

## **An Analysis of Spatial Distribution of Sustainable Rural Housing in Iran (Case Study: Miyankooh District, Ardal County)**

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### **Abstract**

This study has been done through a descriptive-analytic method, which studies housing sustainability status in economic, social and environmental dimensions, and housing distribution among 23 villages located in Ardel township, Miankouh region. The statistical population of the study consisted of all household caretakers of Miankouh region, among which 270 were questioned randomly. The results of the survey on the status of social and economic sustainability of housing in the study area showed that the mean of two reverse dimensions was 2.48 and 2.81, respectively, which was lower than the average. Conversely, two dimensions of the study, the environmental sustainability dimension of housing, showed that the average calculated for this dimension was 3.18 that showed a better situation. The results of the study on the general situation of housing sustainability in Miankouh area showed that the average measured (2.74) was lower than the average basis, and therefore, Miankouh rural district is not in a suitable position in terms of housing sustainability. The spatial distribution results of housing in Miankouh district explained that villages in the studied area experience the same pattern in terms of housing sustainability, and the only village of Kazemiyah, which is formed from the integration of several villages, has the least sustainability and is in front of the village of Choldan with proper access and communication position among the villages of the region with a higher level of housing sustainability.

**Keywords:** Sustainable Development, Rural Development, Housing Sustainability, Miankouh District.

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## Reconsidering Architectural Ethics in Favor of Diminishing Existential and Environmental Hazards\*

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### Abstract

Due to the occurrence of the industrial revolution in the late eighteenth century, classical societies were subjected to tremendous transformations by virtue of the development of communication systems and construction infrastructures. Accordingly, urbanization has undergone significant growth. With the great intervention of the industry and trade in human interrelations, social ties became firmly established by bureaucratic organizations and, especially, monetary issues. Beside the emergence of Taylorism and Fordism propagating the regulation of more efficiency, the instrumental-strategic rationality focused on the principle of domination-supervision conquered the communicative-argumentative rationality focused on the idea of dialogue-agreement. In Capitalism, almost all aspects of culture are determined by the economic factors derived from the ideological apparatuses of the state. This economic system, through technology, captures nature and exploits it, and through media, manipulates people's consciousness and their plans for the future. The outcome has been existential hazards, such as alienation and identity crisis, and environmental problems such as the devastation of the ecosystem. These concerns have severely influenced human's lives for decades. The turning point of the formation of modern architecture, in a sense, is rooted in the beginnings of the industrial revolution. Thinkers and activists of the mentioned movement

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saw themselves as part of an idealistic tendency and hoped to enhance the quality of life. Modernist architects tried to adapt to the 'Zeitgeist', but eventually, they came to create uniform boxes, which were suffocating, from the perspective of existence, and catastrophic, from the perspective of environment. It is here that the anarchist postmodernity, by means of the abandonment of rationalist functionalism and aesthetic purism, organized an ironic approach in mindsets, which were more democratic and less elitist. The essential discussion of the present paper is based on the relationship between future architecture with ethics, from both existential and environmental outlooks. Consequently, we contemplate on the works of architecture after the 1980s, when the emerging concepts such as deconstructivism and folding, came from philosophical theory to architectural praxis and led to exceptional alterations in creating new spaces. The origin of these concepts dates back to the years of the 1960s, when for the first time throughout the history of construction, philosophy, directly, benefited architecture in order to liberate it from identical non-places appeared as the outcome of the modernism. Ideas like phenomenological ontology and contemporary hermeneutics are amongst the most prestigious ones of those theories. Therefore, the prehistory of this paper concentrates on the modernist architecture, which has paved the way, maybe inadvertently, for augmenting the psychological and environmental predicaments of the present time.

### **Introduction**

Architecture could be assumed as a built form or a habitable space, which beyond a purely practical building, shows aesthetic and symbolic characteristics. Since architecture is limited within the framework of the power-ideology-capital triangle, as well as the structural statics, the emancipatory experience resulting from its perception does not come into the same line in regard to other categories of arts. Architecture as a cultural symbol, in essence, is based on the ideological and hegemonic presuppositions of the society. As such, it operates in the role of an apparatus that protects the status quo and stabilizes its authority, even if this mission remains in the unconsciousness level of the active subject. First of all, architecture distributes the people's bodies in the space; in such manner what apparatus is better than this in the grip of the power?

Logic of the free market has increasingly subjugated contemporary society so that with considering only the commodity value, it has reduced everything to an object that can be bought and sold. Under the control of late capitalism, false demands are being implanted in the human minds and, therefore, the possibility of experiencing ontological and semantic freedom has been forgotten. Fulfilling these inauthentic demands brings huge profits to pockets of the rich, who have a fundamental affiliation with the constructions of power and, accordingly, intend to preserve the present politico-social situation. Meanwhile, the modern state, by suppressing the citizens' subjectivities and their pleasures, is attempting to

collapse the individuality in order to establish a kind of compulsory homology. The consequence of this condition is the alienation of the people and the decline of their creativity, as today's human is suffering from serious existential complications.

In parallel, another catastrophe is happening: the destruction of the environment. Irresistible urban sprawling, unsuitable manufacture, demolition of natural landscapes, extreme exploitation of the ecosystem, and excessive consumption of non-renewable energy sources have resulted in numerous environmental crises. The lack of awareness and enthusiasm to deal with these challenges has caused irreparable damage for the humankind. Therefore, in addition to addressing architectural aesthetic aspects, managing environmental hazards is, also, enumerated as a top priority in future buildings. The major questions of this article are as follows:

One. While confronting an artwork or an architectural building, what procedures are being operated in the human brain?

Two. What are the influences of those power interrelations exist in the underpinning stages of social phenomena and lead to the domination principle, on the future projections of human?

Three. What is the nature of architecture, and what are its facilities and tools for diminishing the psychological and environmental hazards?

### **Materials and Methods**

Employing a Nietzschean-Foucaultian approach, in the present paper we propose a critical assessment of contemporary buildings by way of a qualitative method hinge on logical reasoning and case study techniques, in favor of providing a number of ethical solutions for the construction of tomorrow, from both existential and environmental considerations. We initiate the research by exploring the areas of the audience's mind involved in the process of perception and appreciation of an artwork, so as to cast light on the idea of imaginative experience to measure the emancipatory capacity of art and architecture using the concept of 'ostranenie'. Afterwards, we scrutinize the nature of architecture as a social actualization which is surrounded by the interrelations of power dominating the public sphere, and emphasize its politico-ethical attribute.

In the subsequent step and with the aid of argumentation, we discuss that the aesthetic value existed inherently in the architecture is able to bring some degree of freedom and, as a consequence, reduce psychological hazards. Finally, we will address the possibilities of future architecture in diminishing environmental problems through sustainability. Despite the fact that this article, at the first glance, meditates on the theoretical connections of contemporary architecture to morality and philosophy, but in the ultimate analysis, it stretches in the field of future studies and hazards science, since its target is placed on the prediction and

organization of a tomorrow that would be grasped, as much as possible, far from individual and communal difficulties.

### **Results and Discussion**

Architecture is counted as an immense source of aesthetic experience. Philosophical horizons, scientific paradigms, cultural structures, epistemological worldviews, 'Lebenswelt's, psychological factors, and ethnic characteristics, play a significant role in the aesthetic appreciation of an artwork. If the reflection on aesthetic perception did not establish a bond with neuroscience and philosophy of mind, then it would not reach its purposes. In brief, we could say that the different types of comprehension in hemispheres, along with the special associations of the right hemisphere to the hubs of emotions, have organized the human brain as an appropriate machine for making aesthetic decisions. Maintenance of a mental image in the presence of mind is called imagination, which itself depends on perception. On the grounds that architecture is considered a visual art, the imaginative experience is an essential element in the aesthetic evaluation of buildings.

Since the eighteenth century until now, practices of a certain institution that favors the imagination are called art. In the early years of the twentieth century, Russian formalism emphasized the message or the structure of literary works. One of the most important aspects of modernist art is the concept they have developed: 'ostranenie'. In this standpoint, art initiates when we separate ourselves from the ordinary world and break the legitimate rules in order to enter an unknown sphere. Hence, the dialectic of dependence-disjunction in respect to the tradition from which a work of art emanates, constructs the nature of that production. In none of the human fabrications, the future would be free of function and obligation, but in an artwork. Besides, 'catharsis' signifies the psychological effects that some artworks have on audiences, and also, connotes politico-ethical concepts. Art, always, is the postponement of the realization of aspirations. This circumstance cannot take place beyond the current perception of freedom and the needs of today. So, the artwork is 'not-yet-liberation'; not the liberation actualized, but its experience based on the imagination.

Regeneration of the ideology-subject dialectic is organized through the ideological state apparatuses. Cultural institutions, academic centers, and construction industries have a profound cooperation with the hegemonic power dominating the society. The concealed ideological and economic dependence of any given building, to a large extent, does not allow the designer or the user to access the freedom, in thought and action. In spite of the fact that the power is rooted in all human relations, it does not, necessarily, lead to a system of domination, and leaves a little room for subject's transgression in pursuance of attaining emancipation as well as recognizing the self. In this research, we understand the architecture being the manifestation of the socio-cultural symbol

as a meaning, in the fabricated form or space, which ultimately would not be capable of eluding the hegemonic ideology of its history and geography. But, regardless of the serviceability of architecture, it has the underpinning capacity to reveal itself as a politico-ethical object with an aesthetic value, and to help humans free themselves from surveillance and suppression.

As a result of the occurrence of identity crisis in the 1960s, topics like 'plural coding' arose due to the implicit historical references, and burdened the title of primitive postmodern architecture. Designers of this duration, with emphasis on the presence of the past and the revival of the memory, strived to ignore the definite, final meaning. In this regard, nostalgic repetition of the tradition along with ironic allusions, emerged in the notion of 'radical eclecticism'. If in deconstructivism, internal contradictions are revealed by the contrast between the building and its location, folding movement exhibits insolvable complexities by means of flexible folded layers. Thus, features such as discipline breaking, irregularity, and uncertainty, have returned the emancipatory validation to architecture.

In the following, parametricism came forth as a self-referential arrangement in order to create complexity while maintaining readability. Biomorphism is another attitude which, by presupposing the concept of evolution, seeks the models realized in natural mechanisms, metaphorically. Perhaps, the most desirable and auspicious style appeared in recent decades is sustainability, insofar as some theorists consider it, not postmodernism, as the first epistemological paradigm after modernism. Today, ecological efficiency, in terms of regeneration and consolidation of the attendance to environmental issues and the optimized utilization of clean and renewable energies, has been seriously addressed in the agenda of urban planning, landscape design, and architecture.

Modernist architecture, with ideas such as fluidity, eventually, apprehended spatial positions and propelled to functional minimalism derived from machinism and engineering aesthetics. In a sense, the capitalist modernization, in order to secure wealth and correspondingly power, through ideology and bureaucracy, threw the artistic modernism down into the swamp of troubles. In the middle of the twentieth century, the segregation between form, function, and ethical, social, and political values was about to lead to a permanent melancholy. In architectural theories, however, this disintegration was understood as a creative insanity for constructing a new order based on fundamental decompositions. This point put emphasis on the role of architecture in acquiring the experience of existential salvation. It seems that the concept of *ostranenie* has cast an extensive shadow over contemporary architecture, as if 'all that is solid' and rigid, smokily and elusively, 'melts into air'. Unconditional freedom of form, manifestation of complexity, fragmented geometry, Deleuzian non-Platonic spaces, and structural disturbance, are the hallmarks of today's meritorious buildings, which through emancipatory and moral games, demand for bridging geometry and imagination.

Although the anarchist tendencies in architectural postmodernism, such as deconstructivism, folding, parametricism, and biomorphism, have prospered in decreasing the psychological sufferings of human being through opinions like imaginative experience and ostranenie, they did not achieve much success in terms of environmental considerations. This challenge deserves more resolution and determination from the individuals involved in the construction industry. We believe that the liberation from ideological suppression and the attainment of the self that is freed from unjustified subjective presuppositions and truculent objective mandates is an exuberant dream, which could come true, of course only slightly, by virtue of the architecture.

### **Conclusion**

If modern architecture is viewed as a follower of abstraction, totality, and purity, then anarchist postmodern architecture by way of repudiating modernist notions, will be observed as a pursuer of concretization, fragmentary, and liberation. The argumentation of the lack of values hierarchy, which architectural postmodernism has advocated, generates a horizontal situation in which, at any moment, the displacement possibility of the master and the slave is provided. As a result, with the flexibility of the power interrelations, the domination principle departs and the state of freedom from strangulation emanates. Critical considerations of this article show that the aesthetic attribute of an architectural building is tied to a politico-ethical endpoint, and also, it could make the experience of human emancipation feasible, through the imagination which itself is not-yet-liberation. Hence, the architecture of tomorrow in this post Nietzschean age of nihilism would, maybe, be encircled by temporary, non-classical meta-principles.

On the other hand, despite the sparkles of hope that some of the postmodernist styles have streamed in response to existential predicaments, they are still ahead of a meandrous path in the angle of propounding the issues of sustainable design. Thus, in terms of morality and ethics, architecture should actualize the subjective liberalization of the society by means of the ostranenie concept, as well as drawing attention to objective realities of the environment, by means of the sustainability concept. Accordingly, the future belongs to the conglomerate of emancipatory strategies together with sustainable development, which promises to bring about less domination and more salvation.

**Keywords:** Existential and Environmental Hazards, Ideological Apparatuses, Culture Industry, Fragmented Form, Future Architecture.

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## Providing Forest Fire Risk Map Using Multivariate Adaptive Regression Spline (Case Study: Golestan Province)

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### Abstract

Forest areas are among the most important natural and ecological resources on the Earth and are considered as one of the main pillars of sustainable development in any country. Fires ruins almost 5500 hectares of Iran's forests yearly. In this research, firstly, the fire points were identified using the fire data of Forest Organization in combination with MODIS sensor data between 2012 and 2017. Due to the fact that more than 75% of fires were happened in the hot season of the year (June, July, and August), the data of the three months was used for modeling. Then, the effective parameters in fire occurring were evaluated and the dependent parameters were removed. Accordingly, two methods, including multiple linear regression and multivariate adaptive regression spline were studied to predict the fire risk. Some important parameters including the root-mean-square error (RMSE),  $R^2$ , the correct estimation percentage of fire and non-fire points, and error distribution were used to evaluate. After modeling, it was found that the multivariate adaptive regression spline has better performance—where its RMSE of test data was 0.1628, its  $R^2$  of test data was 0.893, and its correct estimation percentage of test fire points and test non-fire points was near 94% and 88% respectively, as well as its error distribution was better than the other method. This actually shows that modeling with a local method is very better than modeling with a global method. Therefore, the risk map resulted by multivariate adaptive regression spline has better reliability compared to those of the other method. Finally, the high-risk areas were recognized using the risk map of this method. The traits of these areas were a short distance to residential areas and roads, having rich soil with organic materials, relatively high temperature, and low height.

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### **Introduction**

In 2000, a convention was established in the United Nations to improve the quality of human life in which the principles of the Millennium Development Goals were adopted. One of these goals was to ensure the stability of the environment and natural resources. In the contemporary world, the value of forests is about 120 billion dollars and the livelihood of almost 9.1 people is dependent on forest (in)directly.

According to the opinion of global experts including FAO, if the forest cover of a country is less than 25% of that country's area, that country is in critical condition in terms of the human environment. Almost 190000 hectares of Iranian forests have been ruined by fire in a 28-year period. Forest fire not only changes the natural ecosystem and ruins many plant and animal species of a region, but also makes other destructive effects like air pollution, respiratory problems, soil erosion, increased flowing surface waters, increased acidity of soil, decreased fertility, tourism industry losses, manufacturing industry and economy losses, and even climate change.

Immediate and accurate detection of the fire location and the ability to determine the effective parameters on it, as well as the detection of the areas with high-risk of fire is among the main concerns of environmental protection and disaster management. We can prevent the fire by training people, making effective regulations and management policies, and increased monitoring to deal with fire triggers. Moreover, in the case of fire occurrence, we must take necessary actions like deploying fire-fighting equipment near hazardous areas and making easy access to these areas. In fact, nowadays, the increasing importance of protecting the forests and natural resources has led to change the focus from crisis management to risk management.

### **Methodology**

The modeling was not possible without non-fire points. Accordingly, at the beginning, some points are randomly selected in the whole area with a certain distance from the fire points and are identified as non-fire points. To implement the methods in MATLAB programming environment, firstly, the parameters used in the modeling are extracted using the maps of these parameters for fire and non-fire points. These parameters are used as inputs in each of these methods.

Constantly, 70% of the selected data were used as the training data and 30% of them were used as the test data. Initially, the multivariate linear regression and then the multivariate adaptive regression spline were used for modeling. The steps of the research implementation are shown in Figure (1).

After implementation of the modeling, the evaluation parameters of each method were provided to compare. Then, the risk map of the area was provided using trial points and Inverse Distance Weighting (IDW) and by employing 12 lateral points for each method (Figures 2 and 3). The points with a high risk

were extracted from the resulted map. Then, the main traits of these points are considered as the traits of high-risk points.

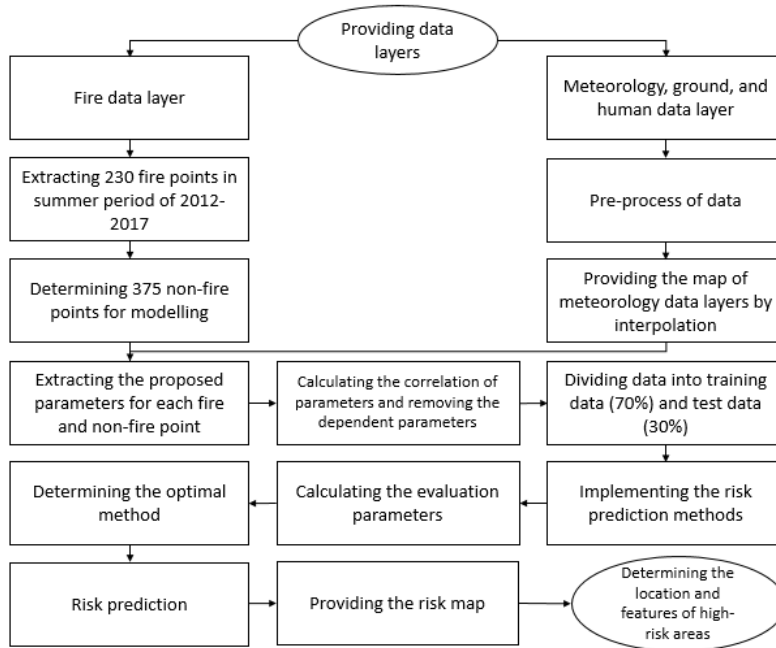


Fig. 1. The steps of the research implementation

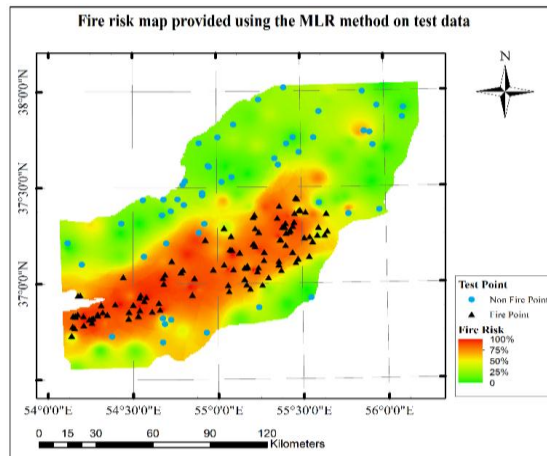


Fig. 2. Fire risk map provided using the MLR method on test data

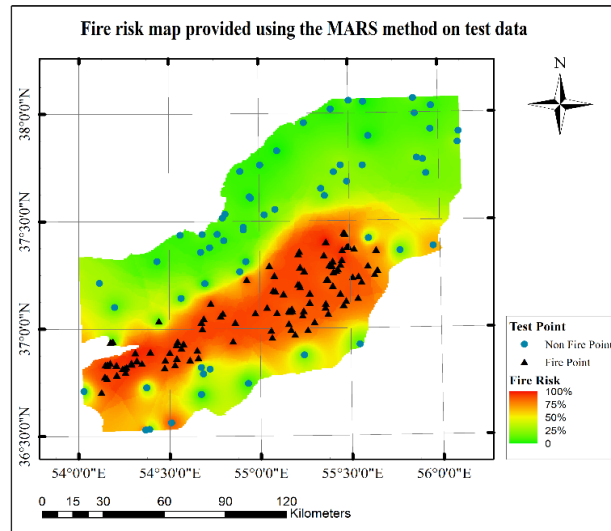


Fig. 3. Fire risk map provided using the MARS method on test data

### Discussion and Results

After removing the dependent parameters from the effective parameters on the fire, the optimal effective parameters are presented in Table (1). These parameters are divided into three groups including climate, ground physical, and human parameters.

The modeling of fire risk was done by two methods. In the training and testing data section, the RMSE and  $R^2$  are presented in Table (2) for multivariate adaptive regression spline and multivariate linear regression methods, respectively. The results achieved by the training data section indicate that the training procedure is more accurate ( $R^2$  closer to 1) and with less error (less RMSE) in the multivariate adaptive regression spline than those achieved by the multivariate linear regression method. The appropriate amount of evaluation parameters for test data shows that the model does not experience over-fitting in these methods.

Table 1. Effective parameters on fire occurrence in the case-study area

Climate parameters	Ground's physical parameters	Human parameters
Average temperature ( $^{\circ}\text{C}$ )	Soil type	Distance from the residential areas (km)
Rainfall (mm)	Height (m)	Distance from the road (km)
Average wind speed (km/h)	Distance from the river (km)	
	Steep direction	

Table 2. Evaluation parameters of risk modeling methods

	Data/parameter	$R^2$	RMSE	The correct estimation percentage of non-fire points	The correct estimation percentage of fire points
MLR	Training data	0.6728	0.2846	42%	74%
	Test data	0.5877	0.3180		
MARS	Training data	0.8932	0.1628	88%	94%
	Test data	0.8211	0.2078		

In the linear regression method, the two parameters of the correct estimation percentage of fire points and non-fire points have a low value, hence, the worst possible scenario has happened and the risk map has the least amount of reliability. In the multivariate adaptive regression spline, the fire and non-fire points are simultaneously estimated with a high accuracy. This makes the risk map provided by the multivariate adaptive regression method becomes to be more reliable.

As seen in the results, the risk map provided by the multivariate adaptive regression spline method has a very higher reliability compared to the risk map provided by multivariate linear regression method. Hence, the risk map resulted by the first method was used to determine the features of the areas with a high risk of fire (Figure 4).

Since the fire risk has a normal distribution, the areas which satisfy Equation (1) are among the 2.5% of the areas that have the most fire risk.

$$\mu + 2\sigma \leq R \quad (1)$$

where  $\mu$  is the average,  $\sigma$  is the standard deviation, and  $R$  is the fire risk. The main features of the mentioned areas can be used as the important tools for decision making. The extraction of high-risk areas is done in ArcGIS environment. Statistical analysis of effective parameters' features in these areas shows some key points. These features include low distance from the residential regions (less than 2 km), low distance from the road (less than 2 km), having mollisol, relatively high average temperature (more than  $28\text{ }^{\circ}\text{C}$ ), and low height (less than 50 m).

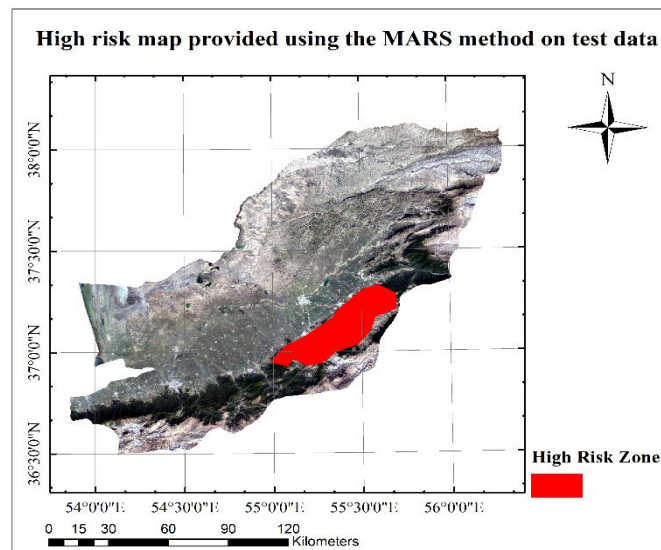


Fig. 4. High risk map provided using the MARS method on test data

### Conclusions

This research attempted to identify the optimal method for modeling of fire points risk using climate, ground physical, and human parameters. Therefore, an accurate local method (MARS) was used along with a non-local method (MLR).

In the test data and the training data sections, the MARS method had the lowest RMSE and a value closer to 1. The outputs showed that the MARS method had a more accurate performance in the estimation of the fire and non-fire points compared to the MLR method. This indicated the high reliability of the MARS method. After determining the optimal method for the modeling of the area's fire occurrence, the points of the area with high risk of fire were detected. After doing a statistical analysis it was found that these points have some fundamental features including low distance from the residential regions (less than 2 km), low distance from the road (less than 2 km), having mollisol, relatively high average temperature (more than  $28\text{ }^{\circ}\text{C}$ ) and low height (less than 50 m).

**Keywords:** Forest Fire, Multiple Linear Regression, Multivariate Adaptive Regression Spline, Risk Map.

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## **Media Managing of Hazards of the Dusts; with an Emphasis on Khuzestan Dusts**

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### **Abstract**

#### **Introduction**

This research investigates to which degree and how much the considered media have paid attention to the news of haze dust in Khuzestan.

#### **Materials and methods**

The statistical community for this study consists of the news articles related to the phenomenon of haze dust in Khuzestan province which have been published in 4 websites: IRNA and Tasnim news agencies, and Ministry of Agriculture Jihad and the Department of the Protection of the Environment in 1395. The data for this study has been collected and described based on the content analysis approach. The findings of the research have been presented in two descriptive and explanatory levels.

#### **Discuss and Results**

The research indicates that most published news articles relevant to the topic at hand belong to Tasnim news agency, and the fewest belong to the website of Agriculture Jihad. More than half of the articles (about 62 percent) belong to the topics of relief and action. Considering the inclusiveness of this issue in the region, no foreign news media exists for the topic of haze dust. About 42 percent of the news articles belong to the post-crisis period. In this respect, about 33 percent of the articles belong to the crisis period. By the same token, 24 percent of the articles are related to the pre-crisis period. Most of the articles are in the form of news and interviews (about 31 percent), and the fewest articles (almost 2 percent) belong to the statement category.

The data for this research indicate that more than half of the analyzed articles (almost 70 percent) are process-oriented. Moreover, the news element which is mostly emphasized is related to the element of "where" with 78 percent. In investigating the news value, the values of "encounter" and "inclusion" are paid attention to more than others with 44 percent, and the value of "exception" receives the least attention with 0.3 percent.

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It became evident that most articles (about 37 percent) have a neutral attitude. 35 percent of the articles display a positive attitude. The perspective of most articles has been information provision with 61 percent and, far behind it, is the preventive perspective with 20 percent. The latter perspective is especially highlighted based on past experiences whose effects can be compared with the current situation. About 57 percent of the images used are news-oriented pictures, and the least used images (about 3 percent) are graphic images. Furthermore, almost 41 percent of the articles have reference and the rest don't.

As for the target of the news articles, about 43 percent belong to the ministers and government officials, and parties and artists have the least share of attention (about 0.3 percent). The findings of this research in the field of covering geopolitical actions indicate that about 10 percent of the articles (32 cases) belong to negotiations with the officials of the countries at the forefront of this crisis, and about 6 percent (19 cases) belong to requests for the cooperation of international organizations.

**Keywords:** News Coverage, Natural hazards, Dust, Communication and crisis communication, Khuzestan.

## **Fusion of Markov Chain and SAX Method for Drought Probability Analysis (Case Study: Eastern District of Isfahan, Iran)**

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### **Abstract**

Drought is one of the most powerful natural disasters, which are affected on different aspects of the environment. Most of the time this phenomenon is immense in the arid and semi-arid area. Monitoring and prediction the severity of the drought can be useful in the management of the natural disaster caused by drought. Many indices were used in predicting droughts such as SPI, VCI, and TVX. In this paper, based on three data sets (rainfall, NDVI, and land surface temperature) which are acquired from MODIS satellite imagery, time series of SPI, VCI, and TVX in time-limited between winters 2000 to summer 2015 for the east region of Isfahan province were created. Using these indices and fusion of symbolic aggregation approximation and hidden Markov chain drought was predicted for fall 2015. For this purpose, at first, each time series was transformed into the set of quality data based on the state of drought (5 group) by using SAX. Algorithm then the probability matrix for the future state was created by using Markov hidden chain. The fall drought severity was predicted by fusion the probability matrix and state of drought severity in summer 2015. The prediction based on the likelihood for each state of drought includes severe drought, middle drought, normal drought, severe wet and middle wet. The analysis and experimental result from proposed algorithm show that the product of this algorithm is acceptable and the proposed algorithm is appropriate and efficient for predicting drought using remote sensor data.

### **Introduction**

Drought is such natural disasters that usually covers a large area and have long-term effects. Due to the impact of this phenomenon on weather, agriculture, water and socio-economic issues, it can have an infrastructural and destructive effect on the environment. In general, due to drought dependence on multiple

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parameters and its complexity, a definition for this phenomenon is no easy task [1]. Drought forecasting can have a useful role in mitigation of this phenomenon's damages, which depends on the exact definition of drought and linking drought with a series of associated indices. Several parameters have been defined on this basis to be modeled during the period of drought forecasting.

Based on studies in the field, these indicators can be divided into two general categories meteorological indicators and satellite remote sensing indicators [6]. The most common weather indices are Standardized Precipitation Index (SPI) and the Palmer Drought Severity Index (PDSI). Generally, satellite indices are vegetation index (VI) and land surface temperature (LST) and its derivatives [3]. Currently, the analysis of time series of drought indicators used to predict drought which is forecast the absolute numerical value based on an extrapolation of the function fitted to the time series.

Firstly, if the drought is a phenomenon with qualitative nature, so even if we express this phenomenon numerically, ultimate results must be expressed qualitatively. Secondly, the nature of the predictions is always probabilistic thus providing a fixed amount is not meaningful. Another problem of existing methods is in determining the communicational interval of any data with previous data. Due to the uncertainty in determining these ranges (delay), an error entered into the prediction process. In this study, prediction carried out in a way that the preceding be considered in it.

#### **Material and Methods:**

This research study area is eastern Isfahan Province where has five sub-regional. The study area has semi-desert climate and is located in the range of latitude N "40 '29 ° 32 and N" 47 '45 ° 32 and longitude E "29 '42 ° 51 to" E52 '59 ° 51. Figure 1 shows the study area. The data used in this research is land surface temperature (LST), and normal differential vegetation index (NDVI) from MODIS satellite products that are free and downloaded from the NASA Earth Observations (NEO) Other data were also used is precipitation data from TRMM. The data for a period of 16 years from winter 2000 to summer 2015 were downloaded.

#### **A. Symbolic Aggregate Approximation method**

Symbolic Aggregate approximation method is one of the approaches to show time series offered by Lin et al. in 2003. This process took a time series as input and turned it into a set of strings as output [15]. By the use of Symbolic Aggregate Approximation method, a time series of arbitrary length  $n$  can be converted to an arbitrary string with length  $w$  ( $w < n$  and commonly  $w \ll n$ ). This method is based on the fact that normalized time series follow Gaussian distribution (Larsen and Marx 1986).

Symbolic Aggregate approximation method consists of two main stages. First, convert the Piecewise Aggregation Approximation (PAA) to reduce the

time series dimension and second discrete time series obtained from the previous step to convert it to the string.

### B. Markov Chain

A Markov chain is kind of modeling in which the current state of the system depends on its previous state. Determining the state of the system (projected) by using Markov model needs previous state of the system and the possibility of changing in system state to other possible states, the so-called transition probabilities to be known [16].

According to the current state of a system, a square matrix  $P$  formed and matrix elements  $P_{ij}$  has represented the transition probability.

In this matrix, the likelihood of early states in the left column and the possibility of cases where the system passes them along the lines of the matrix are shown.

$$P = \begin{bmatrix} P_{r1} & \dots & P_{1j} \\ \vdots & \ddots & \vdots \\ P_{j1} & \dots & P_{jj} \end{bmatrix} \quad j=1,2,3\dots r \quad (1)$$

### Discussion and Results

First, by using data from TRMM sensor and the standardized precipitation index SPI and via Equation 2 for monthly time series of the winter of 2000 until the end of 2015 summer was calculated. By using time series data, land surface temperature (LST) and the normalized vegetation index (NDVI) for the same period with precipitation data, two indices VCI TVX were calculated using Equations 3 and 4.

$$SPI = \frac{P - \mu(P)}{\delta(P)} \quad (4)$$

$$TVX = \frac{LST}{NDVI} \quad (5)$$

$$VCI = \frac{NDVI - NDVI_{min}}{NDVI_{max} - NDVI_{min}} \quad (6)$$

In the second stage, the normal time series were used as input of SAX methods. First, since environmental changes are more noticeable in seasons the amount of  $W$  considered 63 for the PAA convert to reduce seasonally adjusted time series Figure 4 Showing PPA time series of indices used in this research. The next step, assuming a Gaussian distribution for each indicator, and the values of  $\delta$  and  $\delta 3$  as breakpoints for SAX method were selected.

These values were based on probability levels. Moreover, strings intended to convert SAX have been chosen as follows: 1- SW: extreme wet 2- MW: wet 3-

N: Normal 4- MD: drought 5- SD: severe drought.

According to these rules SAX conversion implemented and time series converted to the set of strings which are indicators of drought. Figure 1 showing the transformation for each series of the time.

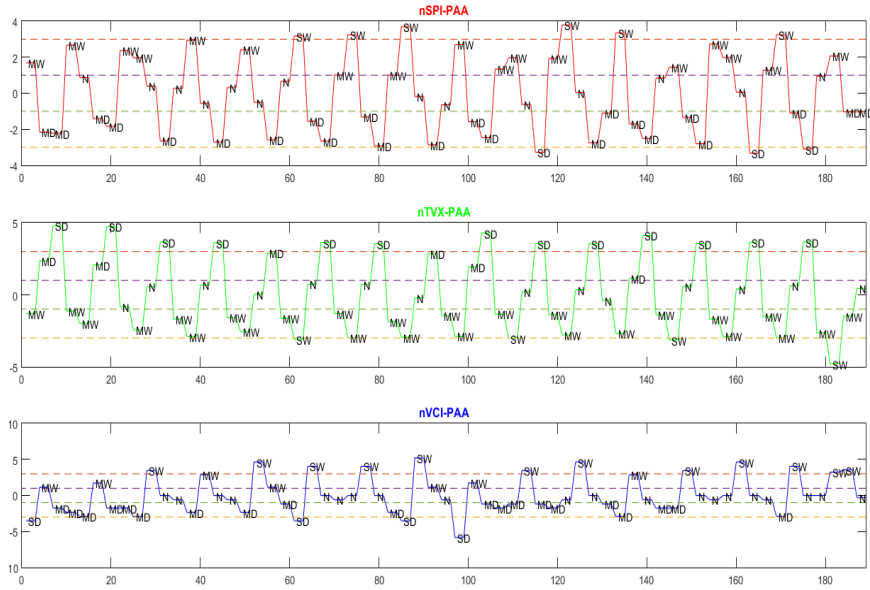


Fig. 1. SAX presentation for drought index

The horizontal axis represents time, the vertical axis represents the amount of PAA for each indicator, and the number written on each of intervals represents the new time series value. In other words, the input time series after SAX conversion converted to a set of strings of qualitative drought values. After conversion of each time series into qualitative data through the SAX method, in the next stage, the collection of qualitative data by using Markov chain method were prepared to predict the probability of the next state. In other words, the transition state matrix for each index was determined. Figure 2 shows probabilistic values for each index through Markov chain.

	SD	MD	N	MW	SW
SD	0.67	0	0	0.17	0.16
MD	0.03	0.81	0.01	0.05	0.1
N	0.02	0.10	0.82	0	0.05
MW	0	0.19	0.14	0.66	0
SW	0	0.03	0.23	0.66	0

(1)

	SD	MD	N	MW	SW
SD	0.66	0	0.12	0.22	0
MD	0.02	0.79	0.08	0.1	0.01
N	0.04	0.14	0.68	0.09	0.03
MW	0	0.07	0.12	0.73	0.18
SW	0	0.22	0.11	0	0.67

(2)

	SD	MD	N	MW	SW
SD	0.66	0	0.33	0	0
MD	0.04	0.79	0.10	0.06	0.01
N	0	0.05	0.66	0.05	0.23
MW	0	0.12	0	0.66	0.22
SW	0	0.28	0.06	0	0.66

(3)

**Fig. 2. Probability model for drought based on (1) VCI (2) SPI (3) TVX**

The correlation coefficient between the values of the likelihood of each index with other indices to evaluate accurately calculated as follows: 1. The correlation coefficient between SPI and TVX equal to 89. 2. The correlation coefficient between SPI and VCI equal to 95. 3. The correlation coefficient between VCI and TVX index equal to 89.

High amounts of correlation between the probability values indicate that resulted probability values are acceptable.

In the final step, after calculating the probability values by using the last status of the three indicators, drought conditions for the next month predicted. The forecast shows that in the fall of 2016 in the Eastern region of Isfahan Province by the possibility of 2% severe drought, 12% drought, 50% typical situation (normal), 25% wet and 10 % extreme wet will occur. For validation of this probability model the dataset of October, November and December for 2015 are analyzed the result shows the probability model is matched with this dataset.

### Conclusion

This study was conducted to investigate, modeling and forecast drought, one of the world's natural hazards and controversial issue. For this purpose, time series of three indices SPI, VCI, and TVX between winter 2000 and summer 2015 were designed and used, and in this study, it was done by incorporation of SAX and Markov chain. The advantage of using a combination of these methods compared to other methods is it provide a probabilistic qualitative model of drought.

In fact, due to the nature of drought that is qualitative and on the other hand, fuzzy and probabilistic nature of the predictions, this method seems more

reasonable than other modeling methods. On the contrary, due to the high correlation between probabilistic models obtained as well as implementing the method for certain modes and the logical outcome of this case, the accuracy of the proposed method was acceptable.

The authors examining the impact of changes in the value of break points of SAX method on the result of probabilistic model and also determining these values on the basis of conditions of each climate left for the future works. In addition, using an analysis of other rules in order to qualify the indices in SAX method or using another method to display time series can be helpful to advance this research.

**Keywords:** SAX, Markov Chain, Drought, Remote Sensing, Isfahan.

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## Identify the Requirements for Training How to Deal with Earthquakes by IRIB TV Channels

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### Abstract

The earthquake is one of a kind of destructive natural disasters that has left many financial and Casualties losses in our country. This issue takes into consideration the need for public education to prepare for earthquake preparation. General education can be provided through the Islamic Republic of Iran television, but it is necessary to explain the roles and requirements of the television to provide these trainings. This research was conducted with the aim of evaluating such roles and requirements using qualitative content analysis method. In this research, deep interview was conducted with 16 experts selected by purposeful sampling. Open and axial coding of the interviews was conducted with MaxQDA2018 software. The findings of this study indicate that television should offer its educational functions for "before the crisis", "During the crisis" and "after the crisis". Meanwhile, TV should provide these trainings in "direct and serious" and "indirect and entertainment-based" formats. In addition, in order to play educational role of television, it must use its capacities like "technical and content", "cultural", and "organizational and inter-organizational" be overcome barriers "in-organizational" and "out-organizational". TV should fulfill the requirements in four dimensions: "Targeting and "Planning", "Audience and Needs Assessment", "Organizational", and "Content", which play their role in providing earthquake exposure training in order to make public readiness.

### Introduction

The earthquake is considered one of the most devastating natural disasters in the world, and Iran is among the most vulnerable earthquake countries in the world. Iran's seismicity creates the necessity for the general education of the earthquake. Media is one of the most important tools that can be used for this purpose. The role of media education in dealing with natural disasters has been studied in several studies [2; 4]. In this article, we review the requirements that

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are required to provide this training. In addition, we discuss the nature of the training in this research and identify the media format for the training.

### Methods

Qualitative content analysis method was used in this research. Qualitative content analysis is a method used to subtly interpret the content of textual data through the process of systematically coding and identifying topics and patterns [3]. The three stages of preparation, organization and reporting are categorized in the analysis of qualitative content, as well as qualitative research [1]; the process of performing these three stages in analyzing qualitative content based on seven steps including: 1. setting the research questions 2. selecting the desired sample 3. defined Content Analysis Approach 4. Planning the Encryption Process 5. Implementing the Encryption Process 6. Determining Reliability and Reliability 7. Analyzing the results of the encryption process. According to mentioned steps, deep interview was conducted with 16 experts selected by purposeful sampling. Open and axial coding of the interviews was conducted with MaxQDA2018 software.

### Results

The findings of this study indicate that television should offer its educational functions for "before the crisis", "During the crisis" and "after the crisis". Meanwhile, TV should provide these trainings in "direct and serious" and "indirect and entertainment-based" formats. In addition, in order to play educational role, television must use capacities like "technical and content", "cultural" and "organizational and inter-organizational" be overcome barriers "in-organizational" and "outsourcing". Tv should fulfill the requirements in four dimensions: "Targeting And "Planning", "Audience and Needs Assessment", "Organizational" and "Content" that play their role in providing earthquake exposure training in order to make public readiness.

### Conclusion

The findings of this study show similarities with other existing studies, but Iran's television tries to provide trainings to create a public readiness to deal with earthquake by using the crisis management structure in the organization, the use of domestic and foreign experts, the allocation of budgets and appropriate training programs, and the use of modern media capabilities.

**Keywords:** crisis, earthquake, education, television, audio and video, general preparation.

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