(30pt) Propose the contents of the life pattern report. Examining the examples of the report as shown at the end of the document, try to design the format and contents of the report for a specific user for a month to improve his/her well-being.

1. Manage mental health through monthly depression level graphs

Based on the user's depression level, the mental health status will be continuously tracked. It identifies the lifestyle pattern that users do a lot when the depression level increases, and sends a warning message. (Example: "Let's refrain from impulse late-night snacks.")

2. Provide medicine alarm

In the case of a user suffering from a disease, an alarm is provided after checking whether the user is taking medicine.

3. Sleep management based on average bedtime and wake-up time

After calculating the average bedtime and wake-up time of the user, an alarm message is provided if today's sleep and wake-up time are above or behind the average. (Example: "You woke up later than usual today!")

4. Manage health care based on the average number of visits to the toilet

After calculating the average number of toilet visits by the user, an alarm message is provided if the number of toilet visits today is less than the average. (Example: "You visit the bathroom less frequently today. Drink more water.")

5. Manage daily exercise based on steps

If the number of steps today is above the average, a message of compliment is delivered. (Example: "You walked more than average! Great job.")

6. Provide advisory messages of exercise based on whether the user has worked out or not.

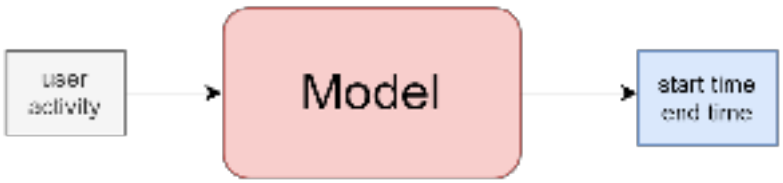
If the user has not done either walking or exercising, it provides a message recommending exercise.

7. Provide a checklist for trivial daily routines

It provides a checklist for trivial but important daily routines such as washing dishes, taking a shower, and cleaning. When the user has completed the task, it is automatically removed from the checklist.

2. (30pt) Decide the appropriate data mining models for filling out the information at the report. Depending on the life patterns that you want to provide, several different models should be chosen and optimized with different hyperparameters.

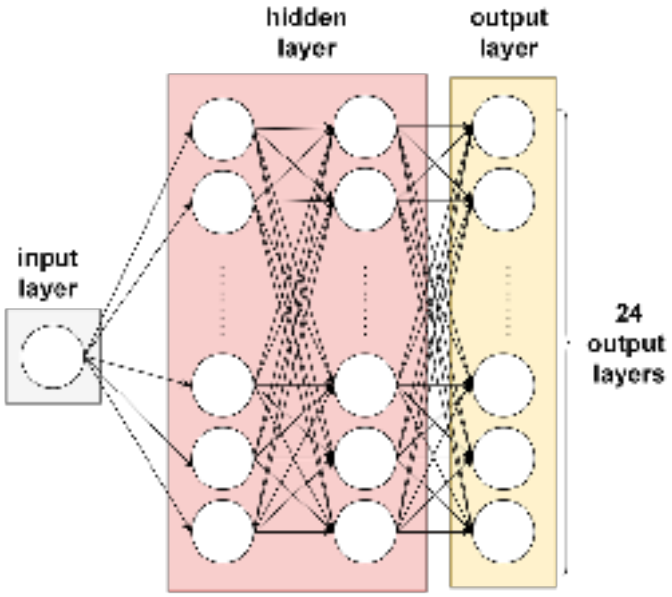
We designed a model to predict users' life patterns to write a report, using the user's activity name as input of the model and the user's start and end times as target.



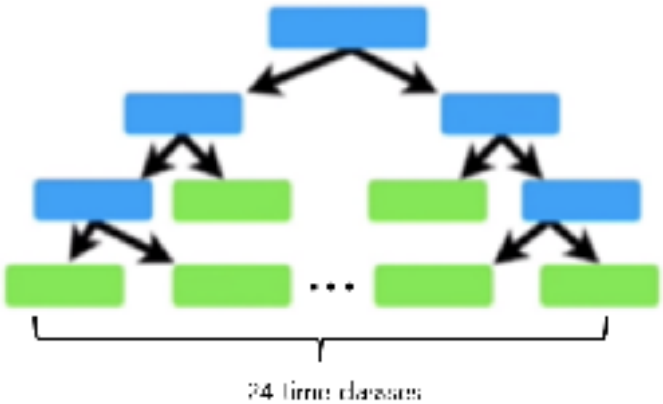
And we're going to make a predictive model using artificial intelligence, and we're going to make a model using three techniques. Linear Regression, Neural Net, and RandomForests.

First, in linear regression, we try to find the optimal weight of the model using gradient descent. The gradient descent method is a method of adjusting the coefficient using the amount of change in the function, and the coefficient is continuously updated in the direction in which the function decreases. And we try to train the model in the direction of reducing the loss as much as possible using this gradient descent method.

Second, in Neural Net, we are also going to use gradient descent to find optimal weight. We try to implement the model in the form of output that the time divided into 24 classes when we put the activity in the artificial neural network as input.



Last, Random Forest has high accuracy, and trains are simple and fast. In addition, it is possible to deal with thousands of input variables without erasing variables, and because it produces good generalization performance through randomization, we try to select a random forest and make a model. We will design a model to classify into 24 time classes.



3. (40pt) Evaluate the models with the validation data and demonstrate the usefulness of the data mining process to complete the service of summarizing the life patterns

Because f1-score excels in comparing the performance of different models, we will use f1-score to compare the performance of the three models. In order to compare the performance of the models, we plan to distribute partitions with 60% of training data

and 40% of test data. And after selecting models, pattern learning and pattern prediction will be performed by the selected model. We plan to evaluate the accuracy of the decided model and use it for our program if it exceeds the standard we set.