

Analysis of Students' Movement Patterns through Big Data

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Abstract. Currently, the usage rate of GPS is increasing. In addition to GPS, Big Data is also in the spotlight. The Big Data is a technique that creates values through repetition pattern analysis of data [1]. Using the Big Data, it is possible to analyze the movement path, time, and behavior pattern repetitive of the students. This study has been conducted using the information collected through GPS. Our future work will be on increasing the reliability of the data and gathering of information of the day of the week, weather, blood type, and occupation.

Keywords: Big Data, GPS, High-Level Analysis, Pattern Analysis, Reliability

1 Introduction

Currently, the usage rate of the GPS receiver is increasing [2][6]. GPS is used in many fields such as intersection location, aircrafts, vehicles, and smartphones [9]. Among these, GPS is widely used in smartphones in particular when compared with the other fields.



Fig. 1. Service Using the GPS

In this paper, we use the Big Data analysis using the GPS data. Currently, the Big Data is used in many parts of the world, similar to the real-time automatic translation system by Google [3]. The Big Data is used in ZARA availability management, operating systems, and Transportation Safety Authority's service record analysis system [8]. The Big Data is the core technology used in many fields such as prevention of disease, crime, unemployment, accident prevention, earthquake prediction, and stock price analysis [4][7]. The GPS aids in collecting a large amount

of data using the APP [5]. Students enter their name, sex, address, and grade as the primary data. The movement path, positional information, and behavior data are further inputted via GPS.

2 Measurement Results



Fig. 2. Movement pattern of the KUT (Korea University of Technology and Education) students

<Fig. 2> shows the analysis of the movement path of the KUT students. The black line indicates mainly the movement path of the students, and its thickness denotes the number of students that passed. We have analyzed the students' movement pattern using the information on time, grade, and sex.

2.1 Analysis of the Movement Patterns over Time



Fig. 3. Movement Patterns over Time

[Action 1: Lecture] [Action 2: Meal] [Action 3: Move the dorm] [Action 4: Using the library]
[Action 5: Rest] [Action 6: Leisure activities] [Action 7: Using the facilities]

The first picture in <Fig. 3> explains the movement pattern between 8 a.m. and 9 a.m., that is, students move through the dorm to the classroom [Action 1]. The second picture in <Fig. 3> explains the movement pattern between 11 a.m. and 1 p.m., that is, students move through the classroom to the dining room or the dorm, denoting [Action 1] or [Action 3]. The third picture in <Fig. 3> explains the movement pattern

between 6 p.m. and 7 p.m., that is, students move through the dorm and the playground, library, denoting [Action 2], [Action 5], [Action 6], [Action 7].

2.2 Analysis of the Movement Patterns by Grade

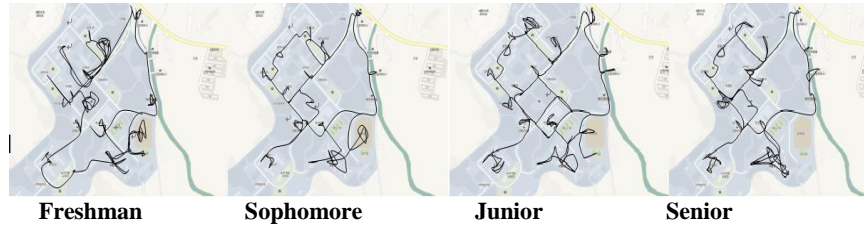


Fig. 4. Movement patterns by grade

[Action 4: Using the library] [Action 6: Leisure activities] [Action 7: Using the facilities]
[Action 8: Academic activities] [Action 9: Association activities] [Action 10: Using the Counseling facilities]

The first picture in <Fig. 4> shows the movement pattern of the Freshman, denoting [Action 6], [Action 7], [Action 9]. The second picture in <Fig. 4> shows the movement pattern of the sophomore, similar to that of the freshman. The third picture in <Fig. 4> shows the movement pattern of the junior, their movement are less when compared with the freshman and sophomore, denoting [Action 6]; however; there is more movement, denoting [Action 4], [Action 8].

The fourth picture in <Fig. 4> shows the movement pattern of the senior, denoting [Action 10].

2.3 Analysis of the Movement Patterns by Sex



Fig. 5. Movement patterns by sex

[Action 1: Lecture] [Action 2: Meal] [Action 3: Moving through the dorm] [Action 7: Using the facilities]
[Action 11: Tea time] [Action 12: Drinking] [Action 13: Talking] [Action 14: Physical activity]

The first picture in <Fig. 5> shows the movement pattern of the male students. It mainly shows the movement pattern denoting [Action 14] and [Action 12]. However, the second picture shows the movement pattern of the female students. It mainly shows the movement pattern denoting [Action 7], [Action 11], [Action 13].

3 Conclusion

In this study, the students' movement pattern data from the combined patterns of the moving path and behavior were calculated. This study was conducted using the collected GPS data, such as time, grade, and sex, via smartphone.

From the results of the high-level analysis and Big Data, we could determine the specific and detailed student movement patterns. This study analyzed the results of the students' movement patterns, based on which, we will conduct further research on the movement pattern with additional data such as weather, season, blood, and occupation.

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