

## Impact of Urban Shapes on urban planning (The Case Study, Borujerd City, Iran)

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### Abstract

This paper is concerned with a methodology that is able to recognize and classify geometric shapes, in particular urban shapes. The main objective of this study is to develop a shape index that will address Whyte's category of "spatial form" (1968), that is, the external appearance or outward form, in contrast with the "internal form," which is the structural form. We first review methodologies of shape recognition and classification. Next, we propose a viable formulation for such an endeavor by drawing from the aforementioned methodologies, and we aim to overcome some of their limitations by formulating a new index. We will apply the resulting shape index to an illustrative case in order to recognize urban shapes.

**Keywords:** Urban Shapes, urban planning, Transport system, Borujerd City

### Introduction

If we imagine the city to be like a continuously changing container having inside complex mechanisms that affect the container as well, is it then possible to know something about its contents by examining the shape of the container? In his study *On Growth and Form*, D'Arcy Thompson observes that "the form of an object is a 'diagram of forces'" (1917), and from this perspective we shall examine our "city-container." The urban outlines depict the effects of economic, political, and social factors that interact and develop in this particular space. Our attempt here is to focus on Whyte's category of spatial form (1968), that is, external appearance or outward form of the city in order to gather information about the internal form of the city, where by internal form we mean the structure of forces which build the spatial form.

Given the above research aim, our first step is to define a way of measuring urban spatial forms. The standard approach to this problem is usually to examine the size of the city (Berry 1971; Vining

1977; Sheppard 1982; Nader 1984; Marshall 1997), but is the measure of the size of a city a feasible parameter to recognize and classify its shape? By knowing the size of a three-dimensional object, we may argue that the object is large or small relative to a specific reference unit, but we cannot derive whether this object is a sphere or a cube. The size of the object does not provide us with such information. We have to reexamine the urban shape as a diagram, as a representation of points, and for this reason we need a feasible parameter. This issue is the subject matter of our paper.

### The Situation of case study

Borujerd is a city in and capital of Borujerd County, Lorestan Province in western Iran. At the 2006 census, its population was 227,547 in 59,388 families.<sup>[1]</sup> Among the existing modern cities in Iran, Borujerd is one of the oldest reported at least since the 9th century. In Sassanid Empire, Borujerd was a small town and region neighboring Nahavand. Gaining more attention during Great Seljuq Empire in the 9th and 10th centuries, Borujerd stood as an industrial, commercial and strategic city in Zagros Mountains until the 20th century. In its golden ages, Borujerd was selected as the state capital of Lorestan and Khuzestan region during Qajar dynasty in the 18th and 19th centuries.

Today, Borujerd is the second largest city of Lorestan; hence, the major industrial, tourist and cultural center of the region. The city has kept its old architecture and lifestyle mostly through mosques, bazaars and houses built in the Qajar era. Its people are mainly of Lurish descent, but there are a minority of Laks who also live in Borujerd and who are Laki speaking, like Balavand, Ghisavand, Shahivand, Bayrnavand, Ichivand, Kolivand, Jalilavand tribes who inhabit the area of Borujerd township.