A Mechanism for creating new shape and syntaxes In Old Mosul City

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1.Abstract

The architectural spaces and shapes are considered as the basis of components formation and grouping of formal architecture in general, including those of old city of Mosul, which display identity elements of traditional architectures. These key elements are useful after proper transfer to data and information symbols of their shapes and combinations. Employment of certain constraints lead to final result belong to architecture identity of the selected shape as a specimen of study. Through such information, it is possible to rehabilitate and design any part in new shape while conserve its belonging to the original identity of the shape in the area. In this respect, Mathlab7 program were employed in the input of data of dimension (length, width, height), shape patterns (square, rectangle, parallel, U shape) in addition to their distribution in space. Pixels were used as measurement unit. The result contain system of composites similar to the mechanisms of engineering patterns formation. After finding he mechanisms of shapes formation in certain architecture, it is possible to use the salve program in the formation of alternative and new shapes belonging or bonded to the same architecture. Finally, present study aimed at achievement of shape and composites formation mechanisms and arrive to several designs and selection of design which is intimate to the architecture identity.

In this study we will create a new shape by two stage which can understanding from other interesting in this paper , in the first stage we select a sector from old Mosul city and trying to analysis this selection by graphic and geometric method by engineering software ,so we used AutoCAD version 2010 and

3D Max 2010 , after finishing this analysis , we will find the order or mechanism for combustion of the selective sector .*(Figure -1)*

Figure -1- part of old Mosul city in Iraq , the selective part[1]

2. Introduction:

The civilized heritage for each of the communities represents the architectural identity for such community. There have been many trends calling for reviving the heritage through detailed examining of architecture, shapes and composition and their interrelations to form another form belonging to the architectural indentify of that community in order to maintain the architectural indentify. This could be done through rehabilitating forms that are blotted out or finding a mechanism for generating new forms or cities similar to the old ones to fill the gaps resulting from deconstruction or rehabilitation of certain area.

The current study aims at examining an old area that is an architectural identity for a certain city or community through analytical study of the shape of plan, deriving the main shapes of the combustion of city shape and finding a mechanism for constructing and generating a new shape belonging to the original architectural identity in order to maintain the civilized heritage of the city.

The study sample has been selected containing an architectural heritage expressing the architectural identity of the area, the old city of Mosul *(Figure - 2)*. shapes composing the basic shape of the city will be analyzed and the main shapes will be derived.

Figure -2- old Mosul city in Iraq [1]

These shapes will be used as basic units to create the general shape of the city through designing a program for generating new shape of cities, allies and streets and the relations among such forms that are housing units in the area. *(Figure - 3)* represents the new organization of relations through which the main shape of the city will be generated. A mechanism for creating shapes in the old city of Mosul will be derived through two stage :

Figure -3- graphic analysis for selective sector from old Mosul city

First: Analysis of the shape plan of the city and finding the main shapes

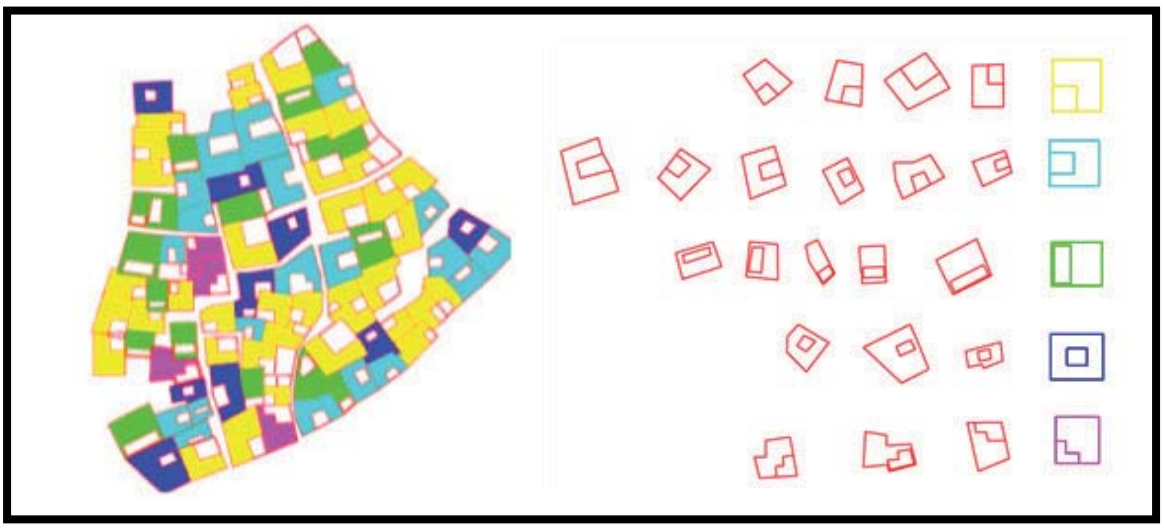


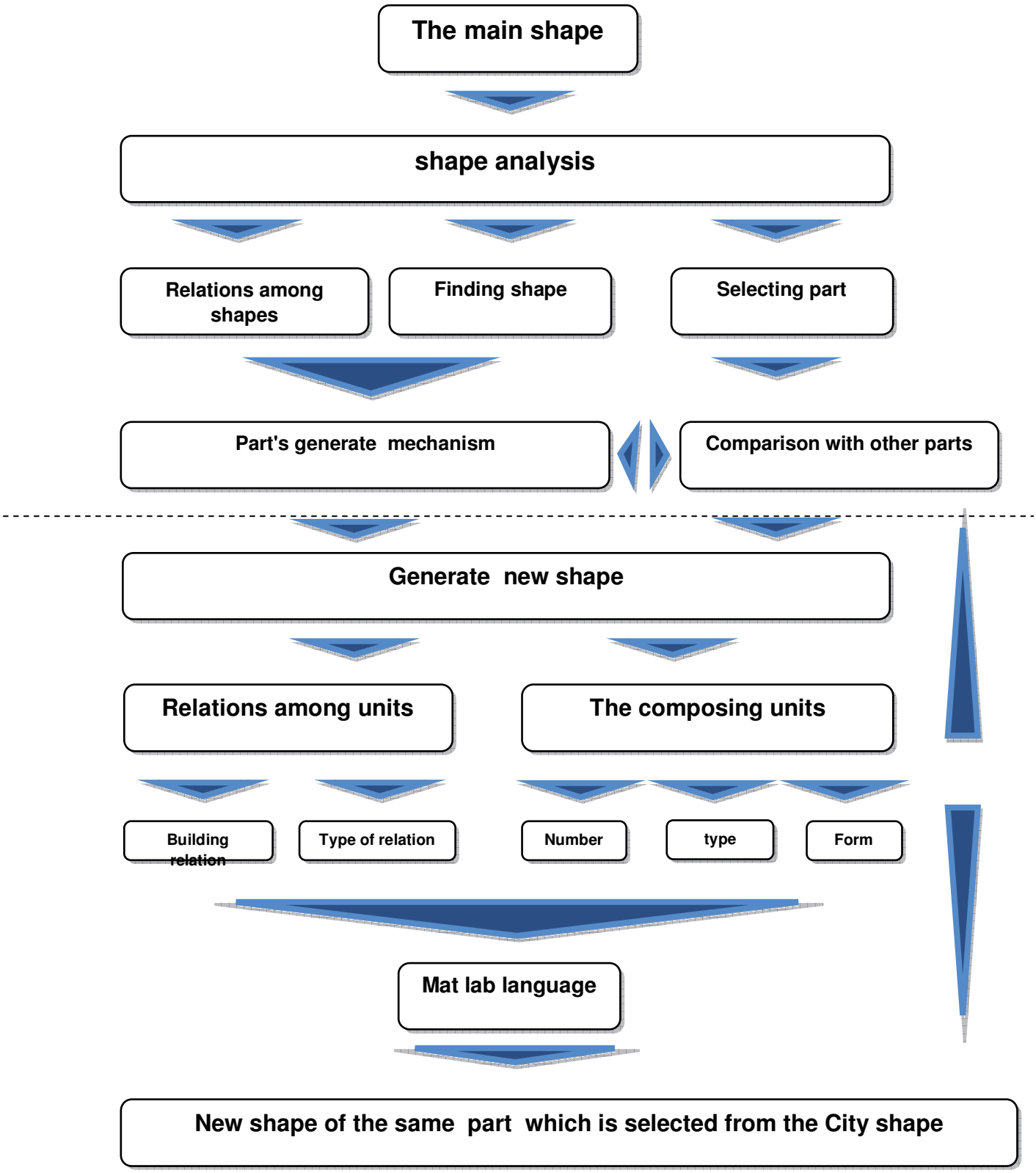
Figure -4- The main shape and related with the other shape

Second: generation of a new shape out of the main shape.

3.The Study Structure

The study structure through which shapes analysis and forming strategy will be derived is as follows:

The Study Structure



3. Analysis of the shape plan of the city and finding the main shapes

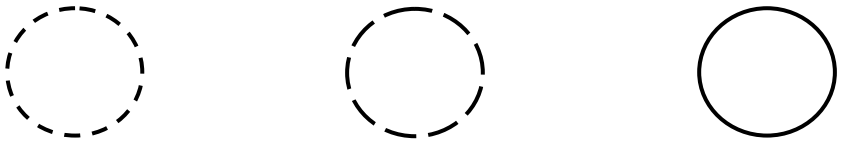
Some of the studies have indicated that the relation among shapes is the beginning for architectural design process. Such shapes are affected by various connecting relations differ with the architectural pattern. The primary origins of the geometrical shape and how its generated is of the basics that are an important storage to be utilized in architecture to produce contemporary architecture holding the character of the old one. This is done through deriving origins of things and analyzing shapes by examining shape geometry to be then related with mathematical relations to be utilized in designing certain software for shapes to find the main shapes.

Accordingly, a part of the old city of Mosul will be analyzed to find the composing shapes using graphic geometrical analysis.

3.1 Primary Analysis of the Form:

In order to have a correct and a logical analysis, some of the studies dealing with the mechanism of finding shapes in general will be reviewed. Some of these studies presented the shape and its forming mechanism as a relating language to construct useful sentences. Thus, the shape consists of many primary elements including letters, then words and sentences leading the final shape and this is the language. [2]

Ching stated that form consists of many rules shapes where there is no existing shape without origin. Circle, for example, is a main shape but generated from other forms either of points or lines arranged by certain mechanism around these circles centers with tangency. [3]



Chase defined shape as a group of productive systems to generate and transform designing languages through adopting certain mechanism (adjacency, overlap, repetition) that could be described as shape gene [4].

The mechanism of creating shape could be used in classifying the historical development of the various architectural patterns. The illustrated rules are used to classify designs in addition to being used as a logical for architectural patterns theories that could reveal the historical pattern. They could also be efficiently used to analyses the structural and shape patterns [5].

Such studies could distinguish some of the mechanisms that are utilized in the current study as variables used as information in Mat lab language , so this language need elements to be executed , this elements will be result from this stage in this study .

3. 2 Form in Architecture:

shape holds a group of the composing characters and feature that are of two types, either physical that are directly perceived or abstract that exists in a deep level where it is not perceived. This is the main feature distinguishing the architectural shape in Mosul city for it contains a cognitive energy that could be deducted through the formal analysis of models.

shapes are divided into:

- **Regular shapes** that contain regular generation mechanisms and their parts have regular relations. Ball, circle, square, cube, triangle and pyramid are examples of the regular shapes [2].
- **Irregular shapes** that have no similar parts and non–equally related. These shapes could be measured through four features:
  - Simple where studies have proved that simple shapes could be quickly perceived.
  - Complex where it has been found that they largely attract than the simple ones.
  - Familiar where they are quickly perceived.
  - Non–familiar where they attract attention and the observer will like to repeatedly watching them [6].

3.3 Graphic analysis shape for the sample (old Mosul city)

Accordingly, the study sample, the old city of Mosul, will be analyzed using the graphic methods through finding:

3.3.1 The main shapes in the plan:

An atmosphere image of Mosul city will be used to find the regular and irregular shapes and to be isolated from other shapes. Each of the shapes will be given symbols in addition to titles, after the sample analysis(figure-5) ,five groups of the main shape were founded(figure -6) , so the groups of shape will be coded as each type as following :

- Group A for the yellow shapes.
- Group B for the cyan shapes.
- Group C for the green shapes.
- Group D for the blue shapes.
- Group E for the magenta shape.

all the above groups analysis as two dimensions and will be used in this stage of study as two dimensions (2D).

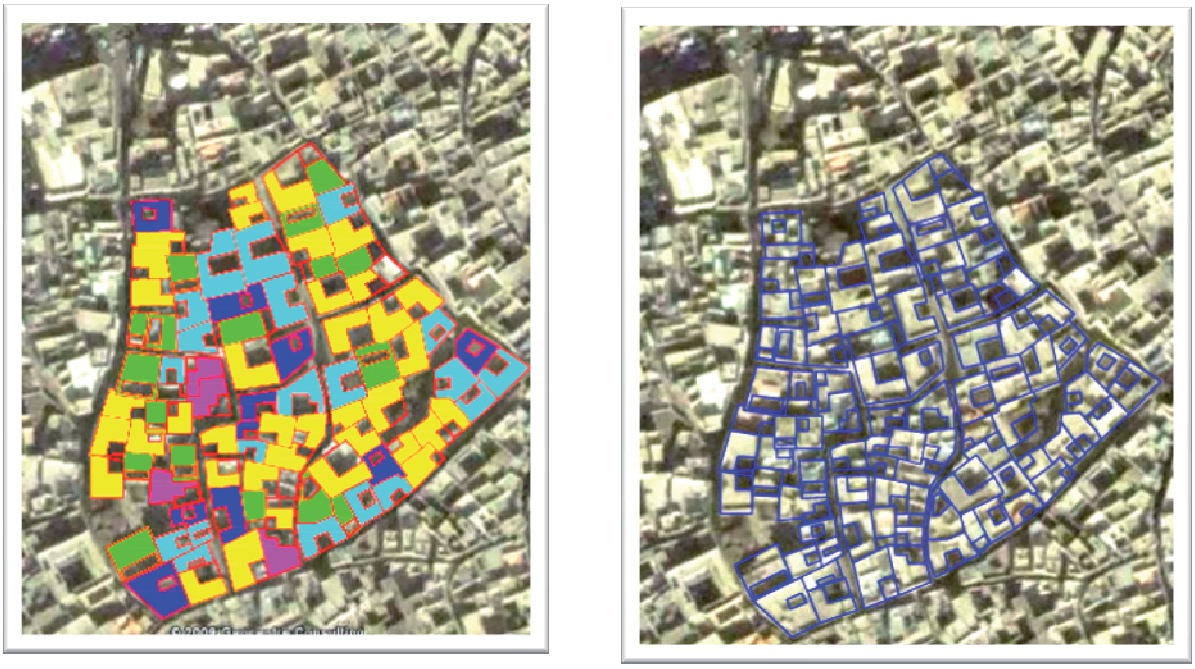


Figure-5-Image analysis to find the main shape

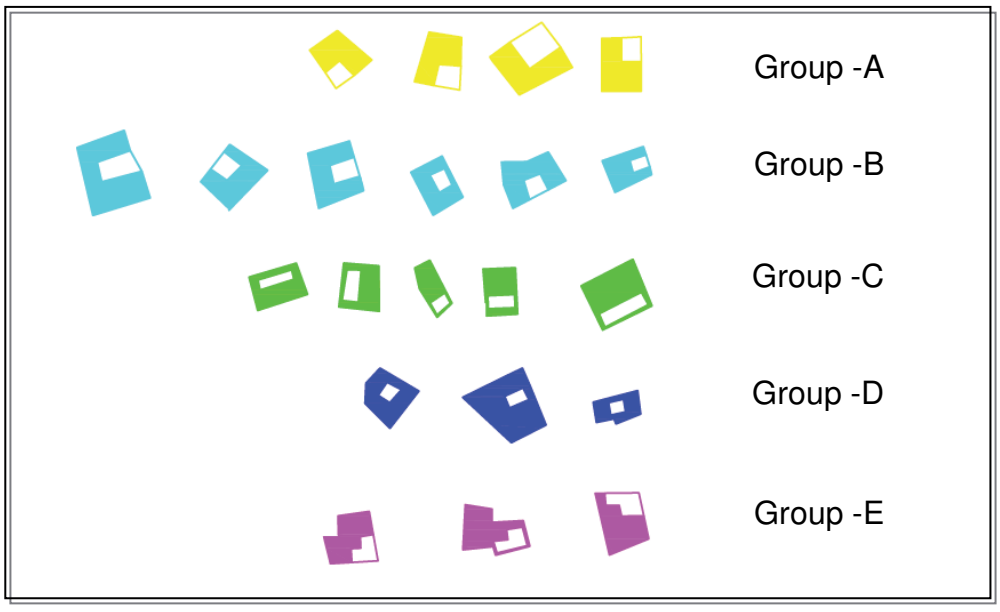


Figure-6- The group of shape in the selective part in the sample

3.3.2 The derived shapes:

After deriving the main shapes, the type of the main shape in the three dimensional level will be find where it will be possible to fix three shapes derived shape from one or more main shape. Each of five groups can find the main shape that the other shapes generate from it , as following figure :

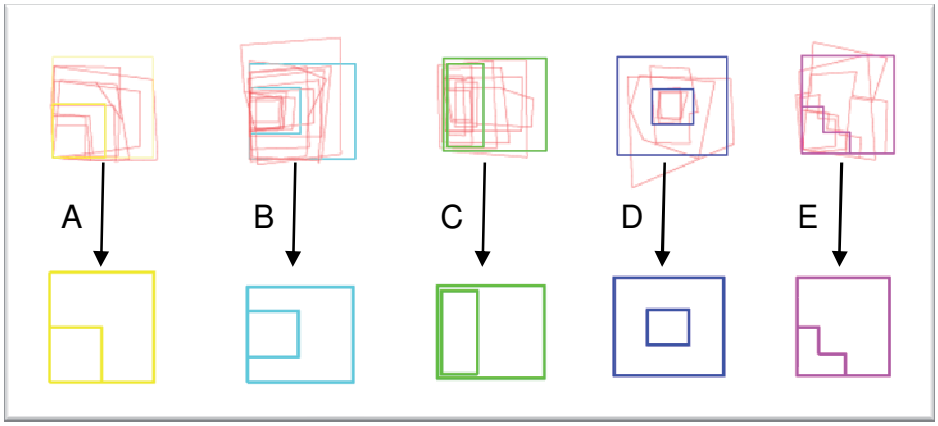


Figure-7- the main shape for each groups

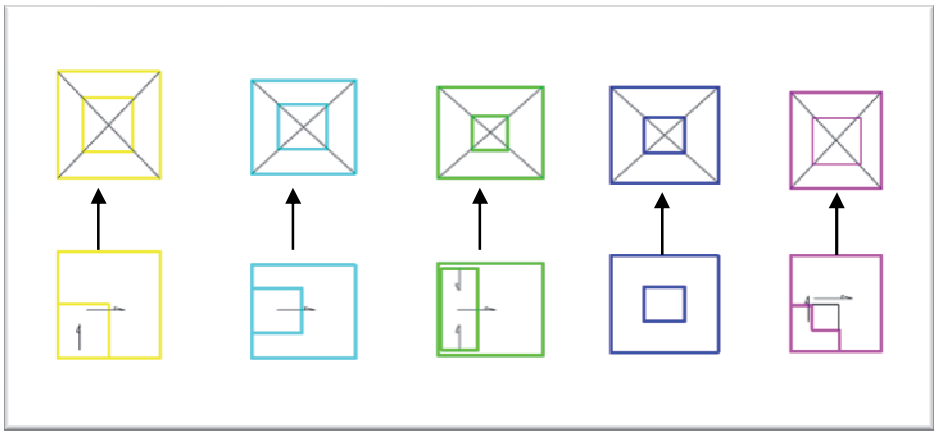


Figure-8- The main shape for all group

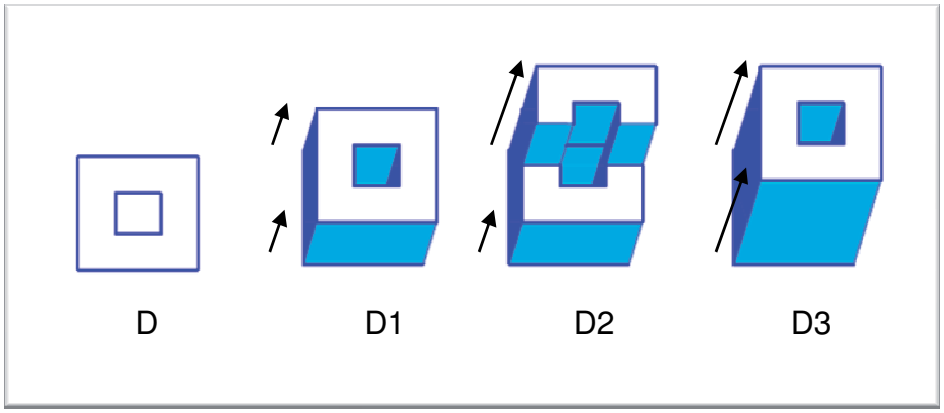


Figure-9- Three type of each group shape

Each group shape contains three type in three dimensions as the figure (9), so the number of main shape in the selective part from the sample (old Mosul city) is five shapes and three sub shape for each main shape , so the total number of all types of shape is (15 shapes) .

3.3.3 Statistic count of the main and derived shapes:

Statistic count of the main and derived shape will be done for the selective sector as these information are important and necessary when reconstructing the city or part of it in addition to their existence ratio in the

site ,this information is very important because the Mat Lap language needs this information as a input data to generate a new shape plan for the sector study as following table .

Table -1-number and ratio of all types of shape that founded in the site

Number of shape in each group														
A1	A2	A3	B1	B2	B3	C1	C2	C3	D1	D2	D3	E1	E2	E3
3	20	15	2	12	8	1	10	6	1	7	2	1	2	1
A-38			B-20			C-17			D-10			E-4		
43%			22%			19%			11%			5%		

3.3.4 The relations among units and shapes :

Adjacency relations among the units in the old city of Mosul and how they connect with the near shapes . This part of study will have more detail and graphic analysis to all shapes which found in the selective sample. From the studies of the properties of the shape plan of old Mosul city we can select the important relations that can be used in the Mat lap software . This properties can be used as a code or constrain to Mat lap to generate a new part of city by the subjective way and to be logic method ,and this properties will symbolized as a code to be used as a data in Mat lap program . so , What are the properties and relations that can be found in old Mosul city ?

The properties and relations are:

- Position

This property means the position of the shape in the site and the distance between the other shape in the same group . The distance here is measured by units and the units are measured by Pixel because the Mat lap language need the distance in unit that Mat lap recognize it .So the distance unit will be symbolized as (X) for all directions ,this mean the distance is same form the center court (the open space in the shape) to the center of the other court in the same group .(figure-10)

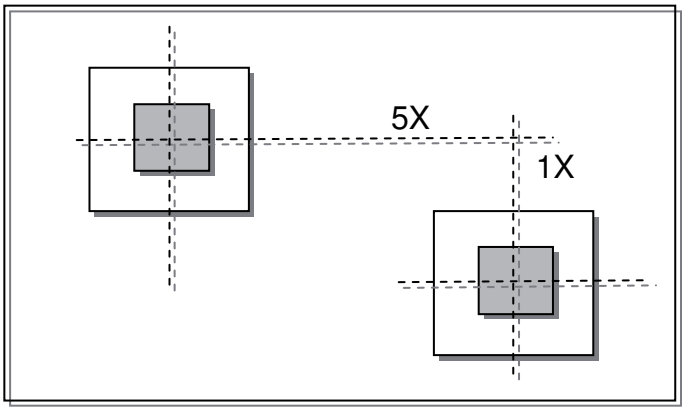


Figure-10- manning of position

- Adjacency

The second property is adjacency , this property manning what type of adjacency can find in the selective sector from old Mosul city , the adjacency can put in three type (tangent – overlap – divergent) and we will discuss this type by graphical figure (figure 11).

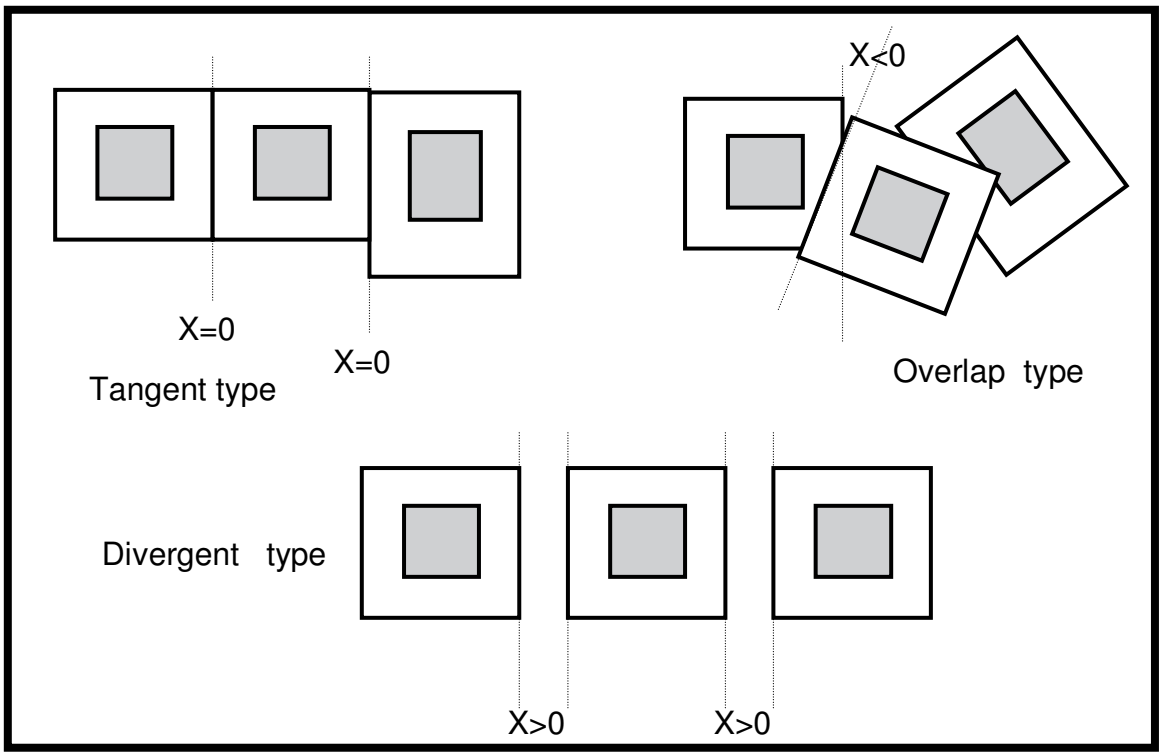


Figure-11- the three type of adjacency among the shape in the site

- Openness

Each shape needed one side open on the outside , its manning that only from three side can be relations with the other shapes , the ratio of opening space to circumference is 10-25% from the circumference of the shape as the following figure (figure-12).

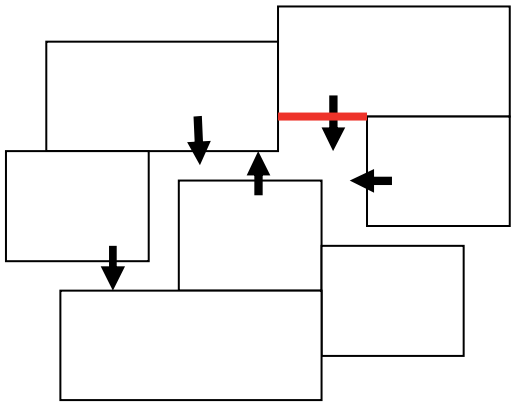


Figure-12- the openness of the shape unite(minimum 10%)

Openness on the outside is The area opened on the alley should be established in order that the result will be a logical one where there is no unit without an open to the alley.

- Transformation

There are many types of transformation in the shape[7] but in types that can found it in the selective sector are three type as the following figures(13-14-15) :

I-Size:[8]

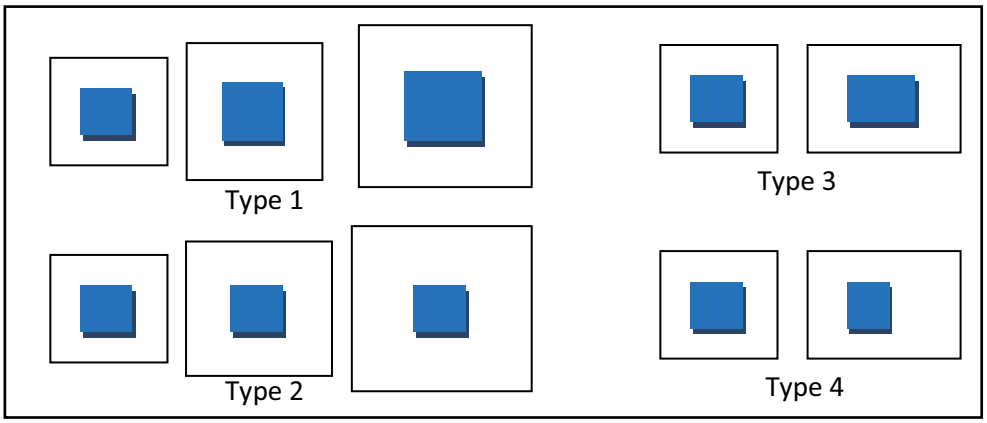


Figure-13- Type of size that found in the selective sector.

II-Rotate:[9]

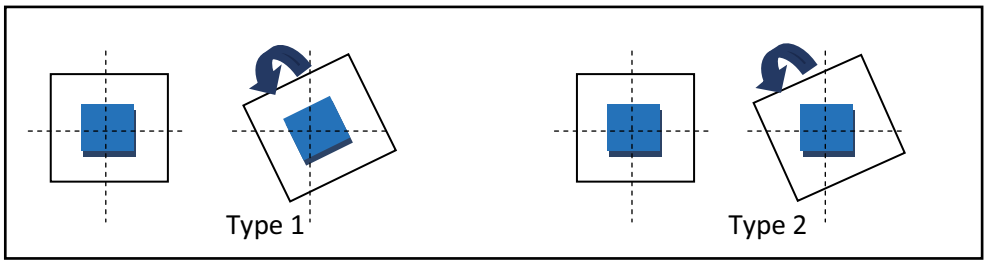


Figure-14- Type of Rotate that found in the selective sector.

III-Stretch:

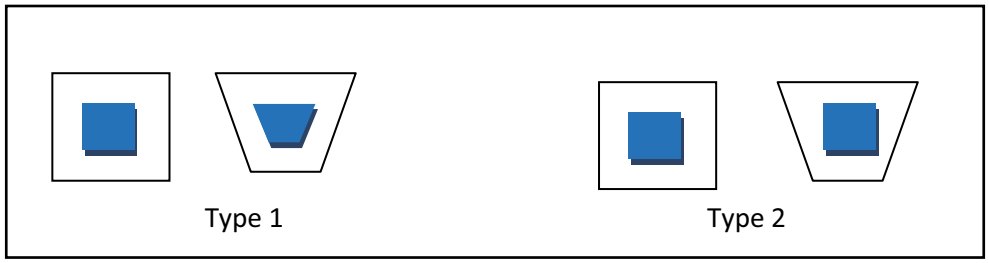


Figure-15- Type of stretch that found in the selective sector.

4 . The results of data

After finding the type of shape and its properties ,we can put it as a final data to be used in the Mat Lap application to create and generate a new shape that related to the main shape .

- Number of unites === 89
- Number of groups === 5
- Type of groups === A , B , C , D, E (figure -7)
- Ratio of group A === 43%
- Ratio of group B === 22%
- Ratio of group C === 19%
- Ratio of group D === 11%
- Ratio of group E === 5%
- Variable of positions === (10- 40X)
- Variable of adjacency (overlap) === 86%
- (divergent) === 14%
- Variable of openness === (10% - 25%)
- Variable of Transformation (Size) === (type 1 * 1.3X) 52%
- === (type 2 * 1.5X)13%
- === (type 3 * 1.1X) 22%
- === (type 4 * 1.4X) 13%
- (Rotation) === (type 1 = 78%)
- === (type 2 = 22%)
- (Stretch) === (type 1 = 81%)
- === (type 2 = 19%)

5. Generation of a new shape (results).

This stage will be application study to generate a new shapes by using Mat lap software , it used for graphic, statistic analysis and other application purpose . we used this software to made a program to generate a new sector shape using the results of analysis shape in the selective part from the sample (Old Mosul City) , this results will be used an input to the program and will be put as a stages to generate and design the new shape , so the stage of input data are:

Select the shape of site	input coordinates to create plane to start the generation

Number of units	Dived the plane as the number of units

Number of groups	for number of design new groups shape

Group / shape	Ratio of each group per shape

In The program of Mat lap two type of data , the first type is the variable date that used to input a new information in each use to program to generate a new shape which the designer need it . the second data is constant which input as an information when the program was made , this date get from the results of the graphical analysis stage. Now ,how can use the program to generate new shape in the same mechanism of shape and syntaxes in Old Mosul City? The answer of this question is the application study of Mat lap program .

Stage 1: generate a new site by input new date of the coordinate (x1 y1 x2 y2) to draw a plane which used as a selective sector that the designer want to generate new part in a same mechanism of shape and syntaxes in Old Mosul City (figure 16)

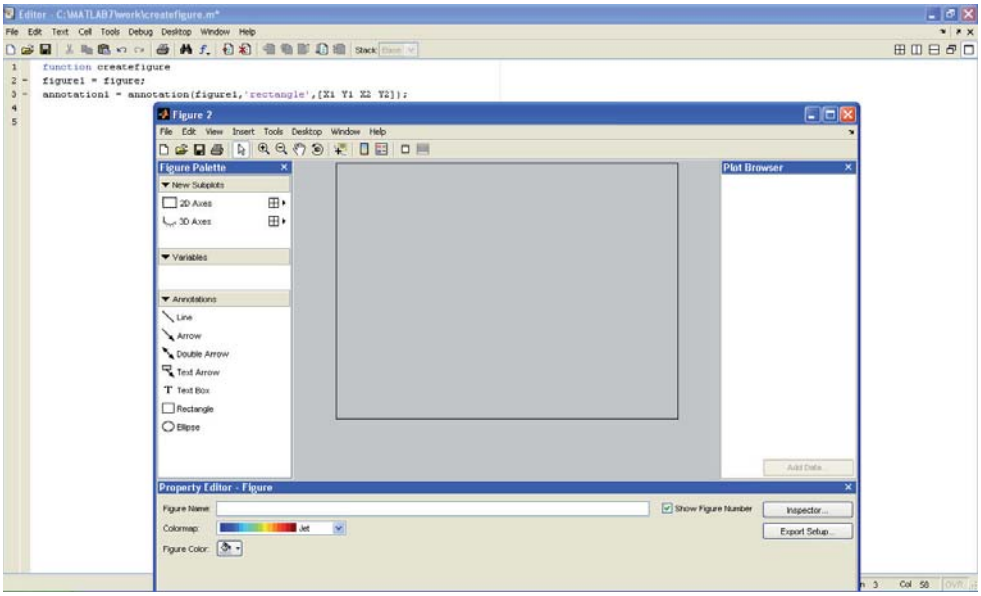


figure-16- stage 1 of generation shape

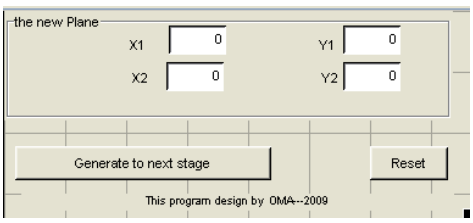


figure-17- input data window

Stage 2: This stage to select the number of unites which lead to generate new shape plan , after selected the number the program will divide the plane to same number of unites .

Stage 3: This stage to select the types of shape which input in the unite of the plane , in this stage the groups of shape will be determinate

Stage 4:determinate the ratio of shape to all shape in all groups by input the ratio in the text window which designed to input the ratio.

Stage 5: run the mat lap program to get the result by graphic drawing in the Mat lap window as the following figure . (figure -18)

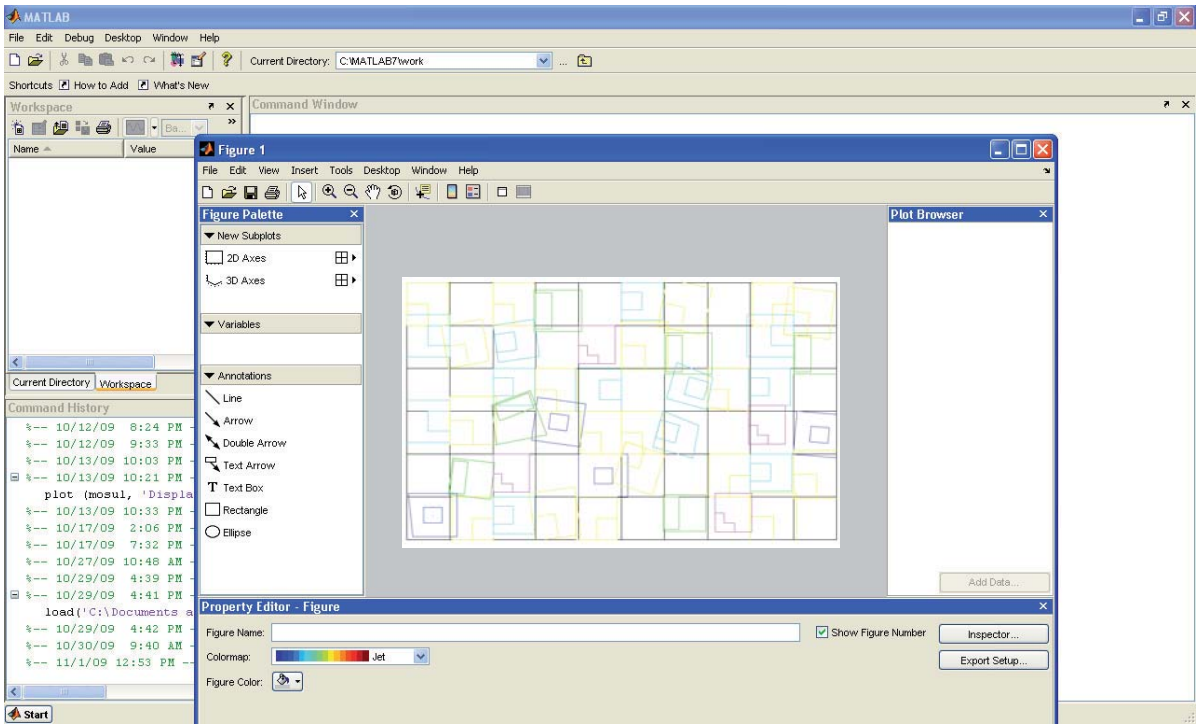


figure-18- after debug and run Matlap to generate new shape plan

after running Mat lap program , the graphical result be show as a new shape plan and we can make it in three dimension . so this program can show many models of shape plan in each used of program .

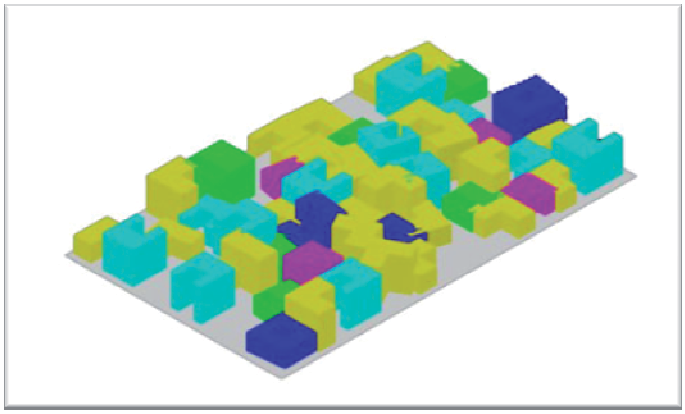


figure-19-new shape plan in three dimension

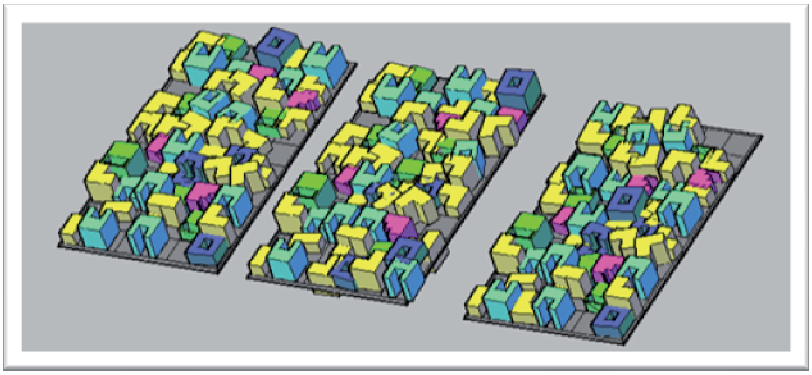


figure-20-other models from same generation

6. Conclusion:

To generate any shape by automatic method , many elements must be analyzed , and the discovered data must be changed into input data by determining the effective data which can be used to create a program in Mat lap or other software . This paper is considered primary in this field , which combines architectural design, and mathematics and computer science program which Mat lap is a statistical and graphical analysis . We can design a new shape plan not for the old Mosul city only but for other shapes by finding their mechanism and generate new ones related to the old shape or to create new shape out of main one . from this paper the architect can generate new shape in two stages , the first stage is the analysis of the sample by the graphical method and discovering the mechanism of generation and syntaxes of the main shape , this mechanism can be used to generate a new shape plan in the second stage . The result from second stage will be the design of the new shape plan , this result can related to the analyzed sample but not exactly the same design , we can use some programs to find the perfect design from the models of shape plan which will be shown in the result.

7. Reference:

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