IDEA SUBMISSION

THEME:

☒Digital health

☐Rural tourism recovery

TEAM NUMBER (mandatory):

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TEAM NAME (mandatory):

Team 4 - BRENT

SHORT SUMMARY (MAX. 500 CHARACTERS) (optional):

BRENT provides those with Irritable Bowel Syndrome, a personalised digital health coach to assist in identifying patterns, suggesting foods to avoid, and forecasting the potential for a flare-up. It will assist the North Atlantic in achieving SDG 3, 9, 10 and 11.

It's key features include;

- A human-like response
- Customized food and symptom information
- Automated Repetitive task of recording meals
- Google Fit integration
- Unique optimal diet and lifestyle recommendation
- Age & disability friendly
- Emergency visit alerts

Rural benefits

- Less travel
- Equality
- Provide feedback

EXPANDED DESCRIPTION (max 5 pages) (optional):

OVERVIEW

Background to 'BRENT'

The BRENT Goose is a bird that migrates throughout the North Atlantic region. It mostly breeds in Greenland and Canada, traveling to the UK, Iceland, and Norway throughout the year. Our innovative idea is inspired by this bird as it highlights the connectivity of the region.

Irritable Bowel Syndrome

2 in 10 people in the UK, 1 in 10 in Canada, besides 1 in 12 people in Norway suffer from IBS. This syndrome is a common long-term condition that affects the digestive system. Sufferers of this syndrome will experience pain and discomfort in their abdomen, and unhealthy bowel movements and symptoms may be severe enough to disrupt day-to-day life. There is no cure for IBS, but habit adjustments, alterations in the food consumed, and some treatments may alleviate the severity of symptoms. Often, an individual's symptoms alter and fluctuate with consuming a specific kind of food or food combinations having no effect one day but causing severe discomfort in the next. Yet, it is unclear why individuals develop this illness. For some, it is genetic, inflammation, a bacterial imbalance, or increased sensitivity. Research has been conducted into the part the brain plays on Irritable Bowel Syndrome. Evidence suggests that increased sensitivity or pain in the bowel can be caused by mechanisms in the brain. Social issues such as stress, anxiety, and depression can contribute to the development of this illness.

The Need of Rural Communities

In today's world, with the emergence of smartphones, rural communities are in desperate need of creative solutions to have equal access to health services. One of the main concerns in the community is the limited number of specialists living in rural areas, which increases the waiting time to visit a specialist. Furthermore, individuals require to travel long distances to see a doctor for mild symptoms that can be controlled through digital applications. Under such circumstances, the initial implementation stage of digital health application can be carried out in a rural setting to measure its success. This would enable the communities to benefit from creative ideas and assist in the improvements of the system. In this way, the needs and requests of the community will be met and will be of top priority. Working alongside these populations will ensure that an application is user-friendly, adaptable, and appropriate for individuals living in rural areas across the North Atlantic region. Moreover, individuals who suspect they may have IBS or are experiencing discomfort can utilize an application to identify patterns and assess if they suffer from the illness. This will reduce the requirement of travel to a doctor's office as they will be able to manage the symptoms themselves.

Current Technologies and Applications

Applications on the market that aim to assist IBS sufferers solely provide a pattern of flare-ups or simple meal trackers. Patients not only need to track their eating and activity habits, but they also seek ways to have a deeper understanding of their body, thereby improving quality of life. Therefore, individuals and suggest avoid list food. BRENT will be fully user-friendly. Users will simply have to input their data, and the application will do all the work for them. A clear, cohesive, and simple layout will be instrumental in ensuring that all individuals, regardless of mental illnesses, age, loss of sight or hearing, or physical impairments, will be able to access and utilize BRENT to its full potential.

Sustainable Development Goals

Our system will enable the North Atlantic countries to progress in their aims to reach the UN Sustainable Development Goals by 2030. Progress in SDG 3, 9, 10, and 11 will follow the development of BRENT.

- **Good Health and Wellbeing (SDG 3)**This goal will be addressed through the use of our strategy as it will allow for improvements in the quality of life and health of those suffering from Irritable Bowel Syndrome. It will better the global knowledge of the patterns of

symptoms of this disease and ensure that its users are getting the best possible advice, management, and assistance with their symptoms.

- **Industry, Innovation, and Infrastructure (SDG 9)** Focusing on target 9.5, the enhancement of scientific research into IBS through our technology will encourage innovation and development of medical assistance for the individuals who suffer due to this condition. This would allow the participating North Atlantic regions to continue striving towards achieving SDG 9.
- **Reduced Inequalities (SDG 10)** By implementing our AI health coach into rural areas of the North Atlantic regions, previously existing inequalities of access to healthcare will be reduced. Those living in rural areas will have equal opportunities as the rest of the country. This will comply with target 10.2, which aims to empower the social, economic, and political inclusion of all.
- **Sustainable Cities and Communities (SDG 11)**This goal is at the heart of our program. The use of the BRENT system will ensure that rural communities continue to be sustainable as they will have access to a unique healthcare system that ensures a high quality of life for those struggling with IBS. Our system will prevent individuals from having to travel long distances for healthcare or more away from rural areas in order to be closer to doctor's practices.

Challenge:

Due to poor quality of life and mood disorders, digestive system diseases, one of which is IBS, are prevalent in rural areas. To reduce IBS symptoms, in rural areas, due to a limited number of specialists and long distances, individuals have to wait months to have an appointment with gastroenterologists to share their diet history. Traditionally, they can get rid of the IBS pain by following a special diet and getting the proper medication. Doctors usually suggest patients avoid special food based on their experience and research, which is not completely personalized for the patient. They also prescribe medication based on the patient's daily health records, which is not usually accurate due to the high probability of forgetting to write meals and symptoms. More importantly, older adults and people with disabilities generally cannot note their food history by themselves accurately, which eventually makes the treatment process ineffective.

Our Slogan: 'DON'T SUFFER ALONE - BRENT, YOUR IBS HEALTH COACH'

Our Aim: Offer a smart health coach that can assist all age groups in managing their IBS and eventually decrease the need for visiting physicians in rural areas.

Innovation: Chatbot acts like a human rather than ordinary application in addition to AI-based recommendation habits recommendation

Our Solution – BRENT:

With the emergence of the smartphone, people have the tendency to use their smartphones to save the record of their daily activities. BRENT is an application that can help people to control their IBS by tracking their diet, symptoms, exercise, mood, and medications. By simplifying the process of recording history, BRENT assists individuals in controlling their IBS. BRENT asks users about their daily meals and snacks and suggests healthy eating and exercise habits according to their medical condition. Additionally, specialists can take advantage of gathered data to give the patient the right dose of medication. More crucially, since the application behaves like a human health coach with the interface like a chat application, it is easy and entertaining to record meals every day. This would encourage all groups of people, even with limited technical knowledge, to readily work with BRENT.

Feature of BRENT

1. **Human-like Response:**
   When an application behaves like a human coach, it is more likely that people have the motivation to follow the advice. BRENT sends a message and reminds the user to record their consumed food and select their daily symptoms from the list. The interactive interface, which is similar to a messaging application, can help the user interact effectively. BRENT uses natural language processing and deep learning

algorithms to grab user messages. In order to make the application send human-like responses, we want to use simple techniques like showing simple emotions and delay sending messages to the user.

2. **Customized Food and Symptoms:**
   BRENT will come with some primary food, yet users can add their food based on their nationality. Moreover, users can add their customized symptoms to the application.
3. **Automated Repetitive Task of Recording Meals:**
   Based on the user's preference, BRENT sends messages in the chatbox to remind the user to add their meal. Some users opt to add their meals several times a day, while others prefer to add data at the end of the day. BRENT automatically asks users to record their meals according to the settings. This will help the user to record their diet and symptoms concisely.
4. **Google Fit integration (Premium users):**
   According to recent researches, being more active can reduce tension which is usually the underlying factor of getting the IBS syndrome. BRENT can integrate with Google Fit application to benefit from the health data, including the number of steps and sleep routine.
5. **Unique Optimal Diet and Lifestyle Recommendation (Premium users):**
   First, eating specific food combinations or taking a meal at wrong time of the day usually results in severe conditions. By tracking mealtime and food, the system can forecast the probability of symptoms occurring. This forecast is based on the avoid food list already presented in the area by researchers. Also, BRENT suggests an alternative to the ingredients, which causes a flare-up according to food list alternatives suggested by researchers. Secondly, those who do not learn history are doomed to repeat it. Some repetitive food combinations trigger IBS. Identifying the repeated pattern are complicated due to a high number of food combinations. It becomes more complicated when the factor of mental health such as level of anxiety and stress comes up. Therefore, thanks to machine learning techniques, we can find repetitive patterns in the data and offer a tailored nutritional recommendation. To simplify, we can use IBS diets like FODMAP, which plays a crucial role in minimizing symptoms triggered by special food as the basis of our recommendation system. With this in mind, as the application collect user's data, we can identify what causes a person's flare-up - be it a specific food combination, timings of meals, a few days of stress, or a specific food group, and suggest appropriate remedies such as foods to avoid, or lifestyle changes. This would allow individuals to have a better quality of life and reduce the severity and risk of symptoms.
6. **Age and Disability-friendly**
   Vision and memory loss are two common age-related problems that negatively affect older adults' quality of life. By sending reminders, BRENT helps the user to track their diet for those suffering from memory problems. Furthermore, the application inherits the font size of the operating system, aid the low vision user to work easily with the interface. Today, old adults daily use some messaging applications like iMessage to interact with their loved ones, so it is easy for them to use the similar UI independently. What is more, people with intellectual disabilities can easily understand the human-like responses of the application. It is worth mentioning that the system has the ability to extend other disabilities upon request of the community.
7. **Emergency Visit Alert**
   There are some simple ways to alleviate IBS attacks symptoms, some of which are applying heat to help treat spasms and breathe deeply. BRENT will educate the patient to use the simple technique at home, reducing the need to travel long distances to visit a doctor in rural areas. Unfortunately, home treatment always does not work, and it is sometimes essential to have an appointment with the doctor when the pattern of signs changes during time. BRENT watches signs and symptoms patterns and sends an alert if the user needs to call a doctor.

How it works?

1. **Name the Personalized Coach**
   The main aim of BRENT is user feels they are interacting with a real coach. Selecting a customized name is one of the techniques that help the user to communicate better with the application. In the first

step, users can select one of the male or female animated characters in the application as their coach and name it based on their interest.

2. **Questionnaire to Adjust Settings**
   In the second step, BRENT starts to gather demographic data, including name, gender, age and etc. The application asks about the number of times that a person takes meals or snacks in the day. BRENT also questions users about their medication, other background diseases, and so forth.
3. **Ready to Use**
   BRENT starts monitoring user's exercise and sleeps patterns through Google Fit integration. It also sends notifications based on the preference, and users will add their food and symptoms using a chatbot-style interface. Additionally, users can easily send messages and ask for healing videos, tailored diets, or avoid list food.

Other Factors to be considered:

- **Data protection (Client-side and server-side):**
  People may have some concerns about sharing their data with insurance companies or so on. We can ensure people by saving habits on the client-side.
- **Language:** Since our application act as a human coach, it is based on the English language at first. It is obvious that other languages can be offered.

SWOT:

Strengths:

- Quickly analyse the needs of patients and provide accurate medical diagnoses and suggestions.
- A very accurate diagnosis and treatment level.
- Scalability: the service system based on artificial intelligence can rapidly expand to other diseases.
- Provides a curated profile for each individual, tailoring the approach to their needs allowing for a unique and detailed profile.

Weakness:

- It is a new approach towards healthcare; therefore, it may take some individuals time to get on board and utilize. People's medical habit is still to go to the hospital or make an appointment with a doctor. We need to shape a new concept of medical treatment, which is not a simple process of downloading and using mobile phone software because health is not an ordinary life needs, but very important. New habits need people's full trust. Whether people want to believe it or not, it involves some privacy, so it will probably be questioned by some interest groups.
- This problem is more concentrated in this aspect that when promoting to the elderly, it needs higher publicity cost, but the elderly are more important users. The elderly may refuse to use it, either because it is troublesome to learn how to use it, or because the elderly in remote rural areas may not have access to this kind of promotion information, so they do not know enough about it.
- Artificial intelligence technology is still developing, and in the field of medical care, virtual doctors can not completely replace professional medical staff. Of course, in the future, this may not be a weakness. After all, with the development of technology and the accumulation of data, an immature model can be made now, and its function can be gradually improved. But at present, how to improve artificial intelligence itself is cutting-edge and difficult work, so it still needs time and a lot of capital investment.

Opportunities:

- Through the cooperation with the government, we can integrate into the social welfare and service system and gain the recognition of the public:

  (1) Cooperate with the government to develop the patient database and help the government

improve the medical service system;
(2) Help the government to carry out a health survey, outsource more health care functions and improve social welfare;
(3) To help the government carry out telemedicine services to improve the medical level in remote rural areas.

- Improving the level of medical services will never become an outdated topic, and the current digital medical and smart medical for remote mountainous areas is still insufficient, so there is such a demand in the market. The local government and social organizations are also happy to see fresh blood join in the cause of improving local welfare, so we can get support from all sides.

Threats:

- If some commercial giants with more powerful algorithm ability and technology invest in this field, we will lose competitiveness. For instance, Google and Facebook, which are technology and social giants, have powerful algorithm systems and massive user base. If they develop similar software or functions, they can be directly based on the existing results, with lower cost, faster speed, and better effect of publicity and promotion.
- Without powerful data protection system and firewall, the personal information of patients may be stolen, tampered and leaked by hackers. Medical data is more private and important than ordinary personal information, and because users inevitably need to fill in all kinds of data to meet the basic information required by the service, our software will contain all kinds of important information. If the system is hacked, it will have serious consequences.

Funding opportunities and payment options

- Searching investment from government, participating in the societal welfare system
- Free and paid functions:
  - Free version:
    1. basic health test and survey(working with Government)
    2. advice on life and exercising, food tracker,
    3. diet and nutrition evaluation,
    4. basic medical consulting(Prepared in advance with automatic keyword reply)
    5. COVID-19 prevention and control information
  - Paid version:
    1. online shop for medicine and drugs(if it is possible cuz in China it is ok and usually the price can be nice because of no physical store cost)
    2. the fast delivery of medicine in a few hours（like taking-out food）
    3. customized food diet and medical suggestions
    4. Set up expert consultation channel

Conclusion:

BRENT will enable the innovative future of healthcare. It will improve the quality of life for those struggling with IBS and enable those who are experiencing symptoms to track them without the need to travel to a doctor. Our technology is an effective, sustainable, user-friendly, and adaptable digital technology.