Analysis of spatio-temporal patterns of Covid-19 virus pandemic and its hazards in Iran

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Introduction

In the present century, the prevalence of COVID-19 pneumonia as a contagious disease has posed major health threats to the world's public health. Despite significant advances in the fight against disease, infectious diseases are still of particular importance in epidemiology and community health. One of the main applications of epidemiological science is to facilitate the identification of geographical areas and vulnerable groups that are at higher risk for disease and risk factors for mortality. A geographic information system is a tool for collecting, storing, cohesive, managing, retrieving, analyzing, and displaying spatial information that can be used in epidemiological research and health policy. Therefore, this research has been conducted with the aim of geospatial study of Coronavirus to model the spatial emission of COVID-19 epidemiology in the country.

Materials and Methods

Based on the purpose of the present research, it is among the applied researches and according to the research method, it is descriptive-analytical. ArcGIS software has been used to analyze data. The statistical population of study includes the number of people infected with Coronavirus (21638 people) in the provinces of the country and in the time range of February 22, 2020 to March 22, 2020. Also, the study area in this research is 31 provinces of the country.

Results and Discussion

The present study has modeled the spread and spatial distribution of coronavirus epidemiology during the period of February 22, 2020 to March 22, 2020 in the country. The highest geographical distribution of coronary heart disease is observed in the northern and central regions of the country. The southern and southeastern regions of the country have the lowest prevalence of coronavirus.

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The results of spatial self-correlation showed that 32.26% of the country's provinces (Tehran, Alborz, Qom, Mazandaran, Gilan, Qazvin, Isfahan, Semnan, Markazi and Yazd) in the HH cluster, 9.68% of the provinces (Zanjan, Lorestan) And Ilam) in HL cluster, 41.94% of provinces (South Khorasan, East Azerbaijan, Kurdistan, Kohgiluyeh and Boyer-Ahmad, Hormozgan, Khuzestan, Fars, Bushehr, Sistan and Baluchestan, Chaharmahal and Bakhtiari, Kerman, Kermanshah and West Azerbaijan) in The LL cluster and 16.13% of the provinces (Golestan, Khorasan Razavi, North Khorasan, Ardabil and Hamedan) are also in the LH cluster.

Conclusion

The results of statistical-spatial analysis of hot spots show that Qom, Tehran, Golestan, Semnan, Isfahan, Mazandaran, and Alborz provinces (22.5% of the country's provinces) are in hot spots and Bushehr, Ilam and Kermanshah (9.67% of the country's provinces) were identified as cold spots. In addition, spatial clustering of the country's provinces showed that the spatio-temporal distance factor is the most important factor in spatial distribution of coronavirus from the center (Qom province) to other provinces, and follows the pattern of compatible spatial distribution.

Keywords: Spatio-temporal analysis, Spatial Diffusion, Epidemiology, COVID-19, Hazards , Iran.

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Identifying and prioritizing risk management indicators in dam-building projects using combination of AHP-ARAS in fuzzy environment based on PMBOK

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Introduction

In addition to the engineering principles of construction projects, optimizing indicators of project management such as financial management, scheduling, quality, and stakeholders' satisfaction are also important. One of the main reasons for the failure of construction projects can be considered the inefficiency and inability of contractors to analyze and assess the unpredictable risks of the project. Numerous risks, on the one hand, can lead to significant time delays in the implementation and completion of these projects, which impose huge direct and indirect costs on the economy. On the other hand, it can have a negative impact on the quality of the outputs, which can be a factor in increasing systems' risks [1,2]. Therefore, identifying and prioritizing risks is one of the most important parts of risk management [2,3]. There has been a lot of research on risk management, but little research has been done on risk management in the discussion of barrier management from a managerial point of view, which can indicate the necessity and importance of risk management. Therefore, this study identified and prioritized the risks of construction projects with a focus on dams, according to PMBOK standard. Beside method of Failure Mode and Effect Analysis (FMEA) and its risks, using multi-criteria decision-making techniques namely Additive Ratio Assessment (ARAS), and Analytical Hierarchy Process (AHP) in a fuzzy environment are applied to try to provide practical solutions.

Materials and Method

This research tries to rank the risks in construction projects in seven steps by focusing on the dams. 51 risk items were identified in the dam-building projects, which categorized risk segregation into four groups: external risks, internal risks, technical-operational risks, and managerial risks. In the following, the screened risks for RPN determination are presented to the experts using a

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questionnaire distribution and a table of linguistic variables. An arithmetic mean method has been used to combine the opinions of 31 experts. After completing the questionnaires related to pairwise comparison, the criteria are formed by the experts of the comparison matrix using triangular fuzzy numbers for each questionnaire. The range used in this questionnaire is the spectrum of nine succulents .In the next step, combining the opinions of experts, using the geometric mean of calculations with fuzzy AHP method and pairwise comparisons have been done. In the next step, considering that all the values obtained from the incompatibility rate calculations are smaller than 0.1, the questionnaire is approved. In the final stage, the risks are ranked according to the techniques used in this study and the degree of risk desirability is determined.

Results and Discussion

Based on experts' opinions, the risks' filtering was done and 15 potential risks were designated for being used in this study. The RPNs were calculated in a range of 80.7 for lack of experience project's engineers to 274.5 for the delay in paying contractors. Then, the experts' opinions were combined with the use of triangular fuzzy numbers and Sis were calculated for Si1 to Si4 as well as their normalized weights. Next, the AHP matrix's inconsistencies were calculated and the values of objective function were extracted from 0.072to 0.118. Finally, the risks were ranked based on their acceptance rate from0.607 to 1.000 for 10 prominent risks. To elucidate, delay in providing equipment with the rate of 1.000 was ranked as 1, financial issues with the rate of 0.980 was ranked as 2, delay in notifying the plans with the rate of0.909 was ranked as 3, delay in paying contractors with the rate of 0.902 was ranked as 4, workplace shot down because of environmental obstacles with the rate of 0.887 was ranked as 5, high inflation rate with the rate of 0.861 was ranked as 6, changing currency equity rate with the rate of 0.861 was ranked as7, unscheduled time for passing changes and plans by consultants or employer with the rate of 0.793 was ranked as 8, fundamental inconsistency between executive plans and technical framework of contracts with the rate of 0.633 was ranked as9, and instability in governments policies with the rate of 0.607 was ranked as10 were indicated as the most important potential risks in dam-building projects.

Conclusion

In this study, after identifying the risks according to PMBOK standard and risk screening by experts, using risk intensity indicators, risk probability and pre-risk detection capability, which are indicators of FMEA technique, priority score of the risks were taken. The use of FMEA technique is one of the advantages of this research due to the possibility of occurrence before diagnosis, which makes the risks from the perspective of this index also be evaluated. In the following,

higher risk priorities were ranked based on the impact on the desired goals of the project. Time, cost, quality, and safety were the criteria for ranking risks. Using fuzzy AHP method, the weights of the criteria were calculated and also the risks were ranked using multi-criteria decision-making methods. Using fuzzy ARAS method, the performance rate and degree of desirability of different options were obtained.

In this study, all the steps of prioritization and ranking of risks have been implemented based on the method designed in the case of a project. Due to the variety of activities carried out in dam projects, the method can be used as a comprehensive model among construction projects, by changing its failure structure. Also, the method of risk analysis in this research can be considered for other development projects. In order to solve the problems and obstacles of using risk management in the country's development projects, the following solutions are recommended:

1. Identify project risks during the project life cycle.

2. Combining project risk management with project financing strategies and choosing the best method.

Due to the fact that one of the risk factors in the design and implementation of construction projects is timely injection and instead of financial resources for the project, it seems that by combining project risk management according to PMBOK methodology and different types of financing strategies and choosing the appropriate method, one of the most important risk factors for construction projects will be reduced.

Keywords: Project Risk Management, Construction Projects, Dam-Building, Fuzzy Environment, PMBOK.

Ecological vulnerability assessment of tourism centers in Langarud city based on SWOT model

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Introduction

In the previous 50 years, rapid growth of tourism industry has been imposed a lot of destructive results on ecology. In the implementation of tourism projects in Iran, environmental test assessments are usually ignored or given the last priority. The environmental effects in the tourism centers of Langarud city have been studied in order to legalize the human relationship with the natural environment and to prevent the destruction of these divine gifts.

Materials and methods

This research is in the category of applied research in terms of purpose and descriptive and inferential in terms of nature. The present research has been done in two ways: library study and field survey. A questionnaire was used to collect data. The statistical sample consisted of 383 people who were calculated using the Cochran's formula and distributed among tourists and the local community. SPSS and Spearman correlation coefficient method were used to analyze the data.

Discussion and results

To evaluate the environment of important tourism centers of Langarud city using the SWOT model, the required information was collected and after collecting field data through a questionnaire, raw information was entered into SPSS software. First, descriptive analysis was used and then in order to achieve the results and objectives of the research, inferential statistics and related tests were used to analyze the data.

Conclusion

The results indicate the negative impact of man-made phenomena on the environment of the region, poor management decisions in the evaluation and implementation of tourism projects, failure to deal with violators, lack of cooperation between tourists and local society and uncontrolled growth of tourism in these centers. Of course, by looking at the positive effects and

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statistical analysis and evaluation of the centers, strategies and strategic solutions have been proposed, the most important of which is the non-repulsive type wt.

Keywords: tourism, ecology, tourism centers, Langaroud city.

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Detection of excess nitrogen stress of corn and hazards with aerial multi-spectral imaging by UAV

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Introduction

One of the main hazards in the agricultural sector is the uncontrolled use of nitrogen fertilizers. Excessive consumption of these fertilizers, in addition to increasing production costs, pollutes the environment, increases product vulnerability and increases the health risk to humans (Bagheri et al., 2013). Improving the efficiency of nitrogen consumption depends on monitoring the nitrogen status of the crop at different stages of growth and applying sufficient fertilizer at the right time and the right place (Zhao et al., 2003). Due to the adverse consequences of improper use of nitrogen fertilizers and the limitations of current methods to determine the amount of required nitrogen fertilizer, it is necessary to use new, fast, and non-destructive technologies for optimal nitrogen fertilizer consumption and increase its efficiency (Xue and Yang, 2008). Numerous studies have evaluated the possibility of using remote sensing technology to determine plant nitrogen status (Warren and Metternicht, 2005). Research shows that this technology can determine the amount of plant nitrogen (Bajwa., 2006; Reum and Xue and Yang, 2008). In recent years, with the development of UAVs, a new opportunity to monitor agricultural products has been found. Li et al used three types of cameras mounted on the UAV to estimate the nitrogen status of the crop in two wheat cultivars. The results of this study showed that the crop coverage index is well correlated with the amount of nitrogen in wheat cultivars (Li et al., 2010). In a study by Zaman Allah et al, UAV aerial imaging was used to investigate the tolerance of corn to nitrogen stress. The results showed that multi-spectral aerial images were able to determine the amount of soil nitrogen. So, nitrogen stress could be detected using vegetation indices. In this study, the NDVI index was strongly correlated

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with ground data (Zaman Allah et al., 2015). Krienke et al. (2017) used aerial imaging using UAVs to estimate nitrogen changes in corn vegetation. The results indicated that the UAV equipped with active sensors was able to determine the nitrogen stress of the plant (Krienke et al., 2017). Corti et al used a low-cost camera mounted on a UAV to study the nitrogen status of corn (Corti et al., 2019). Given the need to reduce the risks of overuse of nitrogen fertilizers, this study aims to identify the nitrogen stress of corn as a solution to determine the need for plant fertilizers using new, fast and non-destructive technologies to measure multi-level aerial reconnaissance with UAVs. Due to the importance of reducing the hazards of overuse of nitrogen fertilizers, this study aims to identify the nitrogen stress of corn as a solution to determine the need for fertilizer using new, fast and non-destructive technologies by multi-spectral aerial remote sensing by UAV.

Materials and methods

The research area was a part of an agricultural farm with an area of about 850 square meters in the village of Javadabad in the city of Varamin in the south of Tehran province with geographical coordinates of 35 ° 8'N and 51 ° 40'E. Soil sampling was carried out before planting. The experiment was performed as a randomized complete block design with 4 repeated nitrogen fertilizers (urea fertilizer) in four treatment levels including 0%, 50%, 100% and 150%. The hybrid corn seeds 450 was planted with a seeder in the depth of 5-8 cm with a row spacing of 75 cm and a spacing of 15 cm between plants. The farm was irrigated by tape according to the phonological stages of corn growth. Urea fertilizer along with irrigation water was injected in two stages of 8-leaves (V8) and tasselling (VT) growth stages. Ground sampling and multi-spectral aerial imaging were performed in 8-leaves and tasselling growth stages between 11 and 13 o'clock. Multi-spectral aerial imaging by UAV was performed on a sunny, cloudless day from a height of 100 meters above the ground. A multi-spectral ADC micro camera (520-920 nm) made by Tetracam was used for imaging (Bagheri et al., 2016). The UAV designed by Bagheri et al., 2016 was used. After capturing and extracting images from the camera's memory card, aerial images were processed using ENVI 5.4 and PixelWrench2 software. The radiometric correction was performed using a white Teflon calibration plate. Pre-processing of images included changing the image format from DCM to TIFF, creating false-color images, radiometric correction of images. Vegetation indices such as NDVI, NRI, MTVI2, CI, and GM, which were associated with plant chlorophyll and nitrogen content were calculated. For ground sampling, 10 corn bushes were randomly selected from each plot and the entire plant was cut above the ground. For all the leaves of each plant, the leaf chlorophyll index was measured using a 502-chlorophyll measuring device (Minolta Corp., Osaka, Japan) after calibration of the device. The Kjeldhal method was used to

determine the nitrogen content of the samples (Bagheri et al., 2012). Data analysis was performed using statistical methods. Also, the nitrogen and fertilizer stress estimation models were extracted based on the studied vegetation indices through regression models and the best model for nitrogen stress at each stage of growth was introduced.

Discus and Results

The relationship between chlorophyll and nitrogen content at different stages of growth

In the V8 and VT growth stages, with increasing the amount of nitrogen fertilizer distributed, the chlorophyll of the samples increased; because with the increase of fertilizer received to the optimum level, the chlorophyll of the leaves has increased. The correlation coefficient between chlorophyll and nitrogen data was obtained in the V8 growth stage obtained 0.92 and 0.999 in the VT growth stage.

Correlation of the studied vegetation indices with the amount of corn nitrogen

In the V8 stage, the second-order regression equation with a correlation coefficient of 0.77, 0.67, 0.86 and 0.88 for the NDVI, NRI, MTVI2 and CI indices, respectively, have the highest correlation for estimating the percentage of nitrogen among other models. In the VT growth stage for the NDVI, CI and GM indices, the second-order regression equation with a correlation coefficient of 0.84, 0.75 and 0.77, respectively, had the highest correlation to estimate the percentage of nitrogen. For NRI and MTVI2 indices, both the power and logarithmic equations with a correlation coefficient of 0.90 and 0.75 had the highest correlation for estimating the percentage of nitrogen.

Conclusion

Due to the need for reducing the risks of overuse of nitrogen fertilizers and the ability of remote sensing technology as a new, fast, and non-destructive method to detect plant variabilities, this study was conducted to identify the nitrogen stress of corn as a way to descript Nitrogen fertilization. The overall results of this study are:

- The amount of chlorophyll and nitrogen content of plants increased with an increasing amount of nitrogen fertilizer applied in both growth stages.
- In the V8 growth stage, the second-order regression equation with a correlation coefficient of 0.77, 0.67, 0.86 and 0.88 for the NDVI, NRI, MTVI2 and CI indices, respectively, has the highest correlation for estimating nitrogen stress among other models.
- In the VT growth stage, for NDVI, CI and GM indices, the second-order regression equation with a correlation coefficient of 0.84, 0.75 and 0.77 had the highest correlation to estimate nitrogen stress, respectively.
- The multi-spectral aerial remote sensing method is capable enough to detect variability and stress in nitrogen fertilizer.

Keywords: Multi-spectral imaging؛ maize؛ Nitrogen Fertilizer؛ Precision agriculture؛ Remote sensing؛ Unmanned aerial vehicle (UAV).

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Preparation of flood hazards management map using a new random forest algorithm (Case study: Lavasanat watershed)

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Introduction

Flood is a pervasive and global phenomenon that causes a lot of human and financial losses every year. Floods are natural hazards that do not occur spontaneously, but are caused by many factors, both natural and human. Floods are one of the three main natural hazards in Iran and it is safe to say that significant floods occur at least once a year in this part of the country. According to studies, 40 small and large floods occur annually in all parts of the country. This highlights the need to study the factors influencing the occurrence of floods. The purpose of this study is to zoning flood prone areas in the region and to determine the priority of effective factors in flood occurrence using a random forest algorithm.

Materials and methods

Thus, according to the studies and research background, 9 land use indicators, distance from the river, slope, height, humidity index, river flow, waterway capacity, precipitation, and land curvature were selected. After determining the variance inflation factor and tolerance coefficient, in the next step by entering the data related to the effective factors to R software, modeling was performed using random forest algorithm and the role of effective factors in flood occurrence in each sub-basin was determined. Flood risk zoning was prepared in four very dangerous, dangerous, medium and low risk zones in ARC / MAP 10.2 environment.

Discus and Results

Lavasan catchment area is divided into 7 sub-basins: Lavarak, Afjeh, Kand, Imameh, Fasham, Meygon and Ahar. The most important factor in the occurrence of floods in all sub-basins is rainfall. In each sub-basin, according to its natural characteristics, factors such as discharge, land use, drainage are other factors for floods.

Conclusion

In the northern and western basins of the Dubai River region and the slope of the next ranks have played a role in the occurrence of floods. In the northern basins

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of the region (Migun, Fasham and Ahar), the height of component 5 is an important factor in the occurrence of floods. In the southern basins of the region, drainage density and distance from the river after rainfall have been the most important causes of floods. Land use, especially in the southern sub-basins of the region, is an important factor in the occurrence of floods. Due to the tourist nature of this region, the process of illegal construction and land degradation has increased sharply in thi.

Keywords: flood, rainfall, land use, hazards manegment, random forest algorithm.

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A look at the Corona virus and the evolution of university education in the world: Challenges and perspectives

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Abstracts

The spread of the corona virus is one of the most important challenges in the world today, and the epidemic of this virus has affected all sections of society, including universities. As with any challenge, the coronavirus epidemic has posed many threats and opportunities for universities and the academic community. This crisis has led the scientific community to gain valuable experience in electeronic learning and be ready to enter a new era of teaching in new ways, including learning in three-dimensional spaces. Culture and art are also linked to education, and this can be the beginning of a move towards global integration in the education process. In recent months, many conferences have also been held virtually, which have been widely welcomed. Global policies have also taken measures to increase the budget for applied sciences so that, the National Science Foundation's budget is shifting from $ 8 billion a year to $ 40 billion. On the other hand, the Covid-19 epidemic has attracted the attention of researchers in various fields and it has changed the direction of world-wide research towards the basic sciences and finding solutions to treat this virus. This will pose a budget problem for some other research areas. Many universities around the world have also faced a number of problems due to the cyberspace approach, including declining enrollment of international students and lack of funding, and this has threatened the lives of some universities. Now, more than eight months after the onset of the coronavirus epidemic, universities around the world have made valuable arrangements to maintain and enhance their educational goals and to adapt more and more to this global crisis. Given the above, in this article we look at these valuable approaches globally. It is hoped that by taking advantage of scientific participation and transferring useful experiences at the global level, we can turn this threat into an opportunity to improve and enhance the level of science and awareness in the country.

Keywords: Corona virus, Covid-19, University, Electeronic learning, Crisis, Opportunity.

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