

# A New Approach DSS for Suitability Analysis

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**Abstract**— Decision support systems (DSS) are highly used in industries like management and administration. However, recently they are also being used in engineering for solving problems up to certain extent. Suitability analysis is a technique used in civil and environmental engineering which is majorly GIS based. A DSS was developed for suitability analysis of various natural aspects of a region with its implementation in civil and environmental. The system is a graphical user interface developed programmatically with the help of MATLAB. It is based on direct interaction and processing with images. It was implemented on LULC, Drain ability, and slope to study the simultaneous effect of these features and observe their combined contribution to the analysis. It was observed that the system can produce the combined effect and also produce the simultaneous effect of variation of weights of features and elements of input images in real time. The number of features being studied simultaneously can be varied according to the requirement of the study.

**Index Terms**— DSS, suitability analysis, MATLAB, GUI.

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## I. INTRODUCTION

Suitability analysis is implemented in civil and environmental engineering for purposes like estimating the appropriateness of a land area for any particular activity.

[1]. There are various methods available for performing suitability analysis. Most of them are GIS based. On the other hand, Decision support systems are widely used in many disciplines including many branches of engineering and management.

[2]. Decision support system (DSS) is a well-established area with respect to research and development

[3]. The analysis reveals that information quality and system quality play key role in decision-making satisfaction, while information presentation is pointless for decision-making satisfaction

[4]. There is a need for Decision support systems to evolve over time for various reasons like changing user needs, technologies and problem understanding

[5]. So the option of suitability analysis was explored using Decision support system and a program was devised that can efficiently perform this task. This can help in reducing on-site human effort and can also provide with another simple and efficient method for the analysis. Computerized systems are helpful with decision tasks including information gathering, model building, sensitivity analysis, collaboration, alternative evaluation, and decision implementation

[6]. The work was done towards the developing a Decision support system for performing suitability analysis with respect to many features. This program was developed using MATLAB programming. The primary idea is based on

the direct use of images and their data for interaction with the user.

## II. METHODOLOGY

Here a decision support system was developed in the form of a graphical user interface programmatically for suitability analysis by use of MATLAB. Data was fed in the form of images. This data was processed using various MATLAB features. Resultant output was also produced in the form of an image. All the involved images and other features were made to display in the same figure using 'subfigure'. Callback property of elements was used to allow user to edit the input images and data. This developed program was implemented on analyzing the combined effect of LULC, Drain ability and slope images (weighted) in a resultant image, thus producing the required combined effect.

## III. DISCRPTION

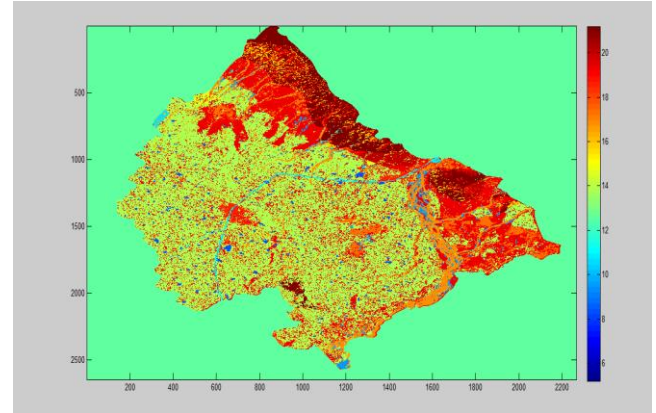
### A. Input.

The project starts by taking three Input images with their colourmap into one figure. Dialog boxes were implemented for selection of images for input. Then the color indexes were extracted from each of the images and assigned weights to all of them randomly (for the sample). Weight assignment can be done by civil and environmental engineering experts based on their experience. It was done on pixel by pixel bases. Matrices were created for holding weighted images, one for each image. Legend and Color bar tools can also be used to have an idea about color distribution in the images. Then weights were stored with their respective indices in a table. A table was constructed for each image. Another table was made for storing overall weights of the

input images.

**B. Processing, Interaction and Callback.**

These tables were made editable for users to change the default values according to the requirement. These tables were associated with their respective images with the help of functions to reflect the changes made in the table on the figure itself. Callback property of table was used to facilitate the interaction between the tables and the images. It is done by sending the edited data back to the concerned function, where it is processed and result is displayed in the same figure and control is passed back to the figure. Then, another feature was added for voluntarily deciding which image will have contribution in the output image and which will not. This was achieved using the checkbox feature. One checkbox was associated with each input image. Its default value was set to 'ON', i.e., all images will be included in the output initially unless unmarked from the figure. All the received information was stored and it was passed to an equation which calculated the resultant values.



The output image was obtained from a matrix calculated by implementing the equation on the matrices containing weighted values and values from the tables. This dynamic output image was displayed on the same figure as a subplot. It was programmed to display the changes resulting from the editing done on the input values and attributes.

**D. Functions**

It is mentioned above that functions were used for various purposes in the development process. There were two functions primarily involved in the working of the program. One function was involved with the handling of tables. This function was responsible for collecting the location of the cell which was being edited and the new value assigned to that cell. Then it updated the value and stored it in the respective matrix or variable. Then it ran a set of commands for implementing the change into the resultant or output matrix and to the image as well.

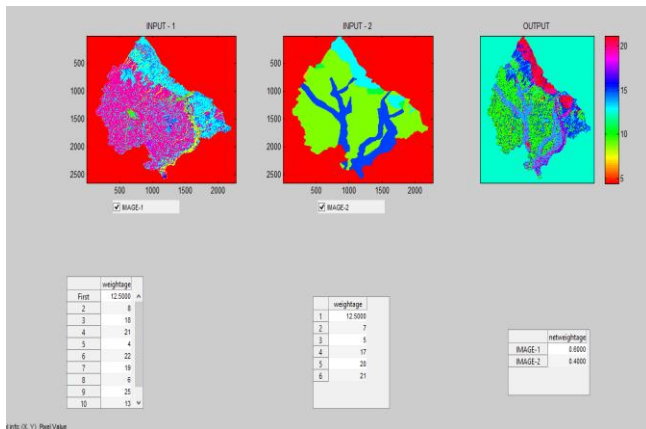
The other function was used with the checkboxes. It was responsible for collecting the location and status of the checkbox being edited and updated those values in the program variables. Then it ran a set of commands to reflect the change in the output image.

**IV. OBSERVATION**

It was observed that this program can display the combined impact of varies features like LULC, drain ability, slope, etc. into one figure. It can also show the effect of variation of one or more input feature and its weightage into the output image, all by means of color variation in the resultant output image.

**V. CONCLUSION**

This project clearly explains the design concept of DSS for suitability analysis and its successful implementation on LULC, drain ability and slope images of the sample



**Figure 1: Working screen of the application**

**Figure 2: Output image of sample test run**

**C. Output.**

region.

## VI. DISCUSSION

There is scope for addition of more features to the program on which we are already working. There is also the possibility of development of another fully functional user interface application that has some specific application in civil and environmental engineering.

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