BDAT 1006
Data Visualization

User-Centered Design Approach

To Data Visualization

Assignment 1

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User-Centered Design

User-Centered Design (UCD) is a fundamental approach that plays a pivotal role in creating effective and user-friendly User Interface (UI) and User Experience (UX) design, for data visualization in this context.

There are multiple phases that lead to a user-centered approach to data visualization which includes research, wireframe, prototype, development, launch and analyze. Although these phases will be explored further in the semester, this report presents the first three phases: Research, wireframe, and prototype for a project that focuses on the analysis being conducted to achieve a healthier lifestyle of an individual.

Phase I: Research

Brief research on achieving healthier lifestyle was conducted to understand the ideal healthy lifestyle. A set of questions was provided to help understand the present health and lifestyle of the individual hence, a short interview was set up to record the answers. The answers were indeed helpful in understanding the context and content of the user.

1. **Tell me a little about you (e.g. occupation, education, family, hobbies, etc.).**
   I'm Rabin Shrestha, 32 year old, database administrator at Octacore Solutions. I belong from Gorkha, Nepal but I've been staying in Kathmandu for almost 4 years now. I live with my wife and a sister here. I'm passionate about computers and new technologies likewise, I'd consider myself interested in biking, walking, reading books and hanging out with friends. I usually try to incorporate at least one of these hobbies in my daily life either before or after work.

2. **What aspect(s) of a healthy lifestyle would you like to monitor in 2023?**
   I've been thinking of getting back in shape for a while now. I didn't manage to exercise regularly to get myself fit since my marriage around a year ago. But now, I'm focusing on achieving an active and healthy lifestyle. I'd like to monitor my daily steps count, calorie intake, sleep patterns, stress levels and exercise habits.

3. **Why is this important to you?**
   This is crucial because I want to ensure that my life is healthy and active. Moreover, these aspects of my life would help me to stay fit mentally and physically. This way, I tend to set a good example to myself and my family, ultimately trying to avoid health issues that might arise in the future.

4. **When would you use this information?**
   I am planning to use this information on a daily basis to track my regular health pattern and make real-time decisions about my diet and exercise. Similarly, I would be reviewing the information on a weekly basis to track progress towards my fitness goals, contributing to my happy and healthy lifestyle.

5. **Where would you use this information?**
   I guess I would be using this information at home before my meals, during my regular exercise sessions at gym and during free hours where I've few tasks planned for the day.

6. **Do you monitor this information currently (digitally or non-digitally)? If so, how do you monitor this information? What do you like and dislike about it? Do you encounter any challenges?**
   Well, yes and no. I don't track this information mindfully by myself to get my health information although I've used some applications in the past. However, yes because my phone has an application that tracks my daily steps and sleep cycle by default.
   The best thing about this is that I don't need to mindfully focus and track my steps and sleep which makes it much more convenient to use it however, this very reason is the problem. I'm not sure if it is accurate.
   Although my steps counter seems to be tracking my walking patterns, the sleep cycle that this application records is nothing like what my sleep schedule. I like the convenience, but dislike the misinterpreting sleep tracker.
   Lastly, finding some specific data or information from within the application is quite a challenge at times. For instance, if I need to find the floors climbed throughout the day today, I should be exploring the whole app to find this specific data. Hence, it is hard to search for some specific data quickly within the app that my phone has by default.

Similarly, the following is the user interview synthesis analyzed to outline the context of the project and its user.

1. **Who is the user?**
   The user is Rabin Shrestha, a 32-year-old database administrator residing in Kathmandu, Nepal with his wife and sister. He is passionate about computers, biking, walking, reading books and spending time with friends. Rabin is currently focused on achieving an active and healthy lifestyle by monitoring aspects life daily steps, calorie intake, sleep patterns, stress levels and exercise habits.

2. **Where should our product fit in their work of life?**
   The product should seamlessly integrate into Rabin's daily life, both at home and during his outdoor activities. It should be easily accessible before or after work, during exercise sessions at the gym, and during his leisure time.

3. **What problems should our product solve?**
   The product should address Rabin's need to monitor and manage multiple aspects of his health and fitness. This includes providing accurate tracking of daily steps, calorie intake, sleep patterns, stress levels, and exercise habits. It should also overcome the challenges he faces with the accuracy of existing applications and the difficulty of finding specific data quickly.

4. **When and how should our product be used?**
   The product should be used both on a daily and weekly basis. Rabin intends to use it daily to monitor his health patterns in real-time and make informed decisions about his diet and exercise. He will also review the information weekly to track his progress towards fitness goals. The product should be accessible on his mobile device, making it convenient for use before meals, during exercise, and during free hours.

5. **What features are important to our user?**

Based on the user's needs, the following features are crucial:

- Accurate tracking of daily steps.
- Monitoring of calorie intake.
- Sleep pattern analysis with improved accuracy.
- Stress level tracking (mood tracking).
- Exercise habit monitoring.
- Quick and easy data retrieval for specific metrics.

6. **How should our product look and behave?**
   The product should have a user-friendly and intuitive design. It should offer a visually appealing interface that is easy to navigate. Behavior-wise, it should provide real-time updates for tracked metrics, ensuring that the user can make informed decisions promptly. Additionally, it should offer a search feature or a clear organization of data to make it easy for Rabin to find specific information within the dashboard.

These aspects identified in the user interview can be useful to design a product that aligns with the user's lifestyle, effectively addresses the health and fitness needs, and offers a user-friendly experience.

Phase II: Wireframe

In the second phase of the user-centered design, a wireframe for the visualizations and dashboard that is supposed to be developed was designed. A wireframe is necessary to build a solid backbone for information, order, and hierarchy before finalizing the design.

The prototype dashboard would be implemented being based on the following design components.


Personal Health and Fitness - Dashboard
Health Summary
7892
Steps Taken
1032
Calories consumed
6 hr 42 min
Time in Bed
Today's Mood
32 minutes
Exercise
Trends
Steps
Calories
Sleep
Mood
Exercise
Sleep Analysis
Some text on Sleep and Bedtime. Some text on Sleep and Bedtime. Some text on Sleep and Bedtime. Some text on Sleep and Bedtime. Some text on Sleep and Bedtime. Some text on Sleep and Bedtime. Some text on Sleep and Bedtime. Some text on Sleep and Bedtime. Some text on Sleep and Bedtime.
Sleep Schedule
Bedtime
23:23
Wake Up
07:20
Your Sleep Pattern - Today
Average Time in Bed
6hr 42min
Filters
Day
Week
Month
Choose Date
Health Goals
10000+
Steps a Day
2250
Calories to Consume
7 hr 20 min
Sleep Time
1 hr 32 mins
Regular Exercise
Your Progress
User Profile
Rabin Shrestha
Age: 32
Gender: Male
Weight: 74 kg
Height: 5 ft. 8 in
Blood Type: B Positive
Family: Married with two kids
1.2
0.9
0.6
0.3
30
T1
E2
E3
T3
STM1
Personal Health and Fitness Dashboard | ©2023 | Avhimanhu Sapkota - Student ID: 200547612 | Privacy Policy

User Feedback

The above draft of the wireframe was presented to the intended user in order to understand their idea of satisfaction. In addition, a user feedback form was asked to be filled which provided the following information.

(+) Likes:

- I like the clean and minimal layout of the dashboard. Looks easy to find the information.
- The visual placement is pleasant, and adding a proper color palette would promote a sense of calmness and well-being, aligning with my fitness goals.

(-) Dislikes:

- It would be great to have an option to customize colors for personalized experience.
- The footer section could include more information, such as a link to customer support or FAQs.

(?) Questions:

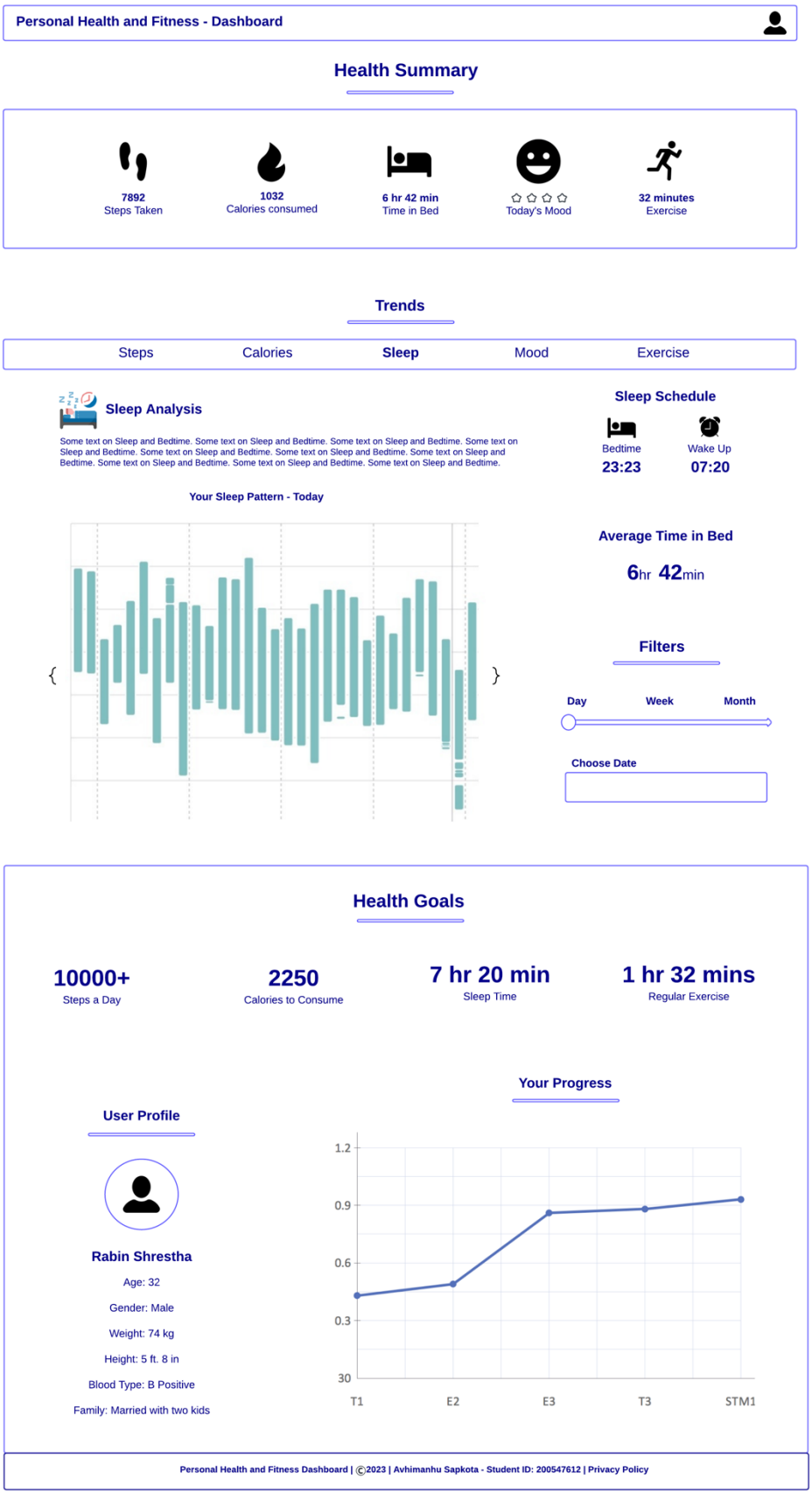
- How will the dashboard handle data privacy? Is my health data kept confidential?
- Can I export my health data to share it with my trainer or doctor?
- Will there be a mobile app version of this dashboard?

(!) Suggestions:

- It would be nice to have tracking section where I can track my usage of the apps to be more focused on achieving my healthy lifestyle.
- A "Reminders" feature that allows to set notifications for some tasks within the app.

Phase III: Prototype

A prototype dashboard was designed to provide a overview of what a final product would look like. Such prototypes are a base of communication between designers, stakeholders, developers and users that validates the general idea of the project. Below presented is the prototype dashboard.


Personal Health and Fitness - Dashboard
Health Summary
7892
Steps Taken
1032
Calories consumed
6 hr 42 min
Time in Bed
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Exercise
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Some text on Sleep and Bedtime. Some text on Sleep and Bedtime. Some text on Sleep and Bedtime. Some text on Sleep and Bedtime. Some text on Sleep and Bedtime. Some text on Sleep and Bedtime. Some text on Sleep and Bedtime. Some text on Sleep and Bedtime. Some text on Sleep and Bedtime.
Sleep Schedule
Bedtime
23:23
Wake Up
07:20
Your Sleep Pattern - Today
Average Time in Bed
6hr 42min
Filters
Day
Week
Month
Choose Date
Health Goals
10000+
Steps a Day
2250
Calories to Consume
7 hr 20 min
Sleep Time
1 hr 32 mins
Regular Exercise
User Profile
Rabin Shrestha
Age: 32
Gender: Male
Weight: 74 kg
Height: 5 ft. 8 in
Blood Type: B Positive
Family: Married with two kids
Your Progress
1.2
0.9
0.6
0.3
30
T1
E2
E3
T3
STM1
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Usability Test

The prototype dashboard was presented to some individuals who were interested to participate in research for the “Personal Health and Fitness” dashboard development assignment for Data Visualization. Two individuals explored the prototype to answer some questions for specific tasks of which their recorded answer has been presented below.

Task 1: Monitoring Weekly Progress (Steps Tracking)
Walk me through how you would use this dashboard to monitor your weekly improvements in the number of steps taken.

User 1 – Answer:

- **Why did you look there?**
  I looked at the top section of the dashboard because it's usually where summaries or important information is displayed. I expected to find an overview of my weekly steps there.

- **What design element gave you that answer?**
  The design element that led me to this section was the " Summary" heading at the top. It indicated that I might find relevant daily and weekly data here.

- **How did you decide to do that?**
  I decided to click on the "Summary" section because it seemed like a logical place to start. It's where I expected to find an overview of my steps, and it turned out to be the right choice.

User 2 – Answer:

- **Why did you look there?**
  I looked at the navigation menu first because I thought there might be a dedicated section for tracking steps. I was trying to find a specific section related to my steps.

- **What design element gave you that answer?**
  The navigation menu's "Steps" option caught my attention. It seemed like the right place to find information about my weekly step count.

- **How did you decide to do that?**
  I decided to click on "Steps" in the navigation menu because it made sense to me. I was specifically interested in tracking my steps, so I went to the section related to it.

Task 2: Tracking Fitness Goals (Calorie Intake)
Walk me through how you would use this dashboard to check how close you are to achieving your daily calorie intake goal.

User 1 – Answer:

- **Why did you look there?**
  I initially looked at the navigation bar for ‘calories’ because it's where I found information about my calorie intake. I assumed that my daily calorie intake goal would be in this section.

- **What design element gave you that answer?**
  The design element that led me to this section was the navigation bar, which indicated that it contains information related to calorie intake goals.

- **How did you decide to do that?**
  I decided to click on that because I wanted to find information about calorie intake. It seemed like the logical place to check my progress.

User 2 – Answer:

- **Why did you look there?**
  I went directly to the "Summary" section because I assumed that's where I could check my regular progress towards my daily calorie intake goal.

- **What design element gave you that answer?**
  The design element that led me to this section was the “heading” at the top of the page menu. It suggested that I could find my general information about my fitness goals as it also has pictures to attract my vision.

- **How did you decide to do that?**
  I decided to click there because I was specifically interested in monitoring my calorie intake goal quickly. It made sense to check the section as it gives quick update on my progress.

Task 3: Analyzing Sleep Patterns

Walk me through how you would use this dashboard to understand your sleep patterns for the past week.

User 1 – Answer:

- **Why did you look there?**
  I initially looked for a "Sleep" section in the navigation menu because it seemed like the most direct way to access information about my sleep patterns. I expected this section to provide sleep-related data.

- **What design element gave you that answer?**
  The design element that led me to this action was the presence of a "Sleep" option in the navigation menu. It suggested that I could find information about my sleep patterns along with the option to choose date.

- **How did you decide to do that?**
  I decided to click on "Sleep" in the navigation menu because it made sense to go directly to the section dedicated to sleep-related data. It's where I expected to find insights into my sleep patterns for the past week.

User 2 – Answer:

- **Why did you look there?**
  I initially looked at the "Summary" section because I thought that information about my sleep patterns might be summarized there. It did have the overview information but, for the past week to find there was quite difficult.

- **What design element gave you that answer?**
  The design element that led me to this section was the "Summary" heading. I assumed that it would provide an overview of various daily metrics, including sleep patterns.

- **How did you decide to do that?**
  I decided to click there because I thought it might offer a concise summary of my sleep patterns for the past week. It was a reasonable place to begin my search for this specific information.

Usability Test Analysis

After conducting usability tests on the health and fitness dashboard, various issues and opportunities for improvement have been identified. Here is an analysis of the critical issues, major issues, and minor issues encountered during the usability tests, along with design recommendations.

Critical Issues:

- **Task 3 (Analyzing Sleep Patterns):**
  Issue: Users found it challenging to locate the sleep pattern analysis feature for multiple timeframe within the dashboard. This issue prevented them from completing the task, causing significant confusion.
  Recommendation: Improve the visibility and accessibility of sleep pattern analysis. Consider placing it prominently with more icons for ease of access.

Major Issues:

- **Task 1 (Monitoring Weekly Progress - Steps Tracking):**
  Issue: Users had different approaches to monitoring weekly step improvements, with one using the "Today's Summary" section and the other relying on the navigation menu. While both approaches were effective, the inconsistency indicates a potential usability issue.
  Recommendation: Streamline the user journey for accessing weekly progress tracking. Ensure that the dashboard offers a consistent and intuitive path for monitoring fitness metrics.

Minor Issues:

- **Task 1 (Monitoring Weekly Progress - Steps Tracking):**
  Issue: Users reported minor confusion when switching between different time frames (daily, weekly, monthly) for step tracking. This resulted in some frustration.
  Recommendation: Enhance the clarity of data filtering options and provide clear labels for different time frames to improve user understanding.

Design Recommendations

Some recommendations that would enhance the design of the prototype dashboard have been discussed below:

Enhance Task Clarity:

- Clearly label and visually emphasize the key features related to tasks, such as sleep pattern analysis and mood level tracking.
- Use descriptive tooltips or labels for icons and buttons to guide users effectively.

Improve Goal Tracking:

- Implement visual cues like progress bars, percentages, or goal completion indicators for tracking fitness goals, including calorie intake.

Streamline Navigation:

- Consider grouping related metrics, such as sleep and stress, to improve the logical organization of the dashboard.

Simplify Data Filtering:

- Enhance the user experience when filtering data by time frames (daily, weekly, monthly). Make sure users can effortlessly switch between these views.

User Education:

- Offer in-app guidance or tooltips to educate users about the dashboard's features and functionality.

Conclusion

In conclusion, the "Personal Health and Fitness" dashboard project has been a comprehensive journey that adhered to the principles of User-Centered Design (UCD). These principles have played a vital role in ensuring that the dashboard is finely adjusted to the specific needs and preferences of its intended users. The emphasis on understanding user context, optimizing task workflows, and repeatedly refining the design has concluded in the creation of a data visualization solution that is not just aesthetically pleasing, but also functional and user-friendly.