Selection of Suitable Sites for Installing CCTVs to Realize Smart City (Case Study: Zanjan City)

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Extended Abstract

Introduction

Security as the necessary condition for urban life can be increased where the level of social, cultural and economic interactions and relationships will be greater. In recent society, there is a possibility of confusion of the security of individuals by various social, political and economic factors. Today cities with all modern facilities are not able to provide peace and security to the citizens. Due to high concentration of the population and activities outside the human scale and the frequency of cars, they gradually diverge from the indicators of peace and security of the urban environment. Planning for the problems in today's complex and multi-dimensional digital and new smart technologies can be facilitated. There are a number of security issues and concerns in the cities involves use the benefits of smart city technology to find and adopt solutions for them. The concept of smart city, as the next stage in the process of urbanization is the political agenda of governments throughout the world. Given this issue and increase in the number of vehicles in the city, the need for increased safety of citizens requires the use of modern technologies including CCTVs. The purpose of this study is to investigate the appropriate areas of surveillance cameras in Zanjan in order to realize the smart city. The main issue here is to determine the most suitable location for installing video surveillance cameras with the smart city landscape in Zanjan.

Methodology

This research has a descriptive and survey-based method due to its practical nature. The data have been collected by field survey. In the first step, using spatial survey and urban maps, spatial information of urban cameras has been taken. In the second step, the information is included in ArcGIS 10.2 software. Then, the coverage radius of each of the cameras is extracted (50 meters), and in subsequent spatial analyses, the missing points are specified. After specifying the criteria and sub-criteria using previous studies literature and experts' opinion in

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the field, input maps are created in the software. Then, using the AHP method, we conducted weighting and combining layers for optimal locations for the installation of CCTV cameras based on their priorities. After combining the layers, the proposed final map was selected according to the criteria for new CCTV cameras, and their priority was identified.

Results and discussion

Changes in technology, in the one hand, and changes in the level of citizens' expectations of urban management on the other have shown the inability of traditional management systems in the cities of Iran more than ever. Given the basic needs of citizens in urban environments including securing public spaces is one of the most important issues that should be emphasized by managers, planners and city officials. The experience of successful countries in this area is moving towards smart cities and integrating urban management. Today, security of public spaces are increased by installing CCTV cameras for the reasons including the cost-effectiveness of the physical presence of police, feeling of being seen and, consequently, the increase in security and reduction in crime and insecurity, feeling of investment by citizens and, in general, increased satisfaction of life. The results of this present study confirm the results of the researches by Deisman et al. (2009); Welsh (2007); and Kitchin (2016) as they stated the need for scientific site selection for installing new cameras to increase security. In terms of prioritization of privacy and public safety and the public's view of installing CCTV cameras, the results of this study are consistent with those reported by Sargolzaei and Ebrahimzadeh (2018), Gates (2010), Avilez et al. (2014), and Deisman et al. (2009). Also, on the relationship between the installations of CCTV cameras with the realization of the smart city, the results are in line with the results of the researches by Vanolo (2014), Coletta et al. (2017), Hall (2010), Batty et al. (2012), and Kitchin and Dodge (2017).

Conclusion

One of the new technologies to improve the safety and security of cities against the dangers is the use of CCTV cameras. Optimizing the location of city-centric cameras in the city can increase the efficiency of using these technologies. The present research was carried out in the first step of the city's current situation regarding the establishment of urban surveillance cameras. The results showed that some areas of the city lacked adequate coverage and are out of the monitoring area of urban cameras. The different areas of the city for the deployment of new cameras were analyzed using four main criteria of user, physical, natural and demographic criteria. In the next step, using the AHP model and fuzzy logic in the GIS environment, 25 subcategories were analyzed in total of the four main criteria with each other. Using existing situation analysis, recognizing outside areas of cameras coverage, and assigning values to the sub-criteria in each of the main criteria, the areas that were susceptible to deploying CCTV cameras were determined. In the last step, using the method and fuzzy functions in GIS, the criteria and sub criteria were combined and the final map was extracted. The final map shows the areas required to install new cameras in a categorized fashion. The obtained results indicated that the city's central and middle areas still have a higher priority for installing city-centric cameras, yet they are prone to setting these cameras. The indicators in this study were examined as elements of urban open system. The results indicate that the distribution pattern of surveillance cameras is not proportional to the extracted urban indicators. Therefore, the need for proper and comprehensive planning in the zoning of Zanjan's CCTV cameras, as well as the installation of other new technologies as inevitable necessity in smart cities, seems to be necessary for having a smart city. The final point is that urban digital cameras, along with other urban actions including educating citizens, immunizing, raising awareness and using day-to-day knowledge, can help improve the security and safety of cities.

Keywords: CCTVs, site selection, GIS, smart city, safety and security.

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