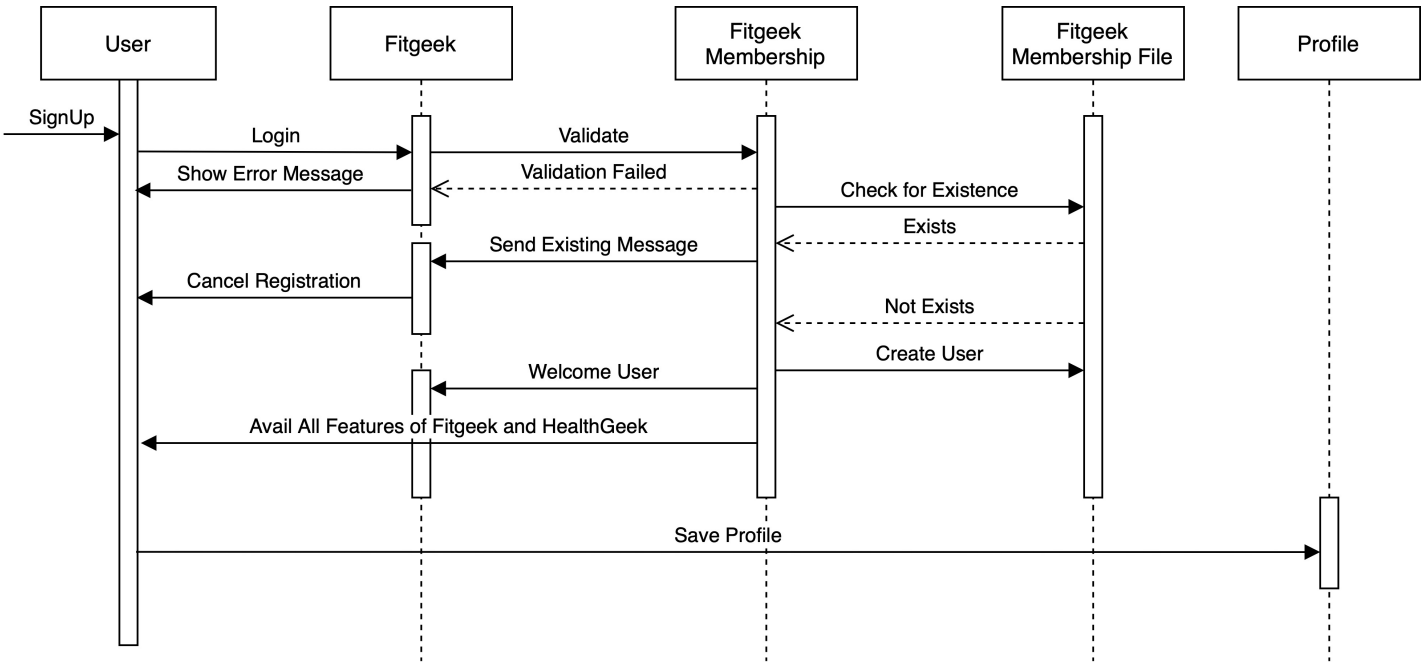


Figure 3.3: Sequence Diagram

The above diagram illustrates the sequence of interactions within the FitGeek project. It showcases the flow of communication between the user, frontend interface, backend server, and database components. This sequence diagram provides a visual representation of how different parts of the system interact with each other to fulfill user requests and process data.

3.3.4 Block Diagram

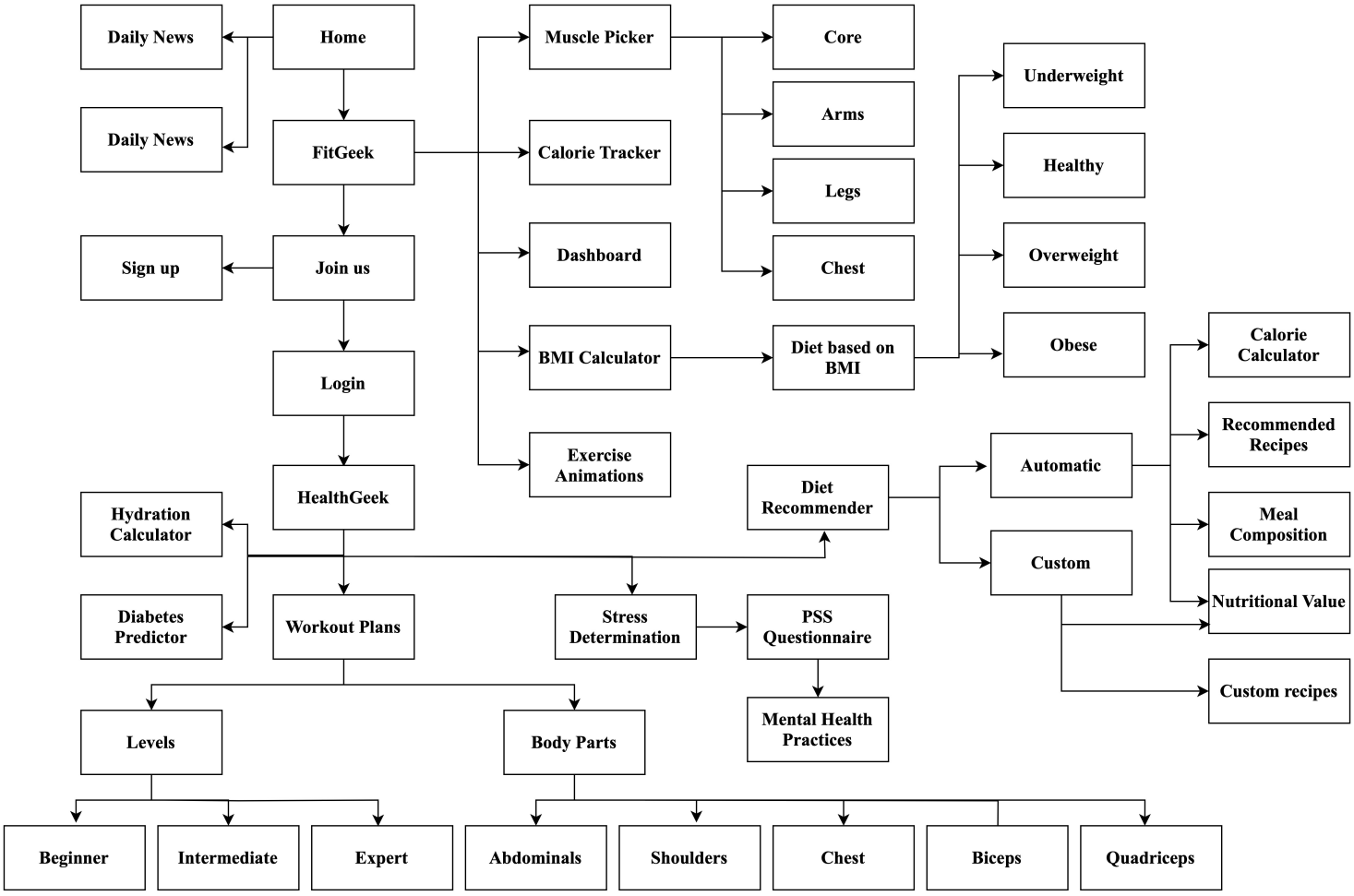


Figure 3.4: Block Diagram

The above diagram illustrates the structure of the FitGeek project. This diagram provides a visual representation of how different parts of the system are interconnected with each other.

Chapter 4

Project Implementation

Project implementation refers to the process of translating the design specifications of FitGeek into functional software components. This involves writing code for the frontend interface, backend server, database management, and machine learning algorithms. Additionally, implementation includes configuring servers, integrating APIs, and deploying the system to make it accessible to users. The implementation phase ensures that the features and functionalities outlined in the project requirements are effectively translated into working software components. It involves rigorous testing and debugging to ensure that the system operates smoothly and meets the needs of users for accessing fitness guidance, exercise routines, nutritional information, and mental well-being resources.

4.1 Code Snippets

Code snippets refer to small sections of code extracted from the FitGeek project that illustrate specific functionalities or implementations. These snippets provide insights into how certain features are implemented within the software. Examples of code snippets include functions for handling user authentication, algorithms for calculating calorie intake, scripts for database queries, or API integration methods. Each code snippet is accompanied by a brief description explaining its purpose and how it contributes to the overall functionality of the FitGeek platform. These snippets serve as valuable references for developers and stakeholders to understand the underlying implementation details of the software.

Figure 4.1: HTML file for dashboard

The HTML file for the dashboard in FitGeek serves as the user interface through which users interact with the platform's features and functionalities. It is a crucial component that presents users with relevant information, including fitness metrics, exercise instructions, health updates, and wellness resources. The HTML file is structured to ensure user-friendly navigation and accessibility, incorporating responsive design principles to accommodate various devices and screen sizes. Additionally, it integrates dynamic elements and interactive components to enhance user engagement and provide a seamless browsing experience. Overall, the HTML file for the dashboard plays a vital role in delivering a comprehensive and intuitive user interface for FitGeek users.

auto.py

```python
import streamlit as st
import pandas as pd
from Generate_Recommendations import Generator
from random import uniform as rnd
from ImageFinder.ImageFinder import get_images_links as find_image
from streamlit_echarts import st_echarts

st.set_page_config(page_title="Automatic Diet Recommendation", page_icon="💪",layout="wide")



nutritions_values=['Calories','FatContent','SaturatedFatContent','CholesterolContent','SodiumContent','CarbohydrateContent','FiberContent
# Streamlit states initialization
if 'person' not in st.session_state:
    st.session_state.generated = False
    st.session_state.recommendations=None
    st.session_state.person=None
    st.session_state.weight_loss_option=None
class Person:

    def __init__(self,age,height,weight,gender,activity,meals_calories_perc,weight_loss):
        self.age=age
        self.height=height
        self.weight=weight
        self.gender=gender
        self.activity=activity
        self.meals_calories_perc=meals_calories_perc
        self.weight_loss=weight_loss
    def calculate_bmi(self,):
        bmi=round(self.weight/((self.height/100)**2),2)
        return bmi

    def display_result(self,):
        bmi=self.calculate_bmi()
        bmi_string=f'{bmi} kg/m²'
        if bmi<18.5:
```

Figure 4.2: Python file for automatic diet recommendation

The Python file for automatic diet recommendation contains the code implementation of the automatic diet recommendation module. It includes algorithms for data processing, machine learning model training, and recommendation generation, enabling the module to deliver accurate and personalized diet plans to FitGeek users.

custom.py

```python
import streamlit as st
from Generate_Recommendations import Generator
from ImageFinder.ImageFinder import get_images_links as find_image
import pandas as pd
from streamlit_echarts import st_echarts

st.set_page_config(page_title="Custom Food Recommendation", page_icon="🔍",layout="wide")
nutrition_values=['Calories','FatContent','SaturatedFatContent','CholesterolContent','SodiumContent','CarbohydrateContent','FiberContent'
if 'generated' not in st.session_state:
    st.session_state.generated = False
    st.session_state.recommendations=None

class Recommendation:
    def __init__(self,nutrition_list,nb_recommendations,ingredient_txt):
        self.nutrition_list=nutrition_list
        self.nb_recommendations=nb_recommendations
        self.ingredient_txt=ingredient_txt
        pass
    def generate(self,):
        params={'n_neighbors':self.nb_recommendations,'return_distance':False}
        ingredients=self.ingredient_txt.split(';')
        generator=Generator(self.nutrition_list,ingredients,params)
        recommendations=generator.generate()
        recommendations = recommendations.json()['output']
        if recommendations!=None:
            for recipe in recommendations:
                recipe['image_link']=find_image(recipe['Name'])
        return recommendations

class Display:
    def __init__(self):
        self.nutrition_values=nutrition_values

    def display_recommendation(self,recommendations):
        st.subheader('Recommended recipes:')
        if recommendations!=None:
```

Figure 4.3: Python file for custom diet recommendation

The Python file for custom diet recommendation contains the code implementation of the custom diet recommendation module. It encompasses algorithms for user input processing, diet plan customization, and recommendation generation, enabling users to create bespoke diet plans that suit their unique requirements and preferences.

```python
import streamlit as st

def reverse_score(score):
    return 4 - score

def calculate_pss_score(answers):
    reversed_indices = [3, 4, 6, 7]  # Indices of questions to reverse score
    total_score = 0
    for i, ans in enumerate(answers):
        if i in reversed_indices:
            ans = reverse_score(ans)
        total_score += ans
    return total_score

def determine_stress_level(score):
    if score <= 13:
        return "Low stress"
    elif 14 <= score <= 26:
        return "Moderate stress"
    else:
        return "High stress"

def main():
    st.sidebar.title("About Perceived Stress Scale (PSS)")
    st.sidebar.write(
        """
        A more precise measure of personal stress can be determined by using a variety of instruments that
        have been designed to help measure individual stress levels. The first of these is called the Perceived
        Stress Scale.

        The Perceived Stress Scale (PSS) is a classic stress assessment instrument. The tool, while originally
        developed in 1983, remains a popular choice for helping us understand how different situations affect
        our feelings and our perceived stress. The questions in this scale ask about your feelings and thoughts
        during the last month. In each case, you will be asked to indicate how often you felt or thought a certain
        way. Although some of the questions are similar, there are differences between them and you should
        treat each one as a separate question. The best approach is to answer fairly quickly. That is, don't try to
        count up the number of times you felt a particular way; rather indicate the alternative that seems like
        a reasonable estimate.
        """
    )

    st.title("Perceived Stress Scale (PSS) Determination App")
    st.write("For each question, choose from the following alternatives:")
    st.write("0 - never")
    st.write("1 - almost never")
    st.write("2 - sometimes")
    st.write("3 - fairly often")
    st.write("4 - very often")
    st.header("Answer the following questions to determine your perceived stress level.")

    questions = [
        "In the last month, how often have you been upset because of something that happened unexpectedly?",
        "In the last month, how often have you felt that you were unable to control the important things in your life?",
        "In the last month, how often have you felt nervous and stressed?",
        "In the last month, how often have you felt confident about your ability to handle your personal problems?",
        "In the last month, how often have you felt that things were going your way?",
        "In the last month, how often have you found that you could not cope with all the things that you had to do?",
        "In the last month, how often have you been able to control irritations in your life?",
        "In the last month, how often have you felt that you were on top of things?",
        "In the last month, how often have you been angered because of things that happened that were outside of your control?",
        "In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?\n"
    ]

    answers = []
    for i, question in enumerate(questions):
        answer = st.slider(f"{i+1}. {question}", min_value=0, max_value=4, step=1)
```

Figure 4.4: Python file of Stress level determination

The Python file for perceived stress scale (PSS) analysis contains code for determining stress levels using the Perceived Stress Scale. The script involves administering the scale to individuals and analyzing their responses. The PSS typically consists of a set of questions or statements related to feelings and thoughts experienced over a specified period, such as the last month.

```python
import streamlit as st
import random
import pandas as pd
from sklearn.feature_extraction.text import TfidfVectorizer
from sklearn.metrics.pairwise import linear_kernel

# Load dataset
dataset = pd.read_csv("exercise_dataset.csv")

# Drop rows with missing values in the 'Desc' column
dataset = dataset.dropna(subset=['Desc'])

# Preprocess text data
tfidf = TfidfVectorizer(stop_words='english')
tfidf_matrix = tfidf.fit_transform(dataset['Desc'])

# Compute cosine similarity
cosine_sim = linear_kernel(tfidf_matrix, tfidf_matrix)

# Function to recommend exercises with workout plan
def recommend_exercises_with_plan(user_level, body_part, num_recommendations=5):
    filtered_dataset = dataset[(dataset['Level'] == user_level) & (dataset['BodyPart'] == body_part)]
    if filtered_dataset.empty:
        return None, f"No {user_level} level exercises found for the {body_part} body part."

    index = filtered_dataset.index[0] if len(filtered_dataset.index) > 0 else 0

    if index >= len(dataset):
        return None, f"Index out of bounds error."

    sim_scores = list(enumerate(cosine_sim[index]))
    sim_scores = sorted(sim_scores, key=lambda x: x[1], reverse=True)
    sim_scores = sim_scores[1:num_recommendations+1]
    exercise_indices = [i[0] for i in sim_scores]
    recommended_exercises = dataset.iloc[exercise_indices]

    return recommended_exercises, None

# Streamlit web app
st.title('Exercise Recommendation System')

# Select skill level and body part
user_level = st.selectbox('Select your skill level:', ['Beginner', 'Intermediate', 'Expert'])
body_part = st.selectbox('Select the body part:', ['Abdominals', 'Quadriceps', 'Shoulders', 'Chest', 'Biceps'])
num_recommendations = st.slider('Number of recommendations', min_value=1, max_value=10, value=5)

# Button to recommend exercises
if st.button('Recommend Exercises'):
    recommended_exercises, error_message = recommend_exercises_with_plan(user_level, body_part, num_recommendations)

    # Display recommended exercises in a table
    if recommended_exercises is not None:
        st.subheader("Workout Plan:")
        workout_plan_data = []
        for exercise in recommended_exercises.itertuples():
            repetitions = random.randint(1, 5)  # Random repetitions between 1 and 5
            break_time = random.randint(1, 10)  # Random break time between 1 and 10
            workout_plan_data.append([
                exercise.Title,
                exercise.Desc,
                f"{repetitions} times",  # Include units for "Repeat" column
                f"{break_time} minutes"  # Include units for "Break time" column
            ])
        workout_plan_df = pd.DataFrame(workout_plan_data, columns=['Exercise', 'Description', 'Repeat', 'Break time'])

        # Display the table with text wrapping for "Repeat" and "Break time" columns
        st.table(workout_plan_df)
    else:
        st.write(error_message)
```

Figure 4.5: Python file of Exercise Recommendation System

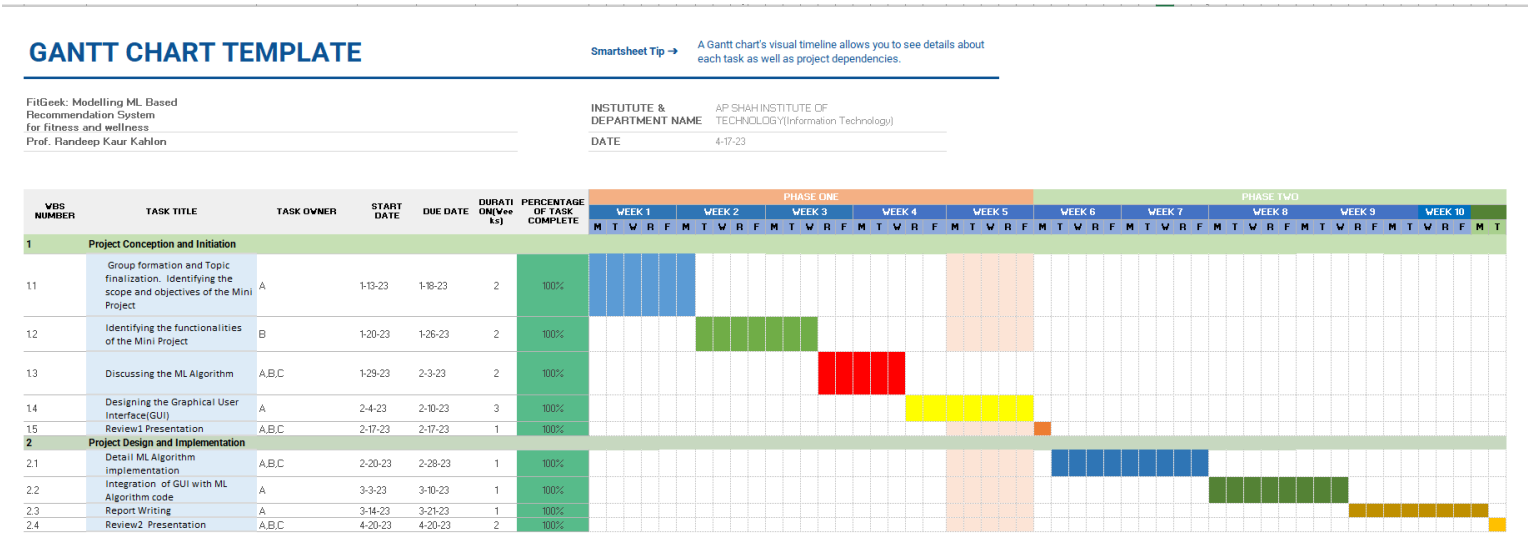
The Python file of Exercise Recommedation System in which the user can gain access to a workout plan based on their activity level.

4.2 Steps to access the System

1. Download the zip file.
2. Open the folder (FitGeek) in the terminal or command prompt.
3. Create a Virtual Environment and open the venv folder.
4. Activate the Virtual environment:
   - For Windows: `.\Scripts\activate`
   - For Mac: `source Scripts/activate`
5. Run `python manage.py runserver`.
6. Open the given link to access the website.
7. Create a superuser.
8. Access the database via '*given-link*/health-admin'. (Example: 'http://127.0.0.1:8000/health-admin')

4.3 Timeline Sem VII

This timeline outlines the project milestones, tasks, and deadlines for Semester VII of the FitGeek project. It includes key activities such as software development, testing phases, documentation, and project reviews, providing a structured plan for project execution and management.



GANTT CHART TEMPLATE

Smartsheet Tip → A Gantt chart's visual timeline allows you to see details about each task as well as project dependencies.

FitGeek: Modelling ML Based Recommendation System for fitness and wellness
Prof. Randeep Kaur Kahlon

INSTUTUTE & DEPARTMENT NAME: AP SHAH INSTITUTE OF TECHNOLOGY(Information Technology)
DATE: 4-17-23

WBS NUMBER	TASK TITLE	TASK OWNER	START DATE	DUE DATE	DURATION(Weeks)	PERCENTAGE OF TASK COMPLETE
1	**Project Conception and Initiation**					
1.1	Group formation and Topic finalization. Identifying the scope and objectives of the Mini Project	A	1-13-23	1-18-23	2	100%
1.2	Identifying the functionalities of the Mini Project	B	1-20-23	1-26-23	2	100%
1.3	Discussing the ML Algorithm	A,B,C	1-29-23	2-3-23	2	100%
1.4	Designing the Graphical User Interface(GUI)	A	2-4-23	2-10-23	3	100%
1.5	Review1 Presentation	A,B,C	2-17-23	2-17-23	1	100%
2	**Project Design and Implementation**					
2.1	Detail ML Algorithm implementation	A,B,C	2-20-23	2-28-23	1	100%
2.2	Integration of GUI with ML Algorithm code	A	3-3-23	3-10-23	1	100%
2.3	Report Writing	A	3-14-23	3-21-23	1	100%
2.4	Review2 Presentation	A,B,C	4-20-23	4-20-23	2	100%

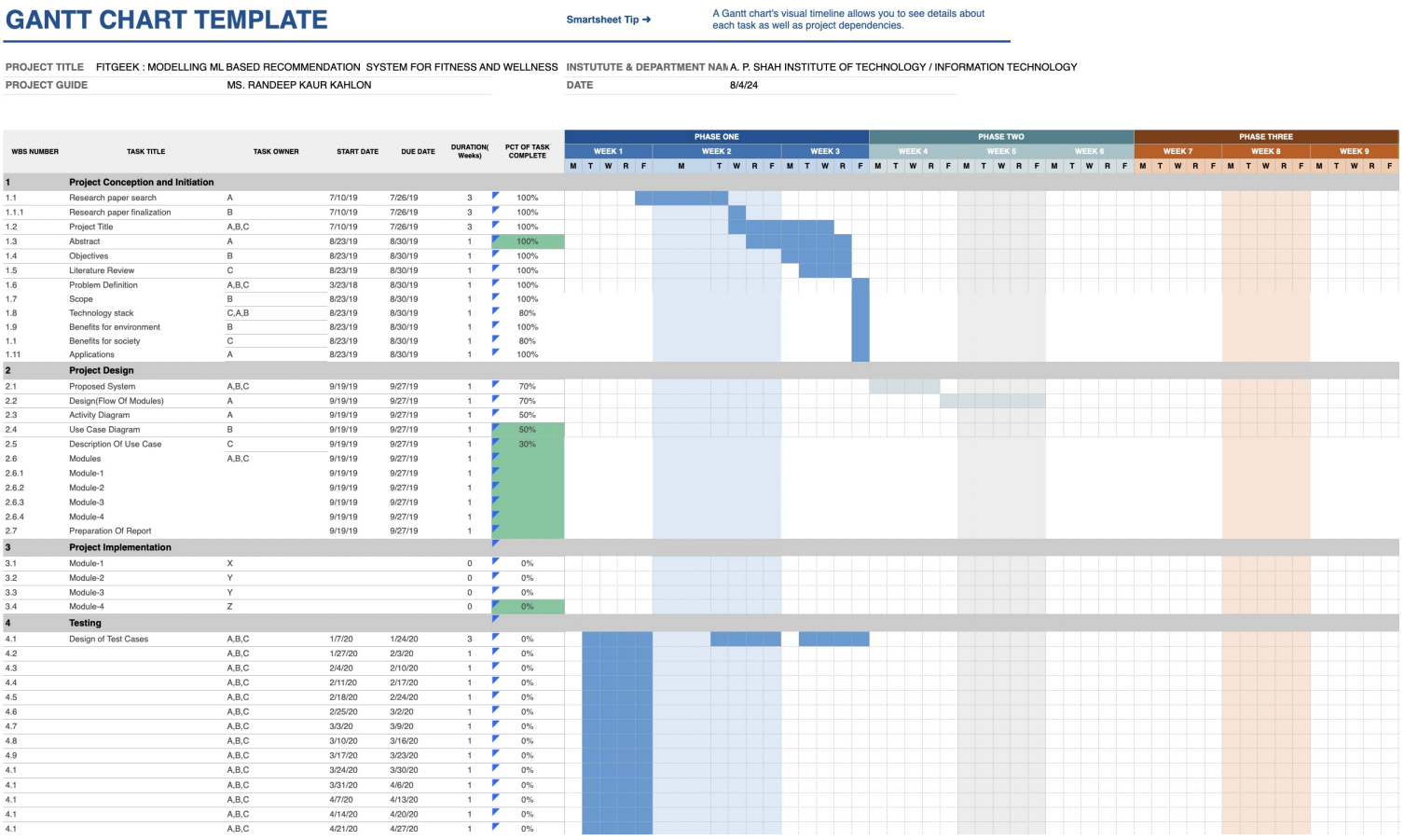
PHASE ONE: WEEK 1 | WEEK 2 | WEEK 3 | WEEK 4 | WEEK 5
PHASE TWO: WEEK 6 | WEEK 7 | WEEK 8 | WEEK 9 | WEEK 10

Figure 4.6: Timeline Sem VII

The timeline for Semester VII visually represents the schedule and progress of the FitGeek project during this academic semester. It includes milestones, deadlines, and dependencies to track the completion of tasks and ensure project delivery within the specified timeline.

4.4 Timeline Sem VIII

The timeline for Semester VIII illustrates the continuation of the FitGeek project into the next academic semester. It encompasses ongoing development activities, refinement of features, integration of feedback, and finalization of project deliverables, aiming for project completion and presentation by the end of the semester.



GANTT CHART TEMPLATE

Smartsheet Tip → A Gantt chart's visual timeline allows you to see details about each task as well as project dependencies.

PROJECT TITLE: FITGEEK : MODELLING ML BASED RECOMMENDATION SYSTEM FOR FITNESS AND WELLNESS
INSTUTUTE & DEPARTMENT NAM: A. P. SHAH INSTITUTE OF TECHNOLOGY / INFORMATION TECHNOLOGY
PROJECT GUIDE: MS. RANDEEP KAUR KAHLON
DATE: 8/4/24

PHASE ONE: WEEK 1, WEEK 2, WEEK 3 | PHASE TWO: WEEK 4, WEEK 5, WEEK 6 | PHASE THREE: WEEK 7, WEEK 8, WEEK 9

WBS NUMBER	TASK TITLE	TASK OWNER	START DATE	DUE DATE	DURATION(Weeks)	PCT OF TASK COMPLETE
1	**Project Conception and Initiation**					
1.1	Research paper search	A	7/10/19	7/26/19	3	100%
1.1.1	Research paper finalization	B	7/10/19	7/26/19	3	100%
1.2	Project Title	A,B,C	7/10/19	7/26/19	3	100%
1.3	Abstract	A	8/23/19	8/30/19	1	100%
1.4	Objectives	B	8/23/19	8/30/19	1	100%
1.5	Literature Review	C	8/23/19	8/30/19	1	100%
1.6	Problem Definition	A,B,C	3/23/18	8/30/19	1	100%
1.7	Scope	B	8/23/19	8/30/19	1	100%
1.8	Technology stack	C,A,B	8/23/19	8/30/19	1	80%
1.9	Benefits for environment	B	8/23/19	8/30/19	1	100%
1.1	Benefits for society	C	8/23/19	8/30/19	1	80%
1.11	Applications	A	8/23/19	8/30/19	1	100%
2	**Project Design**					
2.1	Proposed System	A,B,C	9/19/19	9/27/19	1	70%
2.2	Design(Flow Of Modules)	A	9/19/19	9/27/19	1	70%
2.3	Activity Diagram	A	9/19/19	9/27/19	1	50%
2.4	Use Case Diagram	B	9/19/19	9/27/19	1	50%
2.5	Description Of Use Case	C	9/19/19	9/27/19	1	30%
2.6	Modules	A,B,C	9/19/19	9/27/19	1	
2.6.1	Module-1		9/19/19	9/27/19	1	
2.6.2	Module-2		9/19/19	9/27/19	1	
2.6.3	Module-3		9/19/19	9/27/19	1	
2.6.4	Module-4		9/19/19	9/27/19	1	
2.7	Preparation Of Report		9/19/19	9/27/19	1	
3	**Project Implementation**					
3.1	Module-1	X			0	0%
3.2	Module-2	Y			0	0%
3.3	Module-3	Y			0	0%
3.4	Module-4	Z			0	0%
4	**Testing**					
4.1	Design of Test Cases	A,B,C	1/7/20	1/24/20	3	0%
4.2		A,B,C	1/27/20	2/3/20	1	0%
4.3		A,B,C	2/4/20	2/10/20	1	0%
4.4		A,B,C	2/11/20	2/17/20	1	0%
4.5		A,B,C	2/18/20	2/24/20	1	0%
4.6		A,B,C	2/25/20	3/2/20	1	0%
4.7		A,B,C	3/3/20	3/9/20	1	0%
4.8		A,B,C	3/10/20	3/16/20	1	0%
4.9		A,B,C	3/17/20	3/23/20	1	0%
4.1		A,B,C	3/24/20	3/30/20	1	0%
4.1		A,B,C	3/31/20	4/6/20	1	0%
4.1		A,B,C	4/7/20	4/13/20	1	0%
4.1		A,B,C	4/14/20	4/20/20	1	0%
4.1		A,B,C	4/21/20	4/27/20	1	0%

Figure 4.7: Timeline Sem VIII

The timeline for Semester VIII provides an overview of the project's progress and activities during this phase. It includes tasks related to finalizing software components, conducting comprehensive testing, refining user interfaces, preparing documentation, and making final presentations, ensuring the successful completion and demonstration of the FitGeek project.

Chapter 5

Testing

5.1 Software Testing

Software testing is a process of evaluating a software product to ensure that it meets the specified requirements and works correctly. The main goal of software testing is to identify defects or errors in the software and to ensure that the software meets the business and technical requirements, is reliable, and performs as expected. The testing process includes a series of activities that can be performed manually or using automated tools, and it typically involves testing the functionality, performance, security, usability, and compatibility of the software. The ultimate goal of software testing is to improve the quality of the software and to ensure that it meets the needs and expectations of the users.

5.2 Functional Testing

Frontend Interface: Verify that all navigation links/buttons are functional and lead to the correct pages. Test the responsiveness of the interface on different devices (desktop, tablet, smartphone). Ensure that user input forms (e.g., registration, login, feedback) validate input data correctly. Confirm that interactive elements (e.g., sliders, dropdown menus) behave as expected. Validate that multimedia content (videos, animations) loads and plays without errors. Check for accessibility features such as screen reader compatibility and keyboard navigation.

Backend Server: Test API endpoints for CRUD operations (Create, Read, Update,

Delete) on user data (workout plans, nutrition data, user profiles). Verify that business logic for generating personalized recommendations (fitness plans, diet recommendations) functions correctly. Test error handling mechanisms for scenarios such as invalid input, server errors, and network timeouts. Assess scalability by simulating a large number of concurrent user requests and monitoring system performance. Validate security measures such as encryption, authentication, and authorization mechanisms.

Secure Database: Test database connectivity and ensure data integrity by performing CRUD operations on sample data. Verify that data encryption mechanisms are applied correctly to sensitive user information. Test backup and recovery procedures to ensure data persistence in case of system failures. Evaluate database performance under load conditions and optimize query execution times if necessary.

Machine Learning Algorithms: Validate the accuracy of machine learning models by comparing predictions against known test data. Test edge cases and boundary conditions to assess the robustness of predictive algorithms. Verify that algorithms provide personalized recommendations based on user data and preferences. Assess the scalability of machine learning algorithms for handling large datasets and concurrent user requests.

Community Engagement Features: Test functionality for creating, editing, and deleting user-generated content (forum posts, chat messages, shared content). Test real-time communication features (chat support) to ensure messages are delivered promptly and accurately.

Overall System Integration: Perform end-to-end testing to ensure seamless interaction between frontend, backend, and database components. Validate data flow and synchronization across different modules of the system. Test system behavior under various user scenarios (e.g., new user registration, updating profile information, tracking fitness progress).

Chapter 6

Result and Discussions

FitGeek has undergone a thorough development process resulting in the creation of a robust and user-friendly wellness platform. By carefully planning each stage, from conceptualization to implementation, FitGeek has emerged as a comprehensive solution for individuals seeking to improve their fitness and overall well-being. The platform's feature set is diverse and inclusive, offering personalized fitness plans tailored to individual goals and preferences, along with nutrition guidance, mental health resources, and community engagement features. Through meticulous software testing efforts, encompassing various testing methodologies such as functional, non-functional, and user acceptance testing, FitGeek has been rigorously evaluated for reliability, security, and usability. As a result, the platform has demonstrated its ability to deliver on its promises, providing users with a seamless and effective experience. Feedback from users and stakeholders has been overwhelmingly positive, with many praising FitGeek's intuitive interface, personalized recommendations, and supportive community environment. Looking ahead, the project team will leverage insights gained from testing activities and user feedback to drive future enhancements and optimizations. By continuously refining and expanding the platform's capabilities, FitGeek aims to solidify its position as a leader in promoting holistic wellness and empowering individuals to achieve their fitness and well-being goals with confidence and ease.

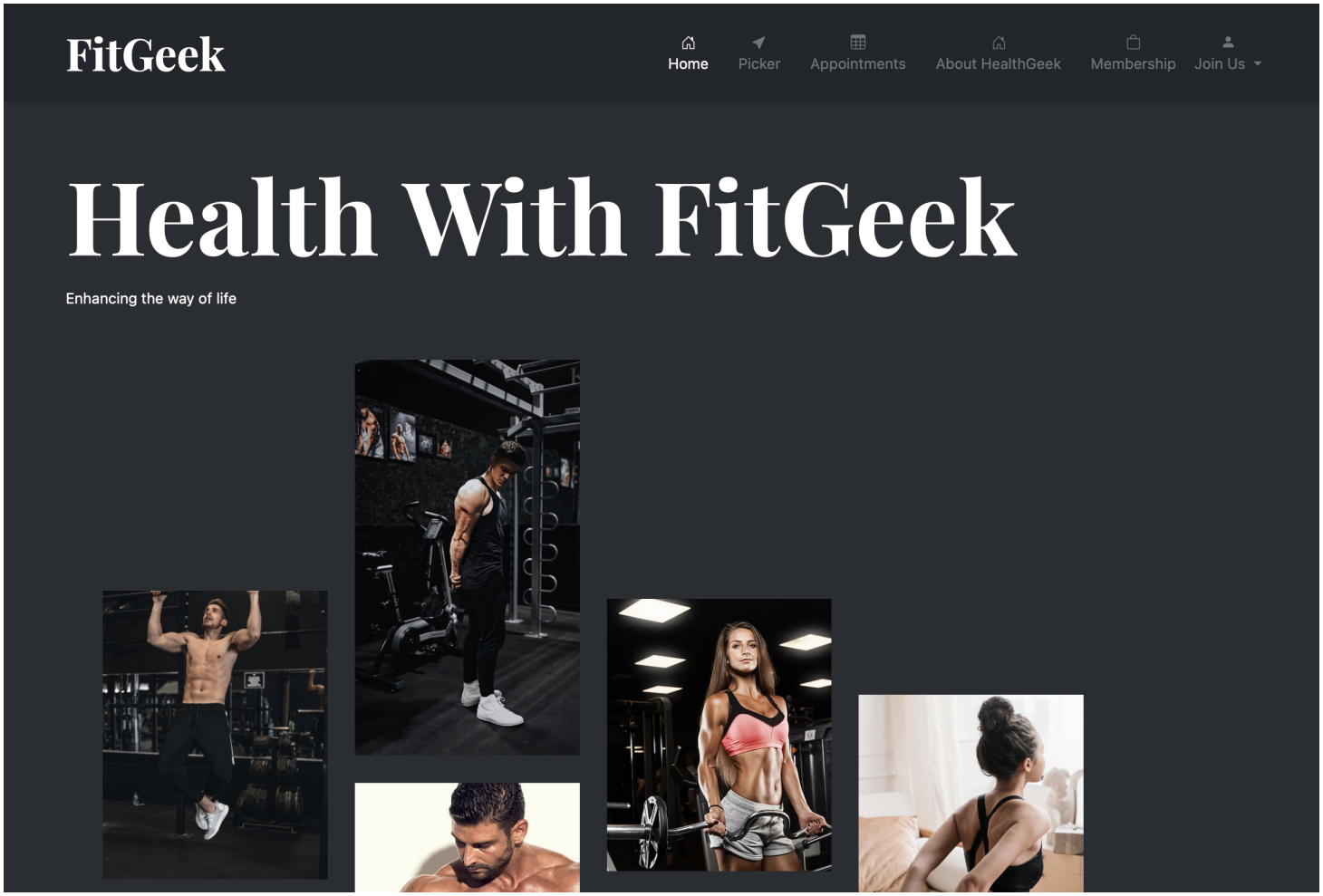


Figure 6.1: FitGeek Homepage

The above image showcases the dynamic homepage of the FitGeek website, meticulously designed to cater to fitness enthusiasts. Featuring an array of intuitive tabs, including Muscle Picker, Appointments, About HealthGeek, Membership, and Join Us, the interface beckons users to explore its diverse features.

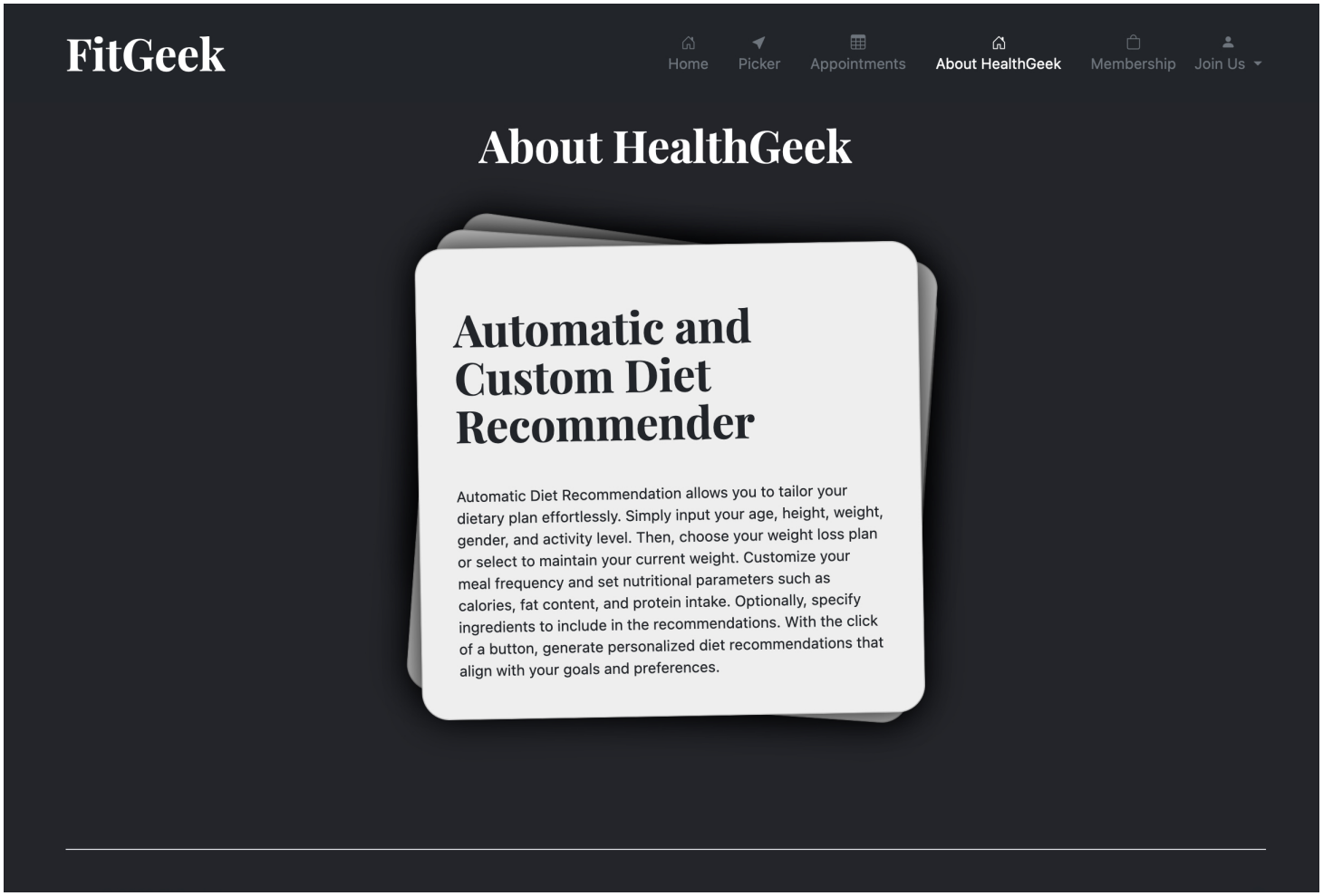


Figure 6.2: About HealthGeek

The image above displays the 'About HealthGeek' tab, outlining several exclusive features tailored for members. These include a hydration calculator for optimal water intake, a stress level determination tool, an automatic diet recommender, customizable to individual preferences, and a diabetes predictor for proactive health management.

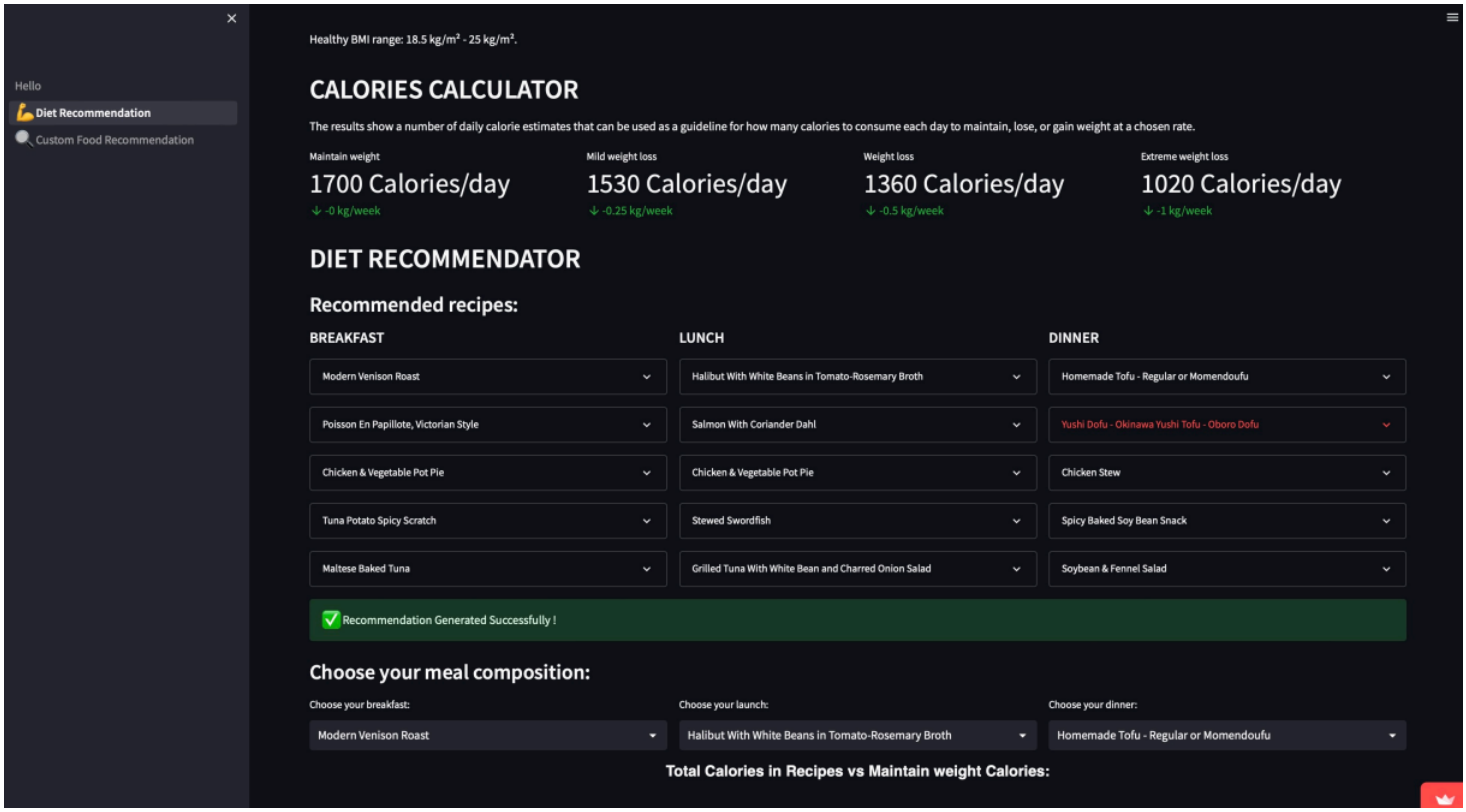


Figure 6.3: Automatic diet recommendation

The output of the automatic diet recommendation module showcases the recommended dietary plan generated by the FitGeek system based on user inputs and predefined algorithms. It includes details such as meal plans, calorie distribution, nutritional information, and suggested food items, providing users with personalized dietary guidance tailored to their fitness goals and nutritional requirements.

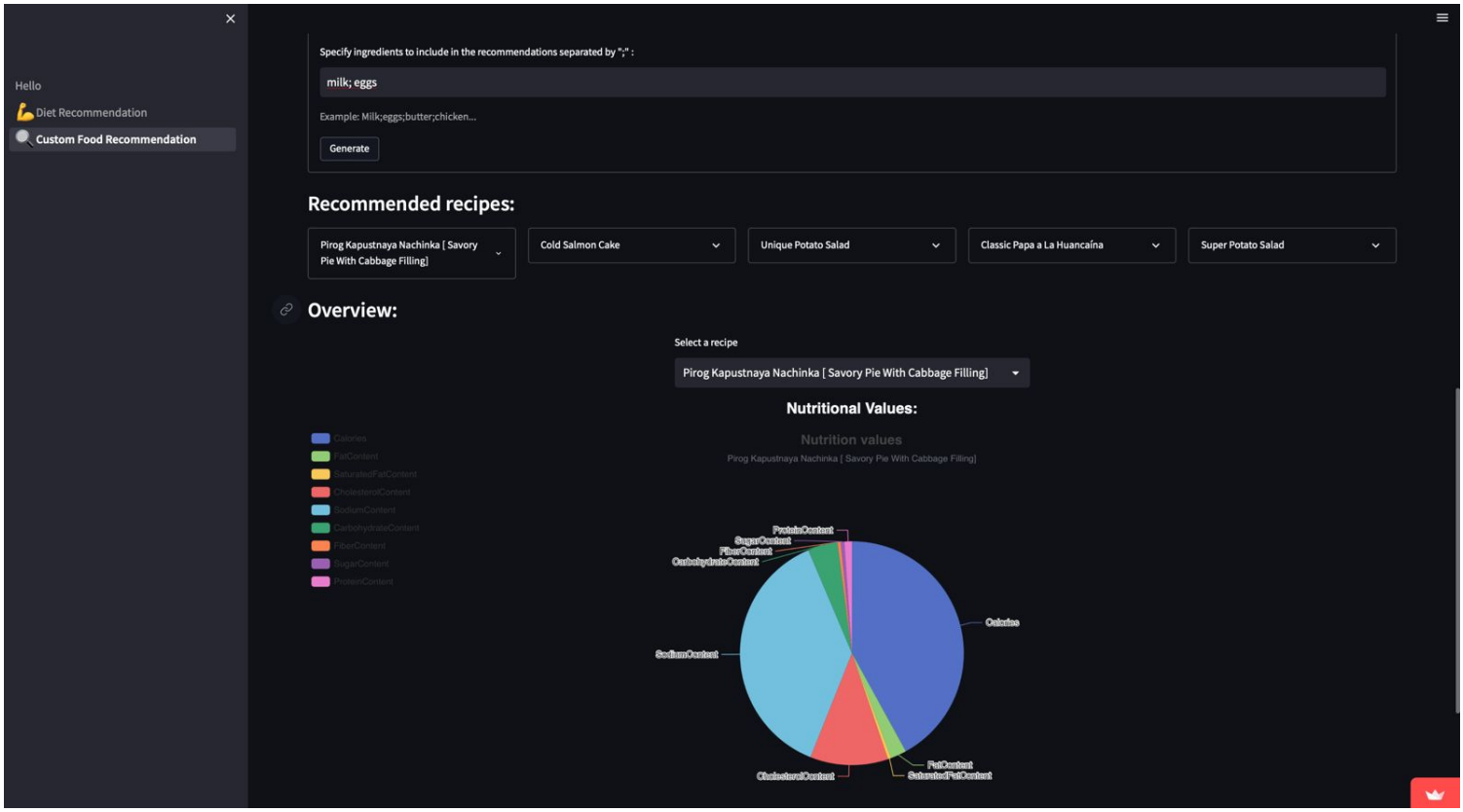


Figure 6.4: Custom diet recommendation

The output of the custom diet recommendation module illustrates the personalized dietary plan crafted by the FitGeek platform in response to user-specific inputs and preferences. This output encompasses detailed meal schedules, nutrient breakdowns, recommended food choices, and caloric distributions, catering to the individualized nutritional needs and fitness objectives of users.

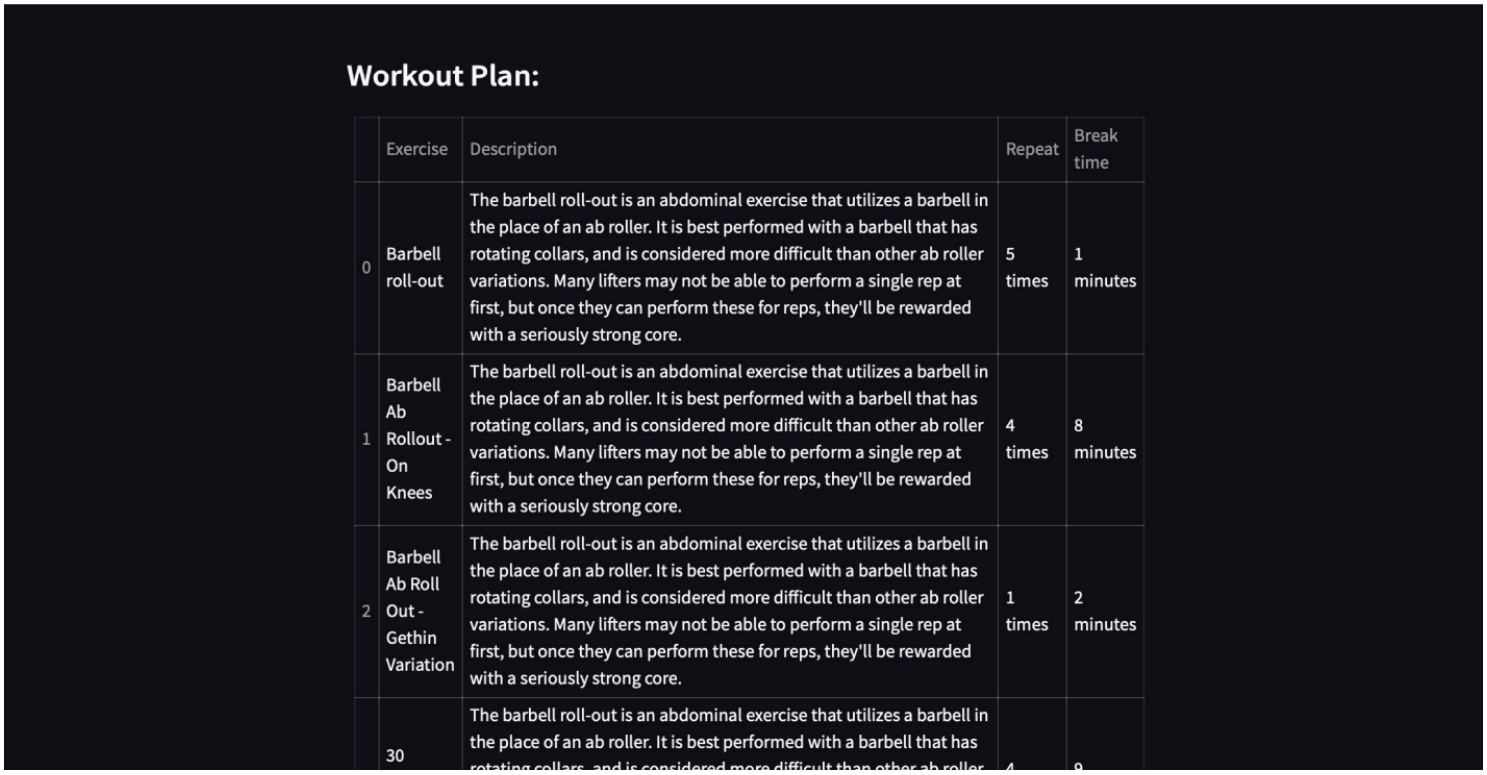


Figure 6.5: Exercise recommendations

The output of the exercise recommendation feature showcases personalized workout routines curated by the FitGeek platform based on user's activity level, fitness goals, and preferences. It presents users with comprehensive exercise plans, including detailed instructions, recommended sets and repetitions, and targeted muscle groups, enabling them to engage in tailored fitness activities aligned with their individual needs and aspirations.

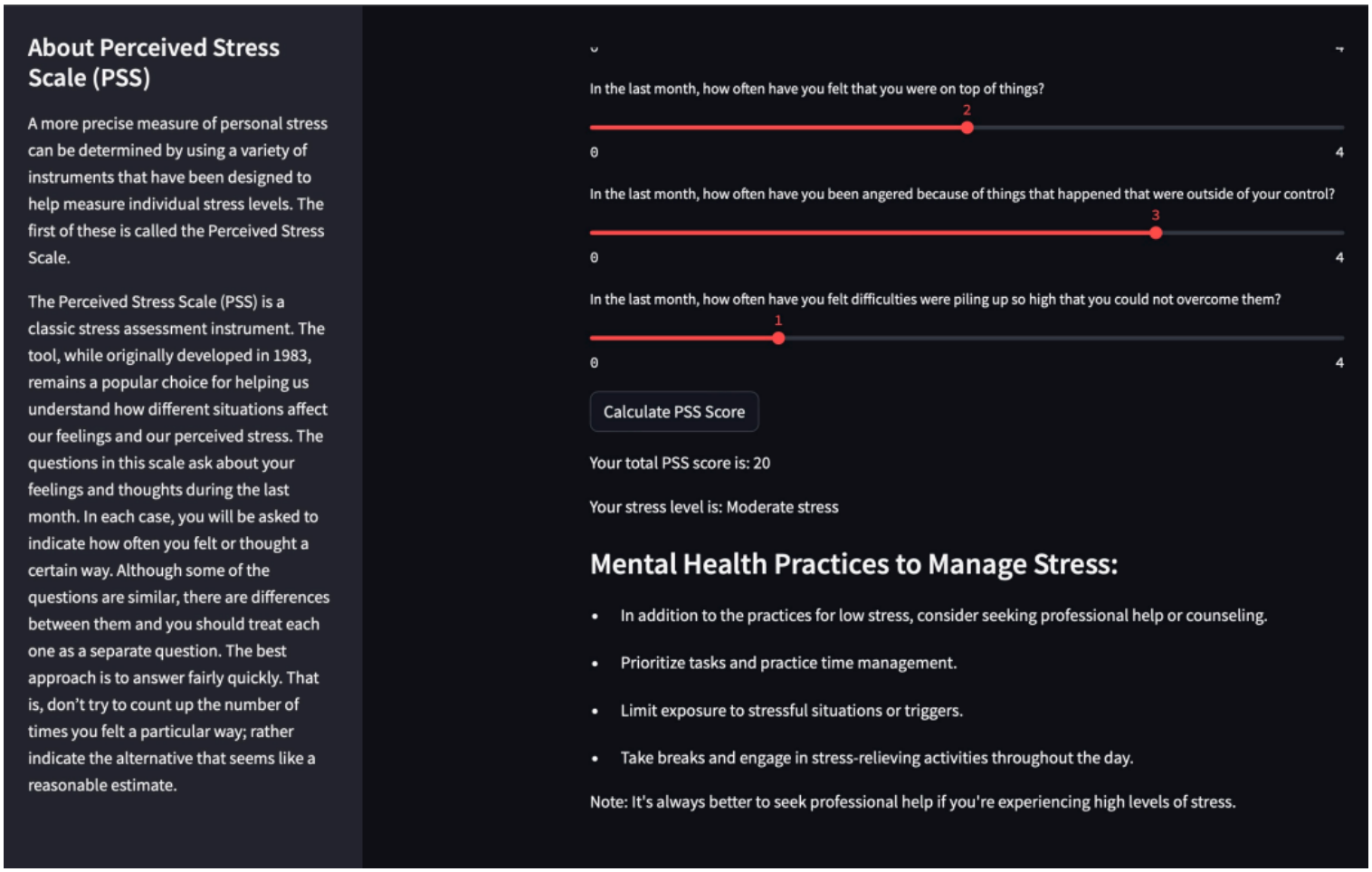


Figure 6.6: Perceived stress scale determination

The output of the perceived stress scale determination module categorizes users' stress levels as low, moderate, or high based on their responses to stress assessment tools integrated into the FitGeek platform. In addition to identifying stress levels, the module suggests tailored mental health practices and resources to help users effectively manage their stress and promote overall well-being.

Chapter 7

Conclusion

In its journey from conception to realization, FitGeek has emerged as a beacon of innovation and progress in the realm of wellness technology. Through meticulous planning and execution, FitGeek has successfully crafted a multifaceted platform designed to cater to the diverse needs and aspirations of its users. By integrating cutting-edge features such as personalized fitness plans, nutrition guidance, mental health resources, and community engagement tools, FitGeek has transcended the conventional boundaries of fitness applications, offering a holistic approach to well-being.The platform's success can be attributed to its unwavering commitment to quality and user-centric design. Rigorous software testing, spanning functional, non-functional, and user acceptance testing, has ensured that FitGeek delivers on its promises of reliability, security, and usability. User feedback has been overwhelmingly positive, with users commending the platform's intuitive interface, personalized recommendations, and vibrant community atmosphere. This validation from users and stakeholders serves as a testament to FitGeek's efficacy in empowering individuals to take control of their health and fitness journey. Looking forward, FitGeek remains dedicated to continuous improvement and innovation. By leveraging insights gleaned from testing and user feedback, the platform aims to refine existing features and introduce new functionalities that further enhance the user experience. FitGeek's mission to promote holistic wellness and empower individuals to lead healthier lives remains unwavering. With a steadfast commitment to innovation, quality, and user satisfaction, FitGeek is poised to make a lasting impact in the ever-evolving landscape of wellness technology.

Chapter 8

Future Scope

The future scope for FitGeek is promising, with opportunities for advanced personalization, integration with wearable technology, gamification, expanded content offerings, virtual coaching, and strategic partnerships. By enhancing personalization capabilities through data analytics and machine learning, FitGeek can provide even more tailored fitness plans, nutrition recommendations, and mental health resources to users. Integration with wearable devices will enable real-time activity tracking and deeper insights into users' fitness levels. Gamification elements, such as challenges and rewards, can make fitness more engaging and motivating. Expanding content offerings to include topics like mindfulness and stress management will provide users with a holistic approach to well-being. Virtual coaching features can offer personalized guidance and support, while partnerships with healthcare providers and wellness programs will extend FitGeek's reach and impact in promoting wellness.

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Appendices

FitGeek uses a virtual environment which isolates the project's dependencies, ensuring that the Django project can have its own unique Python and package environment, preventing conflicts and ensuring version compatibility. This isolation enhances security, as it limits the potential impact on your system's global Python environment. It also makes the project more portable and simplifies dependency management, aiding in project sharing and deployment. In essence, virtual environments are a best practice for Django development, enhancing project organization, reliability, and maintainability.

Appendix - A

Setting up a Django Project in a Virtual Environment

Prerequisites

- Install Python from the official website: `https://www.python.org/downloads/windows/`.
- Install `virtualenv` using `pip`: [language=Python] pip install virtualenv

Create a Virtual Environment

- Open a Command Prompt or PowerShell window.
- Navigate to your desired directory: [language=Python] cd path→
- Create a virtual environment (replace `myenv` with your desired environment name): [language=Python] virtualenv myenv

Activate the Virtual Environment

- Activate the virtual environment (Command Prompt and PowerShell have different activation commands): [language=Python] For Command Prompt: myenv [language=Python] For PowerShell: .

Install Django

- While the virtual environment is active, install Django using `pip`: [language=Python] pip install django

Create a Django Project

- Create a new Django project (replace `myproject` with your project name): [language=Python] django-admin startproject myproject

Navigate to Your Project Directory

- Change your working directory to the project folder: [language=Python] cd myproject

Migrate the Database

- Apply the initial database migrations: [language=Python] python manage.py migrate

Create an Admin User (Optional)

- Create an admin user to access the Django admin panel: [language=Python] python manage.py createsuperuser Follow the prompts to create the admin user with a username, email, and password.

Run the Development Server

- Start the Django development server: [language=Python] python manage.py runserver By default, the server will run on `http://127.0.0.1:8000/`.

Access Your Project

- Open a web browser and go to `http://127.0.0.1:8000/` to see your Django project in action.

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Abstract: FitGeek is revolutionizing wellness by making well-being accessible to all through personalized solutions driven by cutting-edge technology. At its core, FitGeek tailors fitness-related plans like diet or exercises using machine learning, catering to individual preferences and goals while fostering a vibrant community of enthusiasts and experts. Prioritizing accessibility and affordability, the platform offers clear, animated exercises and user-friendly guidance.Integrating disease predictors, personalized diet suggestions, stress estimation tool, and mental health practices, FitGeek stands as a lifelong partner in the pursuit of holistic well-being, aiming to make fitness an achievable and enjoyable journey for everyone.

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Primary Subject Area: AI & Deep Learning

FitGeek: Modelling ML Based Recommendation System For Fitness And Wellness

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Abstract. FitGeek is revolutionizing wellness by making well-being accessible to all through personalized solutions driven by cutting-edge technology. At its core, FitGeek tailors fitness plans using advanced tech, catering to individual preferences and goals while fostering a vibrant community of enthusiasts and experts. Prioritizing accessibility and affordability, the platform offers clear, animated exercises and user-friendly guidance. Additionally, FitGeek ensures users stay informed with healthcare updates and provides remote access to exercises. Integrating disease predictors, personalized diet suggestions, stress management tools, and mental health practices, FitGeek stands as a lifelong partner in the pursuit of holistic well-being, aiming to make fitness an achievable and enjoyable journey for everyone.

INTRODUCTION

In our rapidly evolving world, where health and fitness are integral to daily life, FitGeek stands as a transformative force reshaping the wellness landscape. The pursuit of well-being has transcended trends to become a universal aspiration, and at its core is a vision to make health and fitness achievable for all. This research paper explores FitGeek's multifaceted approach, leveraging cutting-edge technology to offer personalized solutions. Beginning with customized fitness plans crafted using advanced technology, the platform recognizes each individual's unique journey toward wellness. FitGeek fosters a community, uniting enthusiasts and experts for shared experiences and motivation. Its focus on accessibility and affordability provides comprehensive and understandable wellness guidance. Beyond exercise routines, FitGeek integrates healthcare updates, remote exercise access, disease predictors, personalized diet suggestions, stress determination, and mental health practices. It's not just a platform but a lifelong partnership committed to better health. In a study, the researchers conducted a comparison of step counts, calories burned, and miles traveled data gathered by three pairs of fitness trackers over a 14-day period in real-life conditions. The findings indicate that there can be a discrepancy of up to 26% in the reported number of steps when different devices are worn simultaneously. Moreover, the variations observed in the distance traveled, calculated from the step count, followed similar trends. Interestingly, little correlation was found between the number of calories burned and the variations observed in the step count across multiple devices [6]. FitGeek comprises a section namely HealthGeek which focuses on the health aspect of the being as it helps recommend diet plans, determine stress level and recommend mental health practices to be exercised, also inclues a disease predictor. The research aims to explore how FitGeek revolutionizes the wellness industry, making fitness an attainable and enjoyable journey for everyone, especially those who cannot afford or easily access fitness and wellness resources.

LITERATURE SURVEY

In today's fast-paced lifestyle, maintaining good health is essential for a stress-free life. To address this, we propose building a dynamic Single Page Application (SPA) focused on FITNESS. This platform caters to individuals keen on embracing a healthier lifestyle by providing features for Admin, Members, and Trainers. Admin tasks involve managing information, while Members can select trainers, access workout videos, fitness tips, and utilize

online features like music and payments. Additionally, an AI-powered questionnaire will be included. The technology stack comprises CSS3, Bootstrap-4, Animate.css, React, Node.js, HTML5, JavaScript, Express.js, and MySQL (Design and Implementation of Fitness Management Website, [1]).

Emphasizing the significance of securing mobile applications in today's internet-driven age, particularly focusing on fitness tracking apps, the research underscores the potential risk of data manipulation if proper security measures are not in place. It discusses the vulnerability of SQLite databases used in mobile applications, warning about the possibility of data alteration and presenting false information to users if adequate security measures are not implemented. To address this, the paper recommends using the AES encryption algorithm due to its efficiency in securing user data and preventing data manipulation. AES is preferred for its comparatively shorter encryption time compared to other algorithms, ensuring enhanced security for the fitness application and safeguarding user information from potential threats or alterations (Preventing Data Manipulation and Enhancing the Security of Data in Fitness Mobile Application, [2]).

Focusing on addressing the limited automatic tracking solutions for indoor exercises, the study introduces an innovative approach to automatically recognize various indoor exercises, achieving high accuracy rates of 95.3% for activity recognition and 99.4% for repetition count. Beyond exercise recognition, the research also delves into analyzing comfort levels and estimating calorie expenditure during workouts. A new metric called the "Comfort factor" is introduced, evaluating the ease or comfort experienced by the user during exercise. By considering this comfort factor, individuals can make informed decisions about adjusting weights in weight training activities, determining whether to increase or decrease the intensity based on their comfort level (Strength Training: A Fitness Application for Indoor Based Exercise Recognition and Comfort Analysis, [3]).

The paper introduces iFit, an integrated physical fitness testing system designed specifically for assessing the physical fitness levels of older adults. The primary aim is to aid in managing and enhancing their health while counteracting the effects of aging. The system incorporates national physical fitness protocols and comprises four modules for assessing various aspects of physical fitness, catering to both users and medical professionals. Utilizing a wireless sensor network, iFit records and manages test information, offering a comprehensive view of users' fitness statuses. Validation of iFit was conducted through a test session involving elderly participants, demonstrating significant correlations between iFit usage and conventional methods in assessing flexibility, grip strength, and balance (The iFit: An Integrated Physical Fitness Testing System to Evaluate the Degree of Physical Fitness of the Elderly, [4]).

Research investigates the state of fitness videos on Bilibili and their impact due to the platform's burgeoning influence. With a focus on enhancing the dissemination of fitness culture, the study scrutinizes 973 videos to discern factors influencing their communication effectiveness. Using the Elaboration Likelihood Model (ELM), the research constructs a theoretical framework around central and peripheral routes of influence. Employing the XGBoost algorithm, a predictive model is developed to evaluate communication effectiveness and identify crucial influential factors through feature importance analysis. Regression analysis uncovers key insights: videos centered on weight loss amplify communication impact, while life-sharing videos diminish it. Subtitles negatively influence communication, whereas longer video durations and a larger fan base significantly enhance the impact. Notably, female fitness creators' videos exhibit lower spreading effectiveness compared to those from Chinese creators have a higher impact in this context (Prediction of New Media Communication of Fitness Culture and Its Influence Factors, [5]).

TABLE 1. Overview of Literature survey

NAME OF THE PAPER	AUTHOR	YEAR	FEATURES	DRAWBACKS
Design and implementation of fitness management website	Ajitesh Sharma; Yatin Pandey	2022	Member will have various attractive features on website like online music for the workout, online payment, also a noteworthy questionnaire having feature with the assistance of AI.	- User interface design challenges - Accessibility concerns - Integration issues with various technologies - Security vulnerabilities with personal health data
Preventing Data Manipulation and Enhancing the Security of data in Fitness Mobile Application	Ankita R Shekar	2022	Factors influencing fitness video communication on Bilibili include theme, subtitles, duration, fan base, uploader gender, and nationality.	- Complexity in implementing robust security measures - Potential performance impacts - User resistance to stringent security measures
Strength Training: A Fitness Application for Indoor Based Exercise Recognition and Comfort Analysis	Dipankar Das; Shiva Murthy Busetty	2020	Device monitors weight and user activities by using IMU using algorithm of LDA and SVM	- Accuracy limitations in exercise recognition algorithms - Challenges in comfort analysis - Discrepancies between predicted and actual user comfort levels
The iFit: An Integrated Physical Fitness Testing System to Evaluate the Degree of Physical Fitness of the Elderly	Kevin C. Tseng; Alice May-Kuen Wong	2020	IoT architecture for public fitness equipment improves physical fitness by providing efficient exercise and personalized prescriptions.	- Concerns about the accuracy and reliability of the fitness testing system - Potential discomfort for elderly users - Ethical considerations regarding privacy and consent
Prediction of New Media Communication of Fitness Culture and Its Influence Factors	Chi Zhang; Xiaoli Hu	2017	Automatic indoor exercise and comfort analysis system with 95.3% accuracy for activity recognition and 99.4% accuracy for repetition count. Automatic indoor exercise recognition and comfort analysis system may be expensive and have accuracy issues depending on the quality of devices and the user's technique.	- Difficulties in accurately predicting communication effectiveness - Challenges in analyzing diverse media content - Potential biases in predictive models

Design and implementation of fitness management website	Ajitesh Sharma; Yatin Pandey	2022	Member will have various attractive features on website like online music for the workout, online payment, also a noteworthy questionnaire having feature with the assistance of AI.	- User interface design challenges - Accessibility concerns - Integration issues with various technologies - Security vulnerabilities with personal health data

PROPOSED SYSTEM

FitGeek, an advanced wellness platform, utilizes cutting-edge technology for personalized and cost-effective fitness guidance, addressing both physical and mental wellness. The scalable architecture ensures seamless experiences across devices with a user-friendly interface, robust backend server, and secure database. FitGeek's intuitive dashboard, developed with modern web technologies, provides personalized workout plans, nutrition guides, mental health resources, and progress tracking tools. Frontend development leverages HTML, CSS, and Bootstrap for sleek and visually appealing interfaces, while web page development emphasizes Django, HTML, CSS, and Python for dynamic and user-oriented pages. Visual Studio Code (VSCode) is chosen as the primary code editor for its popularity, robust features, and seamless integration capabilities, enhancing the team's workflow for streamlined and effective development.

Dataset

Exercise Dataset

The exercise dataset is a collection of individual exercise habits and physical activity data. It includes information such as Level of the user (Beginner, Intermediate or Expert), exercise type, duration, intensity and any associated health metrics. The user can select his exercises based on his level and other metrics inorder to form a This dataset aims to facilitate the analysis of the relationship between exercise behaviors and overall health outcomes.

Diet Dataset

The diet dataset encompasses diverse dietary preferences and nutritional information of individuals. It includes details on food consumption, dietary patterns, macronutrient intake, and possibly information about dietary restrictions or preferences. Users can select the ingredients of their choice to customise their diet plan according to their needs.

Diabetes Dataset

The diabetes dataset is tailored to the study of diabetes, including genetic markers, lifestyle factors, and medical history related to diabetes diagnosis and prognosis. It encompasses information on blood sugar levels, insulin resistance, family history of diabetes, and other relevant variables. This dataset is designed to support research into the prediction, diagnosis, and management of diabetes.

METHODOLOGY

This research explores machine learning (ML) techniques, including Natural Language Processing (NLP), Logistic Regression, K-Nearest Neighbors (KNN), Support Vector Machine (SVM), and Content-Based Filtering, for health recommendations encompassing diet, diabetes prediction, exercise based on stress level analysis, categorization, and BMI.

Preferred Machine Learning Algorithms for Recommendations

K-Nearest Neighbors (KNN) for Diet Recommendation

1. Utilizes KNN in a diet recommender system based on dietary preferences and characteristics.
2. Recommends diets by identifying the K most similar users using distance metrics.

Support Vector Machine (SVM) for Diabetes Prediction

1. Classifies individuals into diabetic or non-diabetic categories using SVM.Constructs a hyperplane in a high dimensional feature space for optimal separation.

Content-Based Filtering for Exercise Recommendation based on BMI

1. Recommends exercises aligned with users' BMI categories using Content-Based Filtering.
2. Focuses on intrinsic properties of exercises and user characteristics without relying on external preferences.

Natural Language Processing (NLP) for Stress Level Determination

1. Employs NLP techniques to analyze textual input for stress level determination.
2. Processes textual data using sentiment analysis or keyword extraction to quantify and categorize stress levels.

Random Forest for Categorizing Stress Levels

1. Applies Random Forest to predict and categorize stress levels into classes (e.g., low, moderate, high).
2. Models the probability of belonging to each stress level class based on various input features.

Some common steps performed across all applications, involving the comprehensive gathering of datasets specific to each domain (health recommendations, diabetes, exercise, and diet):

1. Data Preprocessing: Implemented rigorously in all domains to rectify inconsistencies, normalize data, and encode categorical variables for numerical analysis.

2. Feature Selection: Applied across all applications to identify and select pertinent features, enhancing the model's predictive power and efficiency.

3. Data Split: Partitioned datasets into training and testing subsets for model assessment, ensuring evaluation on new, unseen data.

4. Optimization: Involved fine-tuning through exploration of hyperparameters, feature selection strategies, and advanced techniques for improved model performance.

5. Deployment: Considerations for practical deployment were made for integrating the optimized models into applications or platforms.

Steps Performed on the Diet Dataset

1. K Value Selection: Experimented with various values of K (number of nearest neighbors) to identify the optimal value for the KNN model.

2. Model Training: Trained the KNN model to learn underlying patterns and relationships within the genetic data.

3. Prediction: Utilized the trained KNN model to predict genetic disorders in the testing set.

4. Evaluation: Rigorously evaluated the KNN model's performance using relevant metrics such as accuracy, precision, recall, or F1-score.

Steps Performed for Diabetes Prediction

1. SVM Hyperparameter Tuning for Diabetes: Carefully selected the most suitable value for the hyperparameter in the SVM model, considering the distinctive features of the diabetes dataset.

2. Evaluation for Diabetes: Evaluated the performance of the diabetes prediction model using metrics specific to diabetes prediction, such as sensitivity, specificity, and AUC-ROC.

Steps Performed for Exercise and Diet Recommendation and Stress Determination

1. Content-Based Filtering for Exercise Recommendations: Tailored exercise suggestions based on individual BMI, ensuring a more personalized and targeted approach to fitness.

2. Natural Language Processing (NLP) for Stress Level Determination: Employed NLP techniques to determine users' stress levels based on textual inputs, enriching the overall user experience.

3. Logistic Regression for Stress Level Prediction: Applied logistic regression to predict and categorize stress levels, providing a quantitative dimension to stress assessment.

4. Evaluation Metrics: Utilized metrics such as adherence rates, health indicator improvements, and user satisfaction for model evaluation specific to exercise and diet recommendations.

Website Design

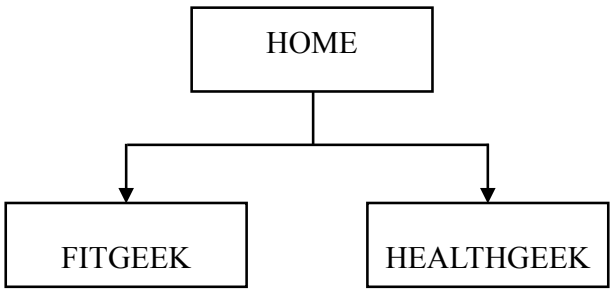

FIGURE 1. Main website architecture

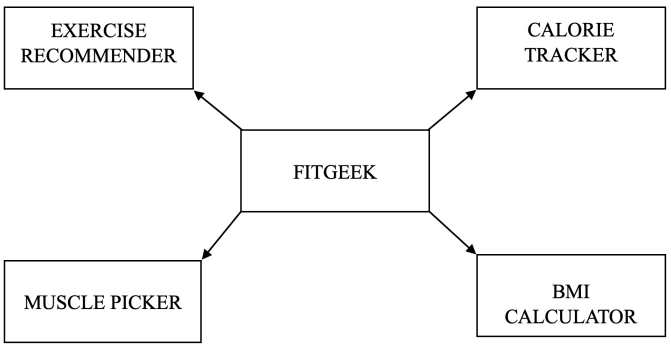

FIGURE 2. FitGeek architecture

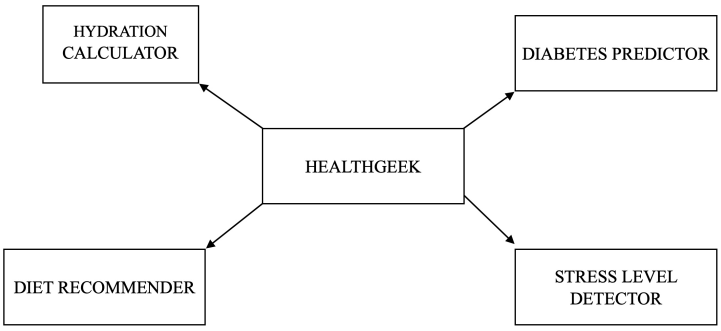

FIGURE 3. HealthGeek architecture

DISCUSSION

The website represents a significant leap in healthcare technology, bridging the gap between technology and patient care. Through the integration of specified technologies, our goal is to not only facilitate early diagnosis but also empower individuals with proactive tools for health management. The website's user-friendly interface and accessibility cater to a diverse user base, promoting health awareness and encouraging regular health check-ups. The inclusion of personalized recommendation systems enhances the potential for targeted health interventions. Tailored recommendations based on individual health profiles and lifestyle factors offer actionable insights, supporting users in managing existing conditions and promoting preventive measures to reduce the risk of future health issues.

In a broader context, the website contributes to the shift towards precision medicine and personalized healthcare. Its focus on overall human wellness aligns with the evolving landscape of medicine, where understanding an individual's fitness requirements is increasingly integral to diagnosis and treatment strategies. As technology advances, the website serves as a scalable model for integrating emerging technologies into healthcare platforms.

Looking to the future, ongoing research and collaboration with healthcare professionals aim to enhance the accuracy of predictive models and the relevance of personalized recommendations. The project's impact extends beyond individual users, providing valuable insights for public health initiatives and healthcare policy. In summary, the website emerges as a catalyst for positive change at the intersection of technology and healthcare.

FUTURE WORK

The future scope involves conducting a more in-depth study to scrutinize the algorithm further, particularly in its capacity to calculate additional health-related attributes. As contemporary fitness trackers offer data on heart rate, sleep patterns and more, our future research aims to integrate these trackers with our website. The objective is to refine our understanding of the algorithm’s accuracy and reliability in measuring and reporting health-related metrics. This future study is expected to make a substantial contribution to an extended evaluation of the overall performance of fitness trackers when integrated seamlessly with our website.

CONCLUSION

In conclusion, FitGeek stands as a pioneering wellness platform, seamlessly merging cutting-edge healthcare technology with patient care to represent a significant leap forward in the evolution of healthcare. By harnessing advanced technologies, FitGeek provides personalized and cost-effective fitness guidance, addressing both physical and mental wellness needs comprehensively. The platform's scalable architecture ensures a seamless user experience across devices, boasting a user-friendly interface, a robust backend server, and a secure database. The intuitive dashboard, developed with HTML, CSS, Bootstrap, Django, and Python, incorporates modern web technologies, while Visual Studio Code (VSCode) enhances the development team's workflow. The platform's dataset, spanning exercise, diet, and diabetes data, is instrumental in analyzing intricate health factor relationships. Leveraging machine learning techniques such as NLP, Logistic Regression, KNN, SVM, and Content-Based Filtering, FitGeek

delivers tailored health recommendations. The research methodology involves standard procedures, including data preprocessing, feature selection, data splitting, optimization, and deployment considerations. Specific to the diet dataset, critical steps include K-value selection, model training, prediction, and evaluation, while diabetes prediction involves SVM hyperparameter tuning and rigorous evaluation. FitGeek's holistic approach and personalized recommendations align with the contemporary shift towards precision medicine and personalized healthcare, emphasizing overall wellness of the being. Emphasizing data privacy, FitGeek serves as a scalable model for integrating emerging technologies into healthcare platforms. Ongoing research and collaboration with healthcare professionals aim to refine predictive models, extending the project's impact beyond individual users, positioning FitGeek as a transformative tool and catalyst for positive change at the intersection of technology and healthcare. It contributes valuable insights to public health initiatives and healthcare policy, establishing itself as a cornerstone in the ongoing evolution of healthcare practices.

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