Analysis of the relations between the occurrence of crime and its spatial tendency in Shibuya area, Tokyo

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ABSTRACT: Recently, as a measure against growing number of various crimes, crime prevention town planning and the plan of criminal estimate system have attracted much more attention, which creates need to research the relations between occurrence of crime and geographical and spatial characteristics of the locations. Several researches revealed that such measures are effective in reducing criminal rate in the Western developed countries. On the other hand, research in this field in Japan is behind considerably compared with the West. This is because it is hard to get data relevant to a crime and few researches based on real data have been accumulated. Then, as a step to the future planning of crime prevention town and development of crime estimate system in Japan, it is necessary to reexamine "dangerous space theory" suggested by many research es and reports not based on quantitative and systematic analysis of real data. Thus, in this paper, we focused on three kinds of crime, "Household burglary", "Office burglary" and "Bag-snatching", that seem to have distinctive characteristics in distribution in space and time and try to examine example relations of space and crime taken from various studies and literatures using actual occurrence data of crimes and to systematically show what kinds of space is how dangerous.

1. INTRODUCTION

In Japan, since 1990's the safety myth has become doubtful, and people feel that the security is deteriorating every year. Actually, while the cognitive number of crimes increases every year, the arrest number is continuing to decrease . (Refer to a right figure)
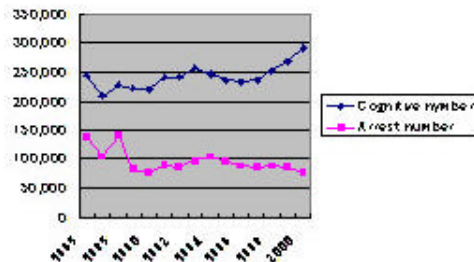
Furthermore, according to the Police White Paper in 2002 announced officially by the National Police Agency on September 27, the rate of an arrest of criminal offense has become less than 20% and that is worst ever. It is present state that even Japanese police force can't deal with the growing numbers of various crimes.

From such situations, in order that police can work more effectively and efficiently, the necessity for the application of geographic information system (GIS) to the police works and Crime Prevention through Environmental Design (CPTED) is advocated.

In the West, these two actions have been already taken and evaluated. For example, in regard to the application of GIS to police works, the GIS has greatly contributed to rapid improvement in the public peace in noto rious city like New York. Moreover, as a national policy for the crime prevention, the urban redevelopment based on the idea of CPTED is performed in various places and has achieved good results in the United States, United Kingdom and Netherlands. Such a success in the West is surely achieved through the accumulation of active researches on the relation between the occurrence of crime and the geographical and spatial tendencies.

On the other hand, in Japan, because it is hard to get the data relevant to individual crimes, most researches are not based on quantitative analysis of the spatial tendency of accrual criminal spots. Harada (2001) and Mori (1999) performed analysis on geographical distribution of local criminal rate at relatively macroscopic scale. And, although Nakamura (2000) and Yukawa (1997) performed research using real data with spatially microscopic scale, not based on systematic statistical inference using crime spot data.

Thus, this paper examines the findings on the tendencies of dangerous space in various existing researches and literatures using actual crime spot data at Shibuya area, Tokyo known as high criminal rate area and tries to extract the high reliable prediction factor of dangerous space.

2. APPROACH OF THE STUDY

2.1 Acquisition of crime point data

First, the types of crime treated in this paper are "slough work", "thief to the office" and "snatching" that it is said that there are some relations between the occurrence of crime and its spatial tendency.
Next, as to the real data of the target crime types we could acquire the data with the address that the crime happened, the day and time and the number of suffered floor. 123case data were collected for "Household burglary", 230case data were collected for "Office burglary" and 61case data were collected for "Bag-snatching" (in 2000 and 2001).

2. 2 Gathering the common characteristics of dangerous space

We gathered and arranged the common characteristics of dangerous space suggested by various literatures and papers in this field and from interview with police officers. The list is as follows.

(1) Household Burglary

Apartments

- The veranda is enclosed with concrete (block) of the height to waist
- The veranda is connected to the next
- Many things are put on the veranda
- An apartment is used not only for dwelling but also for office
- The entrance of an apartment is not conspicuous
- There are trees thick of leaves in front of the veranda
- Everyone is easy to go to the roof of apartment

Detached houses

- There are scribbling on the wall and fence
- A house faces the main street
- A house has no front garden or space
- A parking lot is in the back of a house
- A house is enclosed with high concrete fence
- There is a thing as footing which helps to go up to the 2nd floor by the house
- The window is without a latticework
- A house faces a park
- A house faces the street with few peoples but heavy traffic of cars
- A house is without a fence
- There is a telegraph pole near by the house

(2) Office burglary

- A front door is opened 24hours
- A building housing a number of independent business concerns
- One person puts in between buildings
- Between buildings is a garbage place

(3) Bag-snatching

- On the street that the sideway isn't divided from the roadway
- On the street near the bank and the grocery
- On the dim street (it is amount of the brightness that the fluorescent light of 20w every 30m), but there is also reference said that brightness was unrelated
- On a narrow street is three meters wide

➢ On a one-way street

2. 3 Method of analysis

In order to analyze the relationships of environmental factor and crime, it is necessary to grasp the situation where the crime happened. In this paper, we use four background data to describe environmental conditions as follows.

(1) Electronic residential map by the ZENRIN co., ltd. (2002), which is a database of detailed and latest information about each buildings.
(2) Database of the Yellow Pages (2000), by using it, we can grasp the constitution of the town.
(3) The aerial photograph, which tell us the situation of open space, garden and intervals between buildings.
(4) Field survey, to investigate whether the street is busy or quiet and the bright of the street and so on.

The outline of analysis that we'll conduct using above the four background data is as follows.
First, we tick off the common characteristics of dangerous space enumerated in above 2.2 by applying them to each actual spots. For example, we examine that the brightness of the spot at night using a light meter, how many façades of other houses face to the suffered house and room by field survey and whether there is open space in back the suffered building by aerial photograph and so on. Next, to perform statistic analysis, we examine that how many spaces having the same characteristics are there around the spot. For example, to significantly say that Bag-snatching is happening frequently on the street that the sideway isn't divided from the roadway, we examine the number of streets having the same situation around the spot and analyze its probability using ZENRIN map. Therefore, we can conduct statistic analysis using above four measures.

3. EXAMINATIONS AND CONSIDERATION

3. 1 Qualitative analysis

First of all, we applied the real data where the crime happened to the electronic residential map by the ZENRIN co., ltd. The result of address matching is as follows.

(1) Household burglary

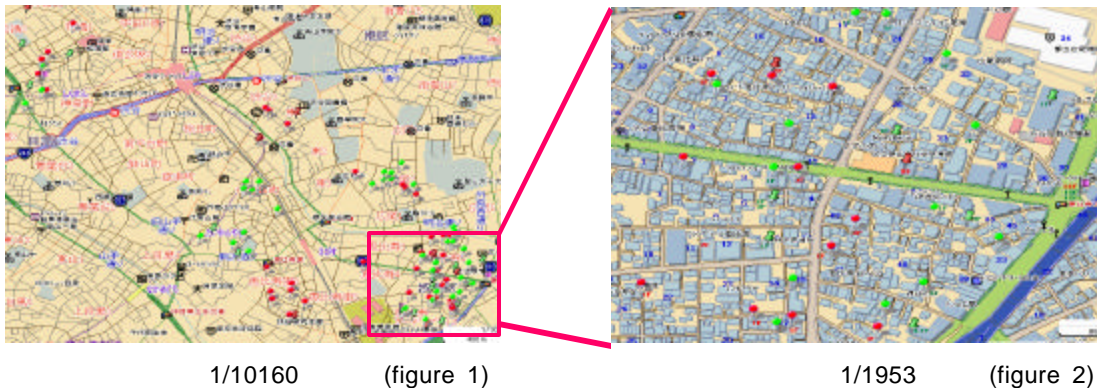1/10160   (figure 1)   1/1953   (figure 2)

Fig.1 is a map with a scale of 1:10160 of Shibuya area. Fig.2 is a map of area called Hiro squarely surrounded in Fig.1. When we take a look at Fig.2, we can find that Household burglary is happening more frequently in the area surrounded by the main street rather than it is happening along a main street.

(2) Office burglary

································ 1/8758········ (figure·3)··· 1/2731·····(figure·4)¶
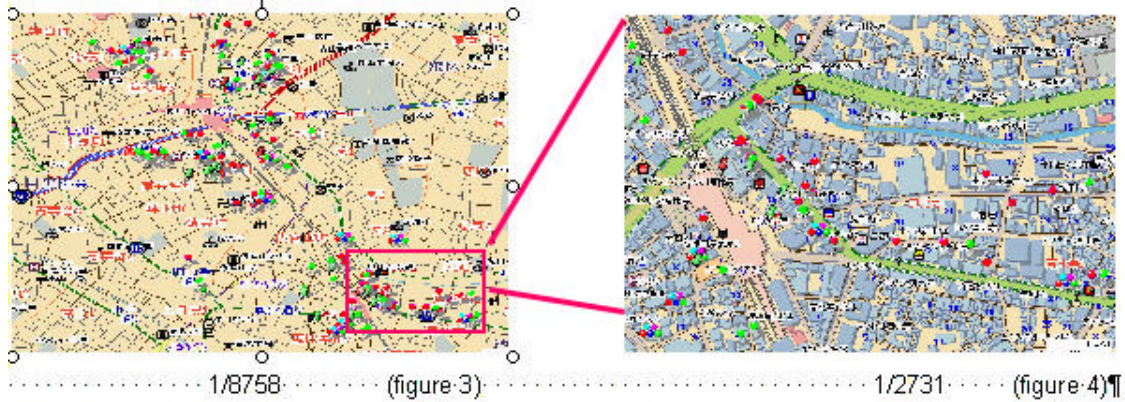
Fig.3 is a map with a scale of 1:8758 of Shibuya area. Fig.4 is a map of area called Yebis squarely surrounded in Fig.3. In the case of Office burglary, compared to the case of Household burglary, the figure 4 shows that the Office burglary is happening along a main street more frequently rather than in the area surrounded by the main street.

(3) Bag-snatching

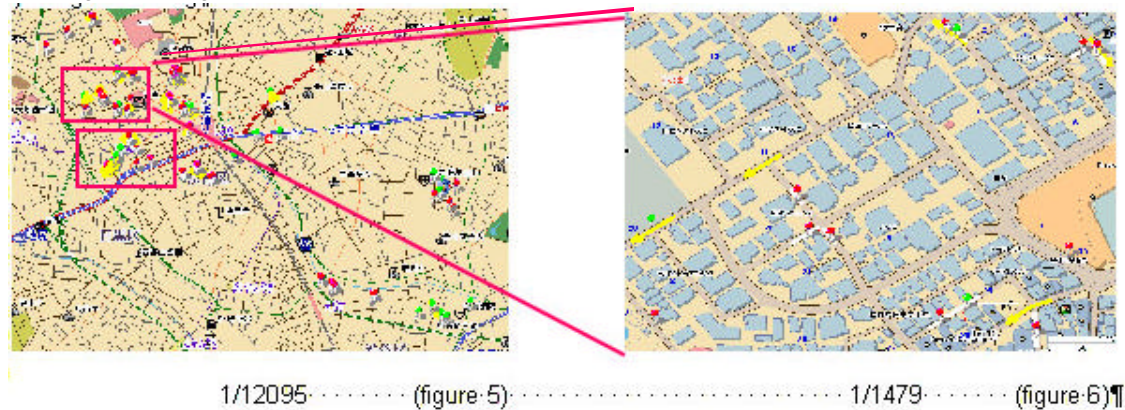1/12095·······(figure·5)··· 1/1479······(figure·6)¶

Fig.5 expresses Shibuya area with a scale of 1:12095. Fig.6 is area called Shoto squarely surrounded in Fig.5. In this case, we tried to examine the relations between Bag-snatching and one-way street. Figure 6 shows that snatching is happening on the one-way street in 5cases out of 10.

3. 2 Field survey

The author conducted one-site inspection of some occurrence spots of Slough work and Snatching. The things the author felt in case of the slough work are as follows.

(1) Household burglary

 ➢ The apartment has auto lock system.
 ➢ The opposite side of entrance of an apartment is a large lot as a school and a company.
 ➢ A pencil-type apartment has a porch on each floor.
 ➢ The apartment has the corridor connected to each doors inside rather than the apartment has it outside.

(2) Bag-snatching

 ➢ A sloping road
 ➢ It happens also on the street of relatively bright at the night.

4. CONSIDERATIONS

From above examination and consideration, when it talks about Household burglary and Bag-snatching, there is some possibility of being relations between occurrence of crime and its spatial tendency gathered from interview with police officer and various papers. But, if most buildings around the spot were the apartments having auto lock system, the result that Household burglary happened more frequently at such an apartment would be nothing but random events, and the cases of Bag-snatching and one-way road may be under the same situations. In this respect, it is necessary to take carefully the surrounding situation into consideration.

5. FUTURE WORKS

In this paper, we examined the tendency of occurrence of crime on its distribution map and found some common spatial tendencies. But we also found that we couldn't know exactly the relations without systematic analysis taking surrounding situation of the spot into consideration. Thus, as this paper's future work, it will be necessary to examine the spatial tendencies gathered from existing papers and interview with police officer using above four measures and to analyze it systematically.

6. REFERENCES

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