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Research Article

Exploring Urban Fear of Crime using Unsupervised Classification - The Case of Athens

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Keywords

Fear of crime,
unsupervised classification,
urban planning,
spatial analysis

Abstract

This publication examines whether urban landscapes, exhibiting different spatial and thematic characteristics, can affect the fear local residents feel about crime. The purpose of this research is therefore to explore the correlation of the fear of crime in modern cities with urban, environmental and social characteristics. In order to verify this postulation, the Municipality of Athens was set as study area and a wide questionnaire-based survey was conducted. A dedicated web platform (http://www.fearofcrime.com/) was employed to collect, analyse and visualize crowd fear experiences and their spatial distribution. Over 900 participants have contributed relevant data to be further explored. In order to meet the above objective and facilitate the process, the respondents and their answers were grouped into clusters via unsupervised classification. The variables were formed by all respondents' answers and the k-means algorithm was used. From this process, groupings of a certain number of clusters emerged. The distribution of each cluster was determined on the seven City Districts of the Municipality of Athens, which were used as spatial reference units, revealing the largest and smallest concentrations. Thus emerged the image of how the phenomenon of urban fear of crime is shaped in the different districts of the Municipality of Athens

Highlights:

- 'A dedicated web platform to collect and visualize urban fear of crime data in Athens

- Mapping spatial patterns of fear of crime in Athens

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1. INTRODUCTION

The fear of crime refers to the fear of falling victim to a crime as opposed to the real possibility. The main crimes that occur on a daily basis are: burglary, theft, vandalism of private property, drug use and/or trafficking, physical violence, verbal violence, racist assault, homophobic assault, and sexual abuse. According to Gabriel & Greve (2003) fear of crime is a construct that includes quite different kinds of threats, e.g. the threat of physical harm, material loss, shame of humiliation. The common factor is that these threats result from behaviour commonly considered to be criminal. In addition, M. Killias (2001) supports that crime is a real and very serious threat, in order to affect the management of everyday life at the individual level. Mapping and understanding the causes of the fear of crime is an essential step in urban planning, public health and quality of living.

In order to develop the case, it is necessary to provide some definitions about the fear of crime, as well as its causes and the contributing factors. Fear of crime is defined as a rational or irrational state of alarm or anxiety caused by the belief that one is at risk of becoming a victim of crime (McLaughlin & Muncie, 2006). Fear of crime comes as a correlation and result of many different parameters, whether social, economic or environmental. Indicatively, we could mention the lack of attention and protection of the urban fabric by the state, but also by the citizens themselves, the abandoned buildings, the unrests caused by social groups, the poor quality of the urban space, the lack of integration of foreign populations into the existing society, the mixed land uses that often change the neighbourhood's character during the day, the lack of policing, etc. All these contribute to the phenomenon of the urban fear of crime.

In understanding this phenomenon, the role of land use in the urban fabric, vitality, daylight, overcrowding, lighting, building density, level of cleanliness and maintenance of roads / parks / buildings, and the aesthetics of areas, are taken into account. It is commonly accepted that the poor urban landscape favours the development of crime itself, as well as the feeling of fear about crime. For instance, Kawshalya et al. (2020) address the issue of difference between the fear of crime and the actual crime in the urban environments. In their bibliometric mapping, environmental factors and health and well-being are the most prominant themes addressed in literature. Foster et al. (2014) present a socioecological exploration of the fear of crime as a deterrent to walking. Also, Köklü & Yirmibeşoğlu (2017) investigate the fear of crime in city centres and neighbourhoods associating environmental and demographic factors. Finally, Solymosi et al. (2021) argue for the strong relation between fear of crime and placial context, also advocating the importance of app-based crowd sourcing methodological approaches in data harvesting.

Thus, the various urban areas include characteristics, social but also environmental, that collectively shape the fear of crime that residents experience. Some of the urban planning mechanisms may prove necessary to reduce urban fear of crime and this can be an objective towards crime-resilient neighbourhoods. The question rising is what are the structural, social and environmental factors that influence the formation of fear of crime. To that end, this article explores whether the urban environment and its character can influence the level of criminal acts, which in turn affects the intensity of residents' fear of crime. The research presents interesting findings about the spatial distribution of urban fear and its association to environmental and social aspects. Using the City of Athens as a specific landscape case, which is a unique ultra-dense city with important urban design issues (Bartzokas-Tsiompras & Photis, 2021), allows policy makers to get a better understanding of the phenomenon.

In the rest of the paper, Section 2 presents the data and methodology employed to tackle the topic. The application of unsupervised classification and the analysis of its results are presented in Section 3. Concluding remarks are presented in Section 4.

2. DATA AND METHODOLOGY

2.1. Questionnaires

For this research, it was deemed necessary to collect primary data on the fear of crime. In order to achieve this goal, it was necessary, according to the principles of primary research in geographical analysis (Koutsopoulos, 2006), to create and widely disseminate a survey questionnaire. The aim was to understand, in the absence of other information, what are the social and environmental parameters that affect citizens' fear of crime, as well as, to showcase how they interact with their area in relation to it.

The questionnaire is divided into four parts:

1. The first consists of questions related to the personal and environmental characteristics of the respondents' area. Whether they consider it beautiful, spacious, clean, bright, etc. The term area refers to the region respondents can walk within 10-15 minutes from their home.
2. The second part includes general questions and looks into people's views and beliefs in relation to crime, including their personal experiences in this regard. For example, what are the criminal acts that frighten them the most in their wider neighbourhood, if the fear has affected their quality of life, if there have been victims themselves, etc.
3. The third part goes in more depth by changing the (cartographic) scale of the research and dealing with the wider area of the respondents' residence. The questions are about the sense of safety they feel regarding specific crimes, whether their area's policing is adequate, and more generally whether they consider their neighbourhood safe.
4. The last part of the questionnaire consists of questions related to the demographic characteristics of the inhabitants, such as age, gender, time spent in the specific neighbourhood, household size, level of education, employment status, etc. in order to draw conclusions about the respondents' profile.

The research focus is not the area but the inhabitants. The subject is the association between each respondent's fear of crime and the urban characteristics of his/her neighbourhood. These characteristics are not intended to provide the area's identity, but to better clarify, as much as possible, the extent to which they contribute to the citizens' sense of insecurity in the urban environment. The scale of the characteristics for which respondents are questioned, covers a small area in the vicinity of their residence.

For the questionnaire's wider dissemination, the data analysis and the mapping of urban fear of crime the platform http://www.fearofcrime.com/ was used, which was developed by GeoCHOROS - Geospatial Analysis and GIS Research Group of the National Technical University of Athens (Tsagkis &Photis, 2021). This platform aims to bring together people and researchers around the world, who are interested in the scientific field of crime fear and more specifically of urban fear of crime (Fig. 1). Its functions include data collection, statistical and spatial analysis, as well as, geographical projection and mapping capacities in a Web GIS environment.

This research studies specifically the Municipality of Athens. The questionnaire processing revealed that among the respondents' demographic variables, the most influential ones regarding the fear of crime are the people's age, employment status and level of education. As far as the environmental variables are concerned, the ones that seem to have the wider impact based on the questionnaires' analysis, are the street lighting during night, its spaciousness, its attractiveness and finally the level of cleanliness and maintenance (Figure 2 and Chart1).

Figure 1. Answers to the question: "Regarding all types of crime, how worried are you that you will become a victim of crime?".

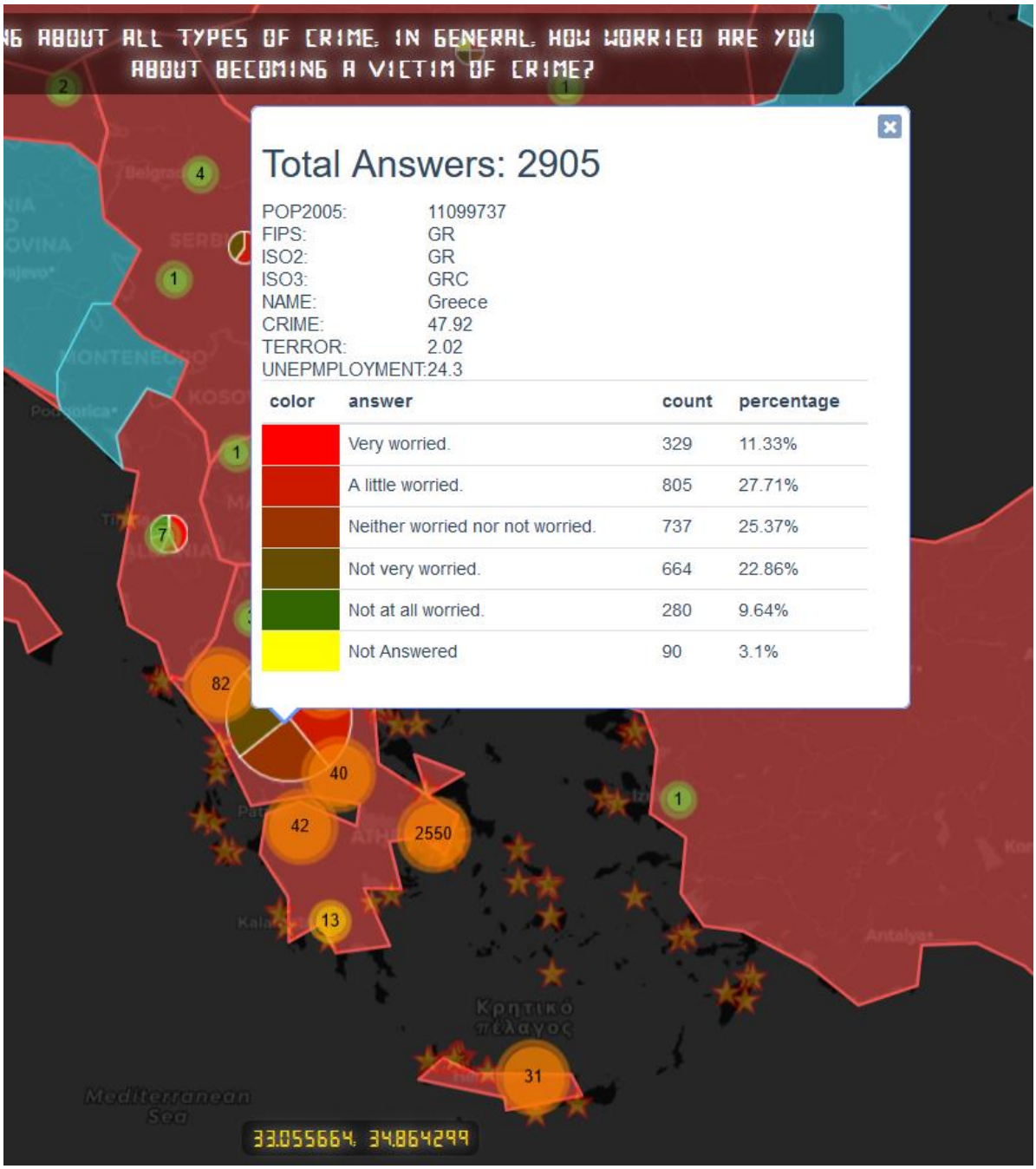

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Figure 2. Answers to the question: "How do you rate the lighting at night in your neighbourhood?".

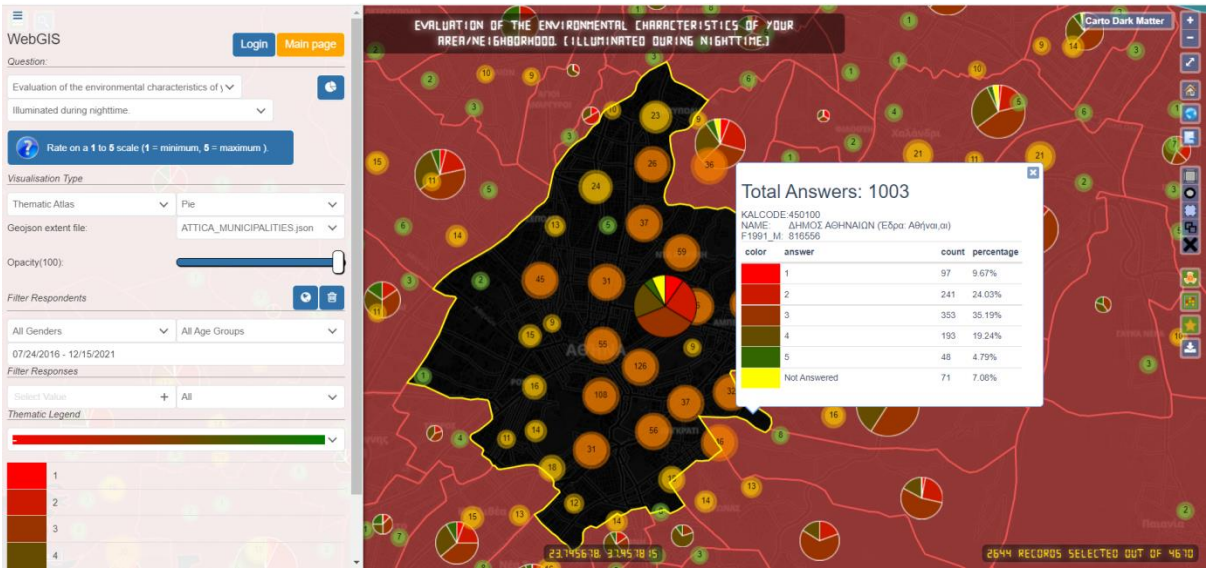

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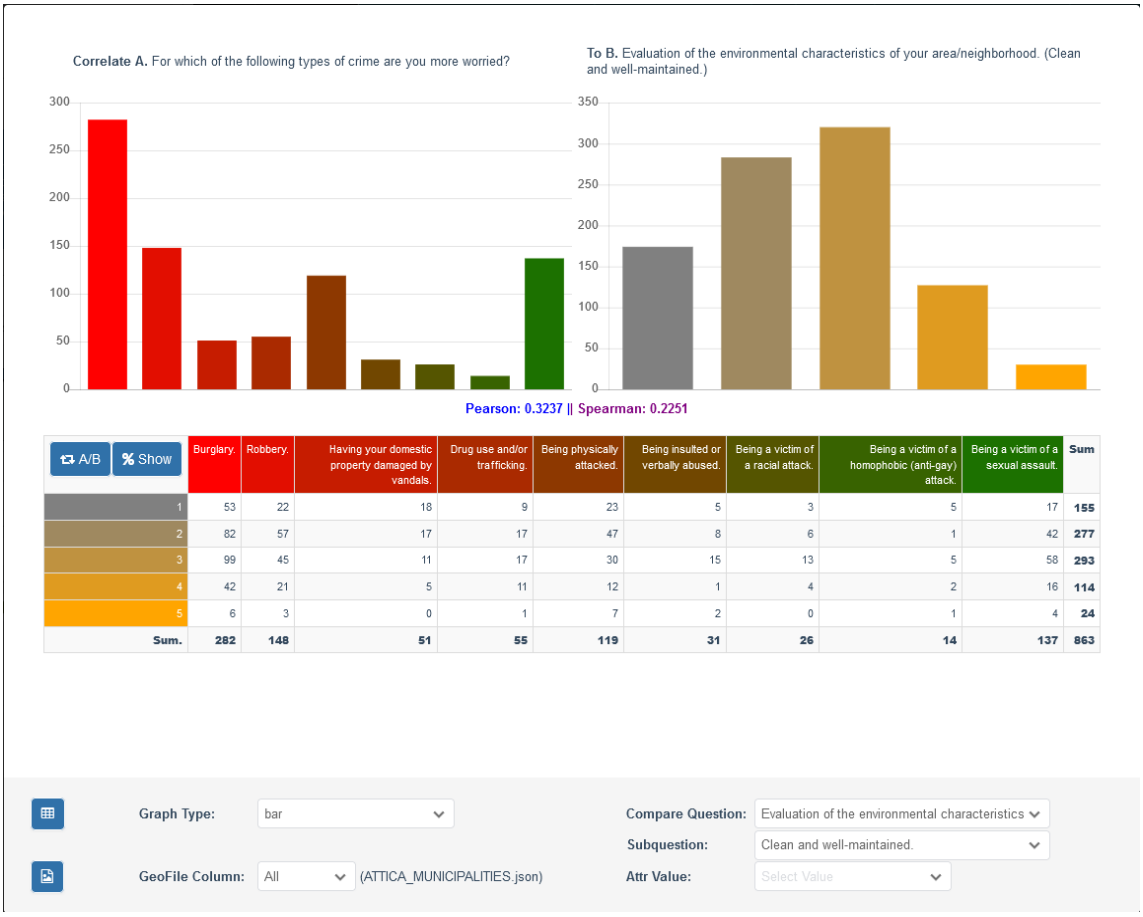
Chart 1. Type of crime that frightens citizens in relation to their neighbourhood's cleanliness and maintenance.



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2.2. Classification (Unsupervised Classification)

In order to analyse the survey data collected, a classification method was employed and especially the k-means unsupervised classification. Classification is the process by which individual objects-events are divided into categories, as objectively as possible, based on the defined criteria. The aim is to treat groups with the same laws and rules (Johnston & Semple, 1983). Classification can be supervised or unsupervised.

Unsupervised classification (Cluster analysis) is a method used in data analysis that seeks to create "natural" data groups. These groups are unaffected, in the sense that no prior assumptions are required, as is the case with most statistical methods. Unsupervised classification is a tool for describing and examining data. It is a data driven method. All that is required of the user is to specify the number of classes.

Unsupervised classification has been used from a very early stage in dealing with geographical analysis problems (Hatzichristos, 1998).

This method is the most suitable when identifying the groups' core, since the inclusion of the characteristics that make up these areas in most cases is not known in advance for the whole study area, in order to use a method that utilizes existing knowledge.

Choosing the right method is a challenging undertaking, since there is not one method more accurate than all others. The definition of the optimal classification method depends on its purpose. There is also no statistical tool that generally decides on the suitability of the methods. In addition, the number of classes is another critical decision, as it affects the classification's accuracy.

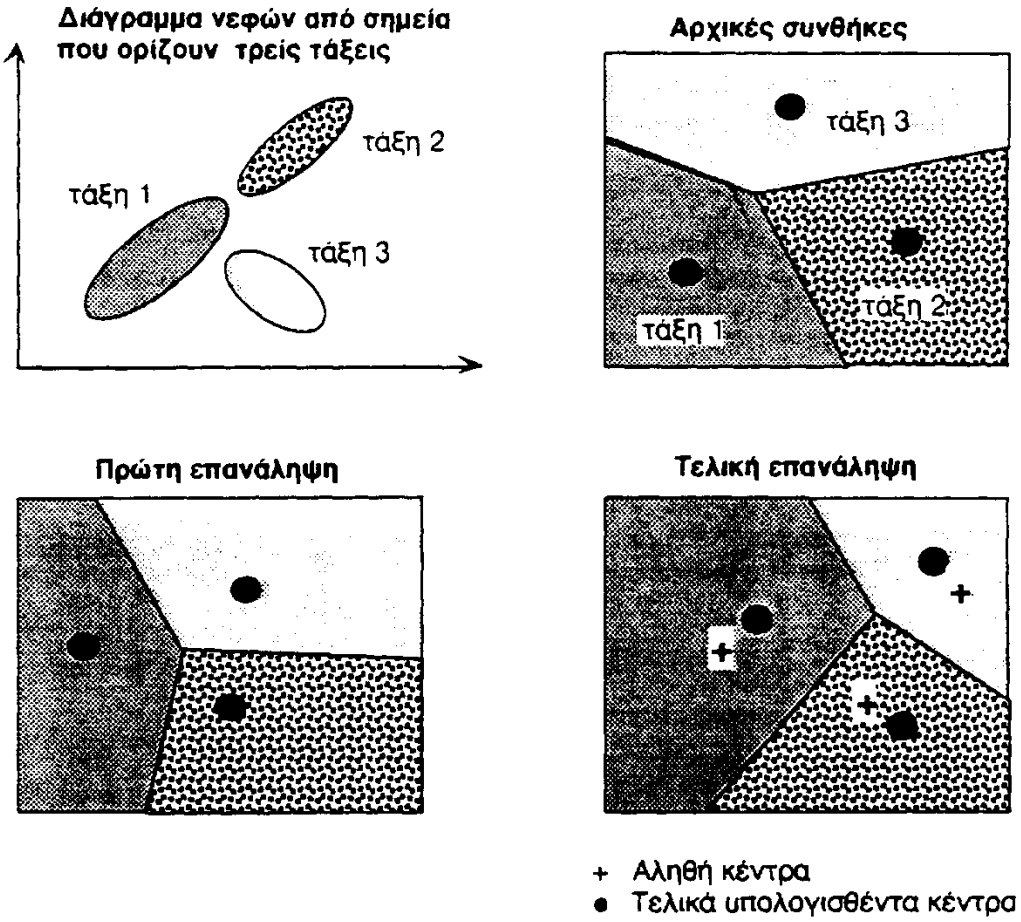
There are several methods that achieve unsupervised classification, such as the traditionally used statistics, the logic of ambiguity, neural networks, and the combination of the latter two with the possible use of genetic algorithms. Then, the characteristics of the statistical classification, as well as, its advantages and disadvantages are presented and analyzed.

Figure 3 (Argialas, 2000) shows an application of the k-means algorithm, which is the most popular algorithm, in a two-dimensional data set. The data consists of three normal distributions with different vector media and volatility tables. The first step of the algorithm defines an initial average vector for each class. Each grid is assigned to the nearest medium and thus the first dividing surfaces are formed, new median vectors are calculated from the result of the previous classification and the grids are assigned to the new classes with the new dividing surfaces. The process continues until there is no significant difference from repetition to repetition. The algorithm is not affected by the selection of the original vector media. If the originally selected vectors are not close to the final average vectors, they will obviously need more iterations for the algorithm to converge.

In the methods mentioned, after each step, the groups are replaced by their centrifuges and the new distances are calculated based on the new centres. Several researchers suggest various other methods of calculating groups. These include:

- The calculation of new groups based on the greater distance between one point of one group and the farthest from the other. This method emphasizes the differences between the groups.
- The calculation of new groups based on the shortest distance between the points of two groups. The calculation of new groups based on the total distance of one point of the group from all points of the other groups. A point is assigned to a group only if it is close to all points in that group. This method is very "conservative".

Figure 3. Graphic representation of the K-centers algorithm (Source:Argialas, 2000)



3. APPLICATION OF UNSUPERVISED CLASSIFICATION – RESULTS

3.1. Definition of classification areas

Based on the previous theoretical background and using the data from the questionnaires answered in the City of Athens in particular, the unsupervised classification was applied and the grouping of respondents along with their answers was done (clustering). All the respondents' answers were used as variables, and the k-means algorithm was applied. From this process, groups of a certain number of clusters emerged. / From this process, certain number of clusters emerged.

The spatial unit selected for the distribution of distinct clusters were the seven City Districts of the City of Athens. Consequently, the largest and smallest concentrations of these clusters in each municipal district appeared. Thus, resulting in the visualisation of the phenomenon of urban fear of crime shaped in the City's different districts.

More specifically, the seven municipal communities, former municipal districts (MD) into which the City of Athens is divided, are:

- The 1st CD that includes the centre of Athens with the so-called commercial triangle. The population according to the 2011 census is 75,810 inhabitants (2001: 100,936).
- The 2nd CD that includes the Southeast neighbourhoods. The population according to the 2011 census is 103,004 inhabitants (2001: 126,932).

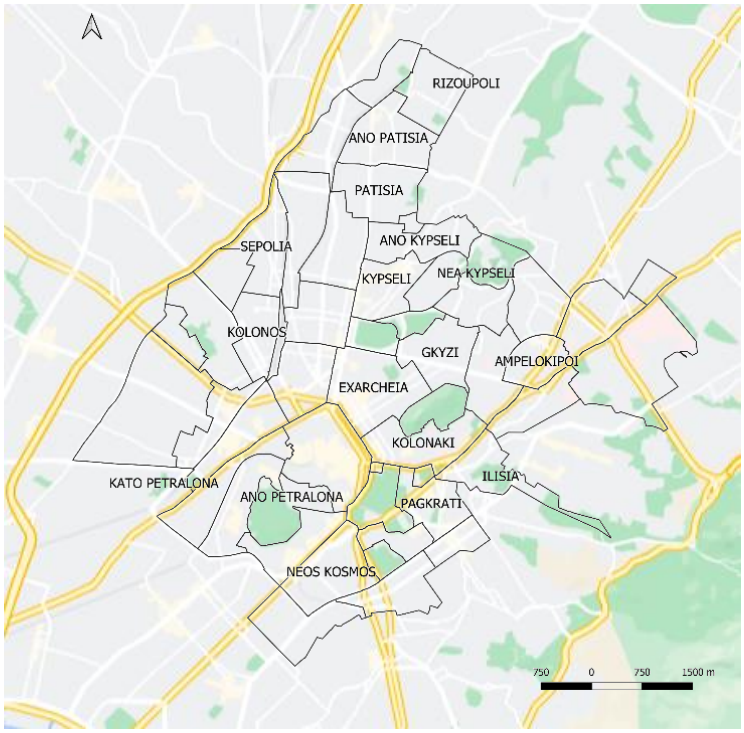
- The 3rd CD that includes the Southwest neighbourhoods with a population, according to the 2011 census, of 46,508 inhabitants (2001: 54,794).
- The 4th CD that includes the West districts. Its population according to the 2011 census is 85,629 inhabitants (2001: 92,310).
- The 5th CD that includes the Northwest districts from Kato Patisia to Probona. The population according to the 2011 census is 98,665 inhabitants (2001: 105,539).
- The 6th CD that includes the northern central districts. The population according to the 2011 census is 130,582 inhabitants (2001: 162,366).
- Finally, the 7th CD that includes the North east neighbourhoods with a population, according to the 2011 census, of 123,848 inhabitants (2001: 146,289).

In total, the City includes 48 sub districts that are subdivided into 129 neighbourhoods. All districtsexhibit a decrease in population, based on the latest censuses of 2001 and 2011.

The largest population-wise areas of Athens sub districts are the following (Fig. 4):

- Koukaki
- Kolonaki
- Exarcheia
- Ilissia
- NeosKosmos
- Pagkrati
- Petralona
- Kolonos
- Sepolia
- Rizoupoli
- Patisia
- Kipseli
- Gyzi
- Ampelokipoi

Figure 4. The largest population-wise sub districts of Athens.



The City Districts (CD) present, mainly in their core, a wide variety of differences. They consist of several neighbourhoods and even quarters, with different characteristics on every term (urban, population, income, man-made, natural, etc.).

The 1st CD includes the city centre, with the historic and commercial triangle and is characterized by a variety of land uses, and different character, between its individual neighbourhoods. On one hand, it includes Kolonaki, Plaka and Syntagma, mostly residential areas along with commercial uses, of land with very high value. They even differ from each other, as for example Plaka is a tourist attraction with all that this description entails. On the other hand, it includes Omonoia and Monastiraki, multicultural areas, with many commercial and leisure uses and tourist attractions as well. In addition, this District includes residential areas such as Ilisia, Neapoli, Koukaki and Exarcheia which are again different due to their character.

The 2nd CD with the southeast districts, includes mainly residential areas, such as Mets and Pagkrati, which in recent years have transformed due to many recreational activities popping up. It also has Agios Artemios and Neos Kosmos, which are considered residential areas, with again a very different character.

In the 3rd CD with the southwest districts, there is Thiseio, Metaxourgeio and Petralona, which are residential areas with a strong element of recreation and a special character. Some of these neighbourhoods have occasionally become gentrification targets. Gazi, on the other hand, which has developed into a recreation area with very distinct features. Roufis also part of the same CD.

The 4th CD with the western districts, includes residential areas again, such as the Plato Academy, Kolokynthou and Kolonos, which are more disadvantaged. Agios Nikolaos and Attiki Square belong to thisCD, which have accommodated a large part of immigration flows, in relation to other areas of Athens.

The 5th CD, which is the northwest part of Athens, includes Kato Patisia and the area of Probona, which residential areas have also been affected by the immigration issue.

Regarding the 6th CD with the northern and central districts, it consists of Koliatsou Square, Victoria Square, Larissa Station and Patisia. The residential use prevails together with commercial activities. Along with the two previous CDs, it has also been affected by the immigration flows. In addition, it includes the railway station of Larissa, of supralocal importance, which serves as a pole of attraction for a large part of the population. Kypseli is an area following a course of upgrading in recent years, having faced problems of identity and high crime, but has begun to regain the lost ground.

Finally, the 7th CD consists of similar areas, relatively central, that combine residential use along with other uses, such as commercial.

3.2. Analysis of results

In order to indicate the optimal results' grouping, three different classification tests were performed, i.e., for 4, 5 and 6 clusters. The results were clearer and more distinct in the 5 clusters' option (Fig. 6). Indicatively, the 4 and 6 clusters tests are also demonstrated in Figures 5 and 7.

Figure 5. Classification of 4 clusters.

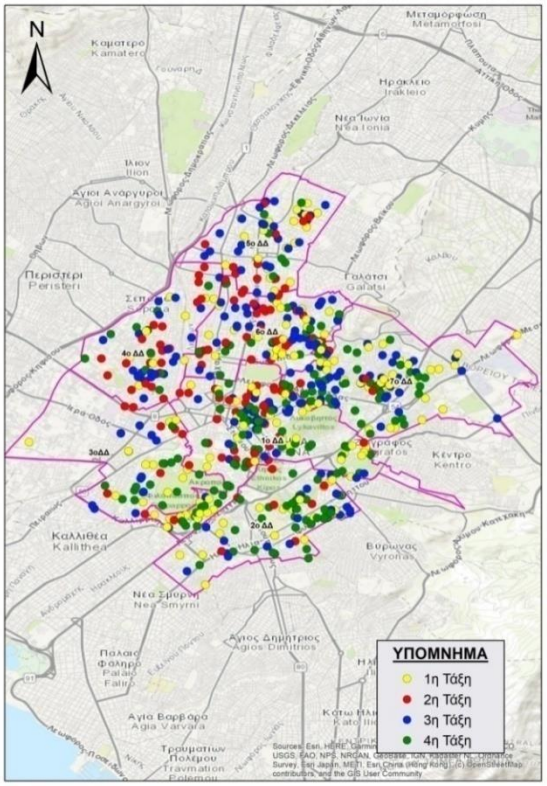


Figure 6. Classification of 5 clusters.

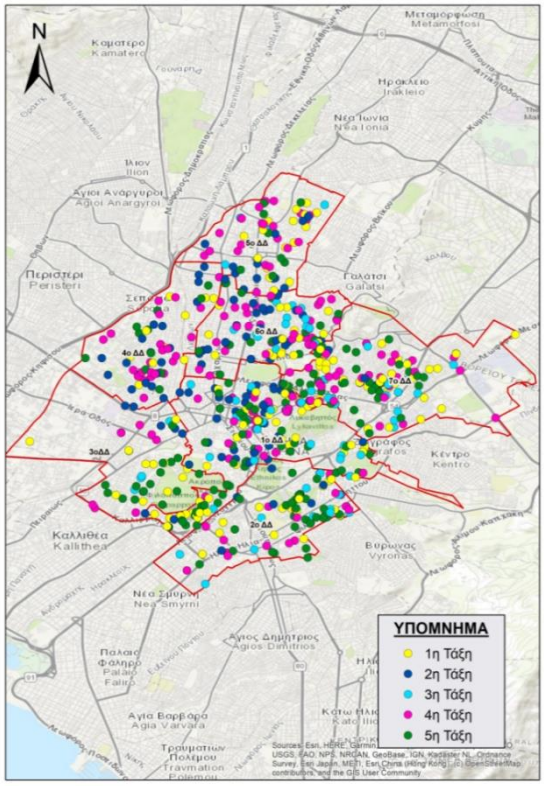
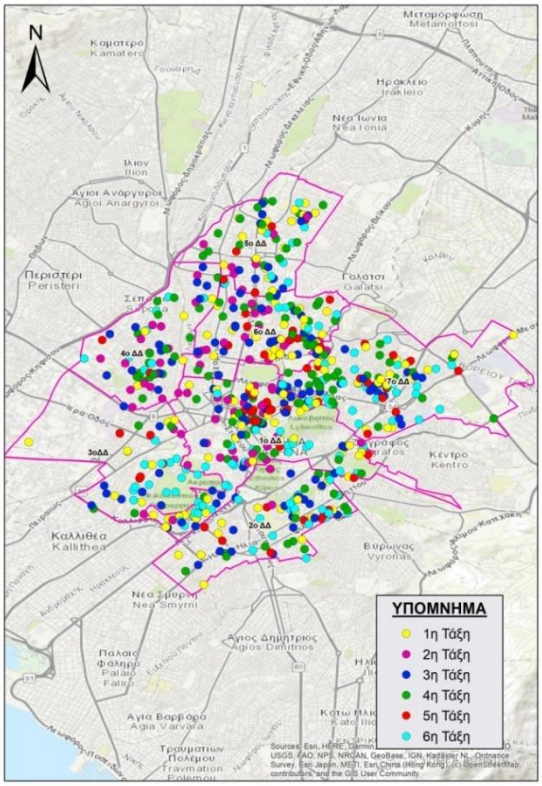


Figure 7. Classification of 6 clusters.



More specifically, according to the **5 clusters** grouping, five groups were created with the following sub-characteristics (see Tables 1, 2 &3):

Cluster1

Cluster1includes women aged 45-54 who live in the same neighbourhood for 10-20 years, in 2-people households, with secondary education, are full-time workers, live in neighbourhoods which they view as too bright during the day and adequately during the night, lovely and spacious, not so clean and vibrant during the morning and not at all alive at night and they claim to feel relatively secure in the probability of falling victim to crime. Their quality of life, according to them, is not affected at all by crime and little by fear of crime. They have not been victims of crime in their area in the last 12 months and consider it unlikely to fall in the next year. They also feel very safe during the day and completely safe at night.

When it comes to car theft, they are relatively calm as well regarding the safety of children in public places like in the park or on their way to school. They also state that they feel neither secure nor anxious about the use and trafficking of drugs, relatively secure about robbery and assault on the street and finally very calm in the likelihood of falling victim in public transportation.

Regarding common crimes, they are most concerned about burglary. In addition, they consider that the level of crime in their area, compared to the rest of the country and their neighbouring areas, is lower than average and has remained at the same level for the last 2 years.

They do not agree that the police and local public services deal effectively with crime, neither do they consider their behaviour changes due to the fear of crime. Finally, they do not consider themselves too afraid of possible victimization.

Cluster2

Cluster 2includes men aged 15-24 who have lived in the same neighbourhood for more than 20 years, in 4 people households, with secondary level of education and some of them

are already university students. They think their neighbourhoods are to some extent bright during the day and not at all at night, not very beautiful and not at all clean, very lively in the morning and a little at night and not at all spacious. They declare themselves to be very worried about falling victim to crime and state that their quality of life is greatly influenced by crime and fear of crime. They have not been victims of crime in the area in the last 12 months, however they consider it possible to fall in the next 12 months, they don't feel safe at all during the day and feel slightly safe at night.

They are relatively concerned of a car being stolen or of the things inside it, very anxious about children's safety in public places such as the park or on the way to school as well as regarding the use and trafficking of drugs, relatively anxious about robbery and attack on the street and very worried they might fall victim in public transportation.

They are more worried about drug use and trafficking. Regarding the level of crime in their area, compared to the rest of the country and their neighbouring areas, they consider it to be higher than average and with a small increase during the last 2 years.

They completely disagree that the police and local public services are dealing effectively with crime. They claim their behaviour is changing due to the fear of crime and do not consider their fear of falling victim excessive.

Cluster3

Cluster 3 includes men aged 25-34 who live in the same neighbourhood for about 2-3 years, in 2 people households and are university graduates as well as full-time employees. They live in neighbourhoods they consider to be very bright during the day, relatively bright at night, a bit attractive and slightly clean, neither too much nor too little alive in the morning and not at all at night and a little spacious. They claim to be relatively calm not to fall victim to crime and declare their quality of life is affected to an average degree by crime and not at all by the fear of crime. They have not been a victim of crime in their area in the past 12 months and find it unlikely to fall in the next 12. They feel relatively safe during the day and completely safe at night.

As for stealing a car or things from inside it, they declare to be neither calm nor anxious. In relation to the safety of children in public places such as the park or on the way to school, they are relatively calm as well as in terms of robbery and assault on the street, while they are relatively concerned about the use and trafficking of drugs. Finally, they claim to feel very secure in the probability of falling victim in public means of transport.

Regarding different crimes, they are more concerned about burglary. They consider the level of crime in their area, compared to the rest of the country and their neighbouring areas, higher than the average and with a small increase in the last 2 years.

They fully agree that the police and local public services are dealing effectively with crime and think their behaviour changes due to the fear of crime. They also strongly claim extremely afraid of falling victim to crime.

Cluster4

Cluster 4 consists of men aged 25-34 who live for the past 10-20 years in the same neighbourhood, in households of 3 people, who are university graduates and unemployed.

They live in neighbourhoods they find a little bright during the day, a little lit at night, slightly beautiful and a bit clean, a little lively in the morning and evening and a bit spacious. They declare themselves as very concerned about falling victim to crime and claim their quality of life is relatively affected by crime and the fear of crime. They have not been a victim of crime in the area in the last 12 months, and consider it neither likely nor unlikely to fall in the next 12. They feel slightly safe during the day and moderately so at night. Furthermore, regarding all types of crimes they were asked about, they claim to be neither calm nor anxious.

They are more concerned about physical violence. They consider the level of crime in their area, compared to the rest of the country and their neighbouring areas, lower than average and remaining at the same levels for the last 2 years.

They agree slightly on the fact that the police and local public services deal effectively with crime. Finally, they state their behaviour changes due to fear of crime and claim to be extremely frightened of falling victim to crime.

Cluster5

Cluster 5 consists of women aged 15-24, who live for about 3-5 years in the same neighbourhood alone, are university graduates, are unemployed and consider their neighbourhoods very bright both day and night, very beautiful and clean, as well as and very lively both morning and evening and very spacious. They claim to be a little worried about falling victim to crime, state that their quality of life is greatly affected by crime and not so much by fear of crime. They have not been victims of crime in the area in the last 12 months, but consider it possible to fall in the next 12. They feel moderately safe during the day, but very safe at night.

When it comes to car theft, children's safety in public spaces such as the park or on the way to school, they claim to be neither calm nor anxious. They are relatively concerned about drug use and trafficking, robbery and street assault, as well as falling victim in public transportation.

The crime that worries them the most is sexual abuse. They consider the level of crime in their area, compared to the rest of the country and their neighbouring areas, lower than average and at the same level for the last 2 years.

They more or less agree that the police and local public services deal effectively with crime and that they are too afraid of being victimized. Finally, they agree that their behaviour changes slightly due to the fear of crime.

Table 1.

5	**cluster**	**cluster**	**cluster**	**cluster**	**cluster**	**total**
1o CD	44	41	24	33	51	**193**
2o CD	15	8	14	18	31	**86**
3o CD	12	4	6	6	18	**46**
4o CD	10	22	0	24	11	**67**
5o CD	16	15	5	23	9	**68**
6o CD	17	34	14	35	15	**115**
7o CD	41	5	18	34	38	**136**
	155	129	81	173	173	

Table 2. Percentage of each cluster in relation to the rest in each CD

	cluster 1	**cluster 2**	**cluster 3**	**cluster 4**	**cluster 5**
1o CD	22,80	21,24	12,44	17,10	26,42
2o CD	17,44	9,30	16,28	20,93	36,05
3o CD	26,09	8,70	13,04	13,04	39,13
4o CD	14,93	32,84	0,00	35,82	16,42
5o CD	23,53	22,06	7,35	33,82	13,24
6o CD	14,78	29,57	12,17	30,43	13,04
	30,15	3,68	13,24	25,00	27,94

Table 3. Percentage of each cluster in each district in relation to the rest CDs

	cluster 1	cluster 2	cluster 3	cluster 4	cluster 5
1o CD	28,39	31,78	29,63	19,08	29,48
2o CD	9,68	6,20	17,28	10,40	17,92
3o CD	7,74	3,10	7,41	3,47	10,40
4o CD	6,45	17,05	0,00	13,87	6,36
5o CD	10,32	11,63	6,17	13,29	5,20
6o CD	10,97	26,36	17,28	20,23	8,67
7o CD	26,45	3,88	22,22	19,65	21,97

Cluster 1 has the smallest percentage in the 4th CD (6.45%). In the other CDs the percentages' variations are not too wide, with the largest being found in the 1st (28.39%). Also, the highest percentage and the one closer to it are both in the 7th district (around 26%).

Cluster 2 showcases very low percentages (3.10% and 3.88%) in the 3rd and 7th CDs respectively, a low one in the 2nd and the largest percentage can be found in the 1st CD (31.78%). Regarding this specific cluster, the differences are quite intense depending on the different municipal districts.

In cluster 3 the percentages vary considerably. The 4th district has no percentage, the 5th and 3rd have low percentages and the highest percentage is observed again in the 1st district (29.63%).

As for the cluster 4, except for the lowest percentage that can be found in the 3rd CD (3.47%), the fluctuations in the rest are not large. It is noteworthy that the highest percentage is observed in the 6th CD (20.23%), with the 7th CD's percentage following at a close proximity (20.23%).

The percentages in cluster 5 are very different from each other. The lowest is observed in the 5th CD (5.20%) and the highest in the 1st (29.48%). Intermediate percentages range from 6% to 22%.

In this grouping we observe that all sets concentrate their highest percentage in the 1st district of the City, with the sole exception of the 4th group, which displays its highest percentage in the 6thDistrict. Their differentiations are observed in the minimum percentages, which are presented in different CDs for each group for the most part. It is noteworthy that group 3 does not appear at all in the 4th CD.

3.3. Percentages of each cluster in relation to the rest in each CD

In the 1st CD, cluster 5 occupies the largest percentage (26.42%) and cluster 3 presents the smallest (12.44%) with small fluctuations for the rest (from 17% -23%).

In the 2nd CD, cluster5 appears to have the highest percentage (36.05%) while cluster 2 has the lowest (9.30%). Here again, no large fluctuations are observed for the rest.

In the 3rd C.D, the highest percentage is again in cluster5, but higher than before (39.13%) whereas the lowest is in cluster 2 (8.70 %%). Clusters 3 and 4 are appearing with exactly the same percentage.

In the 4th CD the image differs from the previous ones and the highest percentage is occupied by cluster 4 (35.82%) while cluster 3 has zero percentage. The 2ndcluster also presents a large percentage with 32.84%.

In the 5th CD, the highest percentage is again displayed in cluster4 (33.82%), while the smallest is again found in cluster3 (7.35%).

In the 6th CD, the highest percentage is again occupied by cluster4 (30.43%) and the lowest by cluster3 (12.17%).

In the last CD, the image is completely different from the previous ones, with the highest and lowest percentages being respectively in clusters 1 (30.15%) and 2 (3.68%).

There are similarities between the city districts 1, 2 and 3 where the highest and lowest percentages of the respective groups are identified (with the only exception being the minimum percentage in the 1st), as well as between the districts 4, 5 and 6 where again the percentages match. The only city district which is differentiating from the rest is the 7th.

4. CONCLUSIONS

As mentioned, a similar image of the clusters' concentrations appears for the city districts 1, 2 and 3. The environmental-urban characteristics of these three districts display similarities, as all three refer to the centre of the City of Athens along with its surrounding areas. They are characterized by a combination of land uses, such as housing, trade, leisure, services, etc.

In these city districts, most respondents belong to cluster 5. That is, young women up to 24 years old, who are unemployed and some of whom are university graduates. The concern and insecurity they express about crime is small and does not particularly affect their quality of life. They live alone in beautiful, clean and vibrant neighbourhoods. The crime that worries them most is sexual abuse. Lastly, they estimate that crime rate in their areas is lower than the country average.

At the same time, the least respondents in the 2nd and 3rd city districts belong to cluster 2. This group includes young men, up to 24 years old, some of whom are students and live in families of four. They are very concerned about crime, which greatly affects their quality of life. They are more concerned about drug use and trafficking as well as falling victim in public transportation. Their residence areas are not considered attractive due to environmental characteristics. They also believe that the level of crime in their area is high.

As for the other city districts, similar results appear in the 4th, 5th and 6th city districts. In this case also, city districts have common features, as they include areas relatively disadvantaged in their majority, characterized by an increased number of immigrants of recent years.

More specifically, most of these city districts belong to the 4thcluster. This group includes men aged 25 to 35, who are university graduates, unemployed and living in three-member households, in areas they consider relatively good in terms of environmental characteristics. They feel a little insecure, especially at night, which relatively affects their quality of life. The crime that scares them the most is physical assault. At the same time, they consider that crime in their area is at a lower level compared to the rest of the country.

Additionally, the fewest in these municipal districts, including the 1st CD, belong to the 3rd cluster. It should be noted that in the 4th municipal district, the 3rd cluster is not at all represented. These are men aged 25-34, university graduates and full-time employees. The areas in which they live would rate average from an environmental point of view. They do not feel particularly insecure and are not affected by fear of crime. They are more concerned about burglary, as a probable crime, and consider crime in their area to be relatively high.

The only city district that differs from the rest is the 7th, which includes the northeast areas of the City of Athens. They are relatively central and combine land uses such as housing and trade. Most respondents in this city unit belong to the 1st cluster. These are women aged 45-54, who live in two-member households, are high school graduates and full-time workers. They generally feel safe in their neighbourhood and fear of crime does not affect their quality of life at all. They consider their areas to have relatively good environmental characteristics and are more concerned about burglary.

In conclusion, the above survey and analysis revealed very interesting results about the landscape of urban fear of crime in the City of Athens. The adequate sample size provided sufficient certainty about the findings. Indeed, harvesting data using crowdsourcing platforms

such as the one employed above, has many practical benefits on speed and cost of collection, including reaching remote areas.

A meta-analysis of urban fear, getting the experts' qualitative view on this multifaceted issue, such as that of a criminologist, psychologist, police officer, town planner, journalist, etc. would certainly enrich the approach and is considered very important. To conclude, a better understanding of the phenomenon can then lead to interventions in urban areas sensitive to crime to reduce the sense of insecurity of their residents. These urban planning instruments may prove an essential objective towards fear-resilient neighbourhoods.

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