An Integrated Model For Emergent City Behavior Based On User Movements

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Abstract. Today, with rapidly evolving information technology, computer technologies has become an interface rather than a tool for design process. With the development in computer applications it has become possible to solve design problems which were not possible to handle before. Computer environment which has become an interface rather than a tool for design has also led to the emergence of a number of concepts. New concepts such as Computer Aided Design (CAD), Computer Aided Manufacturing (CAM), Computer Aided Engineering (CAE) are being involved in design process. With the development of Artificial Intelligence (AI), AI has earned an interdisciplinary position. Agent based systems which are contained in the fields of AI have become the subjects of many researches in design basis. Approach to the problem solving process in the process of architectural/design problems is to be addressed as an important point within the scope of evaluation process. In this context user movements have a very critical role in process of problem solving according to the design problems. While designing or solving a design problem, ignoring the user movements can lead to unwanted results. Within the scope of this study user movements in city are considered in the context of emerging urban part/particles as a preliminary study.

Keywords. Emergence; agent-based systems; user movements in city; city dweller.

INTRODUCTION
This paper describes user movements in city which are considered in the context of emerging urban areas as a preliminary study. Agent based systems have an important role in different disciplines. Beside this with rapidly evolving information technology agent based systems became one of the most important tools for architecture and urban design. By taking advantage of this features of agent based systems, a model has been developed according to the user movements in the city. Two major issues of reflective emergent patterns involve how to define city-now and transforming data taken from city motion into an interactive map of the whole. As system undergo through the process of creating emergent images of the city, it will enable to experience the city in different ways and from this point; overlapping fragments and their constant flux will introduce a new city
concept. In this paper an attempt of rediscovering city dynamics and expressing it through the city-now is experimentally discussed.

EMERGENT CITY BEHAVIOR
Human being has become the most important element in the development of a model due to the user movements in the concept of emergent city behavior. City users not only produce urban pattern, social and economical process which city has but also create a fluidity of the city. This fluidity is due to movements constituted by user movements. The impulsive and exploratory properties of the user movements are considered to be a power to be used in understanding the process of urban development. Researches about urban city concept and urban lifestyles show us that user movements would be the most valuable data for underlying formations of the future city. Emerging city behavior can be defined from the city-now; reflecting the dynamics by altering features and consequences. If this reflection can be deliberately inspected, traces of emerging cities can be found. Than this reflection acts as a threshold, nestles the progression of the city. Dynamics occurring in this threshold define the city through city dwellers. Lynch agrees that; city dwellers not only use the city but also rediscover it while giving new meanings (Lynch, 1960). City dweller frames the city with motion through exploration while it is fragmented by the movement qualities. Entire city would be perceived as a superposition of motion fragments.

City dwellers are acting as passerby, not intriguing with the place and merely perceiving or exploring the environment. Inevitably city images would emerge in these areas. These places can be exemplified as; walking areas, low dense roads, paths, parks etc. When entire city is mapped, city fragments become emphasized creating images enabling the superposition. This idea of new city concept can be exemplified of making a possible city image of overlapped diversities. So city dweller in a city fragment would have a city image of the edges overlapping. In order to make an attempt of representing the whole, one should gather as many inputs as possible and enabling a map of the whole, one should be able to interpret how a city emerges and how a city would be in the future.

Industrial development, as well as many other things as have led the emergence of new urban models and theories. Particularly with the increasing mobility this change seems to occur so quickly. Disintegration of urban pattern and disappearance of traditional urban relations stand out clearly. Especially after 1950s this situation has become more clear and as a result of that architects’ interest have begun to turn towards urban environment and urban design (Cullen, 1961). In this context we can talk about relations between city dwellers and urban environment which is basically the main concept in this ongoing study. We believe that city dwellers and their relations are directly related when considering urban design. Perception of the city or relations between urban parts can be explained by three main factors. These factors are (1) optic; the people’s eye moving through the city capturing fragments of life (2) places and (3) the urban pattern (Marling, 2008). When we consider these factors from the point of emergence first factor becomes the priority. What we mean by “optic” is the moving eye in the moving body that is the drama of juxtapositions that come alive when we walk down the street and experience the contrasts between. Especially it becomes more alive in city environment. Having two contrasting pictures in mind a vivid contrast is felt and the town becomes visible in a deeper sense. It comes alive through the drama of juxtapositions. Unless this happens the town will slip past us featureless and inert (Cullen, 1961).

The other factor is “place”. Place has to do with our reactions to the position of our body in the environment. It is the feeling of entering or being in a room. If you stand at the top of a tower, the feeling differs from that of standing at the bottom of a deep cave. The last one is the “urban pattern”. The fabric of cities: color, texture, scale, style, character, personality and uniqueness (Marling, 2008). After these first impressions we can say that urban environment has
a very dynamic nature and it tends to show more dynamic behavior. The urban fabric is an overall dynamic environment, to which urban architecture and urban form are related. In that sense this approach to the city is not new; but as cities and the urbanized areas have developed and changed into even more dynamic places, they include more of this dynamic, holistic environment in their environment. The urban context is not only the sum of the buildings, infrastructure, squares and signs, but also cultural images, flows of people, money and information. It also includes technology, media, cultures and power and bureaucracy (Nielsen, 2004).

The global size XL city is not the kind of city we are used to. In his famous article “The Generic City” Koolhaas brings up realities in huge contemporary cities, and he focuses on the formerly unnoticed qualities of these cities. The main quality is the liberation from identity and from historic character. Koolhaas’ texts map the public realm of big cities, they try to describe the ongoing urbanism as a kind of point-zero according to the cities we know and are familiar with (Marling, 2008). The size XL city is described as a negation of classical cities. There is no centre, no periphery, no identity, no history. One cannot tell where the cities stop and the landscapes begin. The street is dead. Master planning is useless. There are few or no public places, and many wastelands, theme parks or golf courses; and architecture is reduced to a copy and paste activity. The mass culture is mainstream, and devoid of anything that can incite strong feelings: soap opera, selected news and light entertainment. The only remaining social activity in the big cities is shopping. (S, M, L, XL, 1995). The Generic city is a city liberated from the captivity of center, from the straitjacket of identity. The generic city breaks with this destructive cycle of dependency: it is nothing but a reflection of present need and present ability. It is the city without history. It is big enough for everybody. It is easy. It does not need maintenance. If it gets too small it just expands. If it gets old it just self-destructs and renews. It is equally exciting – or unexciting – everywhere. It is superficial – like a Hollywood studio lot, it can produce a new identity every Monday morning (S, M, L, XL. P. p. 1250).

The categories that are named are useful in order to understand the cities on the move. But first of all they are based on feelings and creative registrations following certain ideas, and not just on research (Marling, 2008). Using them in your mapping, you can often feel the limits: you can put everything or nothing into the terms. Thus, they are more like themes than useful analytical terms. Especially when we look into the big cities like Hong Kong, Las Vegas, Tokyo etc. we can see this kind of behavior which is the main reason of the emergence.

The physical and experiential discoveries on the city dwellers caused by daily life has been the starting point to develop a model to analyze urban environment in this study. The city has a constant motion which has led us to evaluate it in a continuous evolutionary process. This evolutionary process is actually an unconscious product of a conscious behavior. This became an important factor in the context of emergent city behavior. If we approach to the situation from this point of view development of a model that can predict the future or the changes that the city undergoes will enhance the effectiveness of the situations. In fact with this study we believe that we will have an opportunity to use the mental maps; that city dwellers create in time due to perception and experiences; the city or town in terms of users over time, in a more effective way and we think that it will help us how to design urban environment. Perception through everyday life in the city depends on actions and speed of effectors which introduces new experiences to the city dwellers. While continuity and speed creating fast fragments on the other hand stableness and interaction with the city produce slow fragments. Thus it can be said that reflecting these experiences will allow creating a new map for the city-now which invokes process of emerging from city-now to city-future. By adding new experiences and uses to the interactive map, perception of the city concurrently changes. In order to achieve
In the scope of this model the aims can be summarized as follows. (1) Identifying locations in the city with the context of emergence. (2) Analyzing user movements and agent based systems with the concept of emergence. (3) Developing a model that can contribute to the formation of urban space. With the results obtained from agent based model, the evaluation of user movements and the city's development in terms of urban dynamics can be considered as a preliminary tool for urban design process. It is crucial to gather data in order to develop a working model. In the beginning of collecting data for the concept of emergent city behavior, it is important to understand the now-situation. Documentation of the city through the scope of motion and attraction places is a crucial point of the process in order to understand the dynamics of fragments and their perception.

Data used in this model is gathered from the results of an experimental design studio in one graduate course in I.T.U faculty of architecture. Course aims to explore the patterns and trends of socio-spatial preferences and activities of architecture student community in metropolitan city. In the scope of this experimental studio, the aim was to propose data mining as a rigorous methodology for the analysis of socio-spatial problems. In this course specific routes have been given to the users and movements of these users have been studied according to places which they use or not. The data of movements is listed in surveys in order to keep information (Figure 1, 2, 3). And the results of the surveys have been obtained by studying these movements of the users (Sökmenoğlu, A., Akgül, C.B., 2010). Data achieved from the surveys is evaluated in Processing which is a Java based programming language and a preliminary model has been developed according to the user movements.

With the surveys we tried to answer following questions as a preliminary process in order to gather data for model.

• Is it possible to locate the third place a student will stop by if we know the first and second places he/she has already visited in weekdays?
Is it possible to locate the third place a student will stop by if we know the first and second places he/she has already visited in weekends?

Can we guess the places a student will prefer to visit if we know what he/she is studying at university?

Is it possible to guess the places a student will prefer to visit if we know where he/she lives?

Is it possible to locate the places a student will prefer to visit if we know his/her scores about that route (safety, density, attraction etc.)?

Is it possible to know the places a student will prefer to stop by if we know his/her music background and its relation with places in that route?

Can we guess the places where a student will prefer to stop by if we know how often he/she eats at that route?

Is it possible to know the places a student will prefer to visit if we know his/her social activities and what he/she is studying?

Is it possible to guess the places a student will prefer to stop by if we know when he/she has started to study at university and whom he/she is staying with?

Creating diagrams for the relationship between motion and perception of the space reveal an abstract map for guiding process of the whole.
Different kinds of information are needed in order to understand the relationship between movements and emergent city behavior. In order to achieve that user movements have been studied not only in weekdays but also in weekends. Also places which appear to have same functionalities are considered as a group such as transition, communication, accommodation zones etc. (Figure 4). As a result, different group behaviors have been tested in context of user movements. These varied information allow us to test alternative applications of model.

After taking data from the movement of effectors from city dwellers emergent behaviors would arise. Concurrently data gathering and superposing them with the collected data would define behaviors. As a result of that the model will be a simulation which would be shifting its features of motion simultaneously. Process of overlapping emergent spaces which differs according to the experiences becomes main point. Alteration of perception through the concept of motion and observing different behavioral patterns of the fragments with the changing effectors create an interactive map for the emergent city (Figure 5).

We can summarize the model in several ways:

- Traces left by agents are to be considered the most important data during the process of evaluation.
- The city has a dynamic structure and as a result of that traces left by agents show dynamic features which are very valuable in order to understand emergent city behavior.
- Traces left by agents will allow us to create an overview between places and their relations with city dwellers.
- As the city undergoes continuous evolutionary process all the time we can’t talk about specific or certain formation of the city.
- Agents that move according to the attraction points create an interactive map and traces left by agents effect other agents. As a result of that places tend to become more visible in the context of emergence. Such as density of usage etc.
- The outcome of the process (model) shouldn’t be evaluated as a final product instead it should be assessed as an input for further experiments and evaluations.

*Figure 4*
Places according to the functions

*Figure 5*
Model (agents creating emergent behaviors in city)
• Each profile produce different results so as a result it is important to be able to compare those results in the context of urban environment and emergent city fragments.

CONCLUSION
A city with a flux of diversities mostly shaped from motion is the new city concept. The model is tending to understand and trace the emerging city behavior. Integrated model which represents the emergent city behavior takes an existing city life. By taking existing situation it points out the conditions in the intersection of city now and future city and suggests how the model can be applied. In this regard the model which is based on user movements and experiences, will be suitable not only for evaluating the emergent city behavior but also for city users in the terms of perception.

REFERENCES