Chapter 2
Linguistic Location Authority: An Intricate Imperative

Akeem Olowolayemo
International Islamic University Malaysia, Malaysia

Abu Osman Md Tap
International Islamic University Malaysia, Malaysia

Teddy Mantoro
USBI – Sampoerna University, Indonesia

ABSTRACT

User centric design on mobile devices has gained tremendous attention in recent time. One of the aspects that is very critical to making mobile applications and interface handy is to inculcate linguistic approach to the outputs and design. This work examines the requirements and prospects of presenting location authority in linguistic form. Traditional approaches include geometric and its extension in the form of topological or symbolic location authority. Despite the inclusion of topological systems to compensate for the inadequacies of the classical geometrical approaches, the role quantitative reference plays in location authority is still extensive yet not completely in tune with the natural cognitive of human mind. The present work examines the imperative for linguistic approach to location authority. It sought to evaluate the rationale for perception based linguistic approach to location authority relative to landmarks or points of interest. Efforts were also made to identify the prospects as well as challenges in the implementation on location based devices.

LOCATION AUTHORITY

Location authority is *any set of referents for location references* used to describe locations for location-based services (Shafer, 2003). Every location based system requires the representation of the location in effective and efficient scheme. The original approach was based on geometrical models, viz; longitude, latitude, and altitude, and has been employed in Global Positioning Systems (GPS) and other Global Navigation Satellite System (GLONASS) devices. The standards for geometrical model is developed

DOI: 10.4018/978-1-4666-9845-1.ch002

under the *World Geodetic System* versions, previous, in the series include WGS60, WGS66, WGS72, while the latest was based on WGS84 (Shafer, 2003). The WGS84 has remained the standard location authority for use in cartography, geodesy, and navigation. This is the current location authority implemented on GPS enabled systems. Since its adoption, it has undergone many revisions and improvements. The underlying principle in geometrical approach is Euclidean. Geometrical systems, such as global positioning systems (GPS), designate location in coordinate form, viz; latitude, longitude and altitude. This has been utilized in different navigation systems mostly for outdoor environment. Generally, as can be obviously seen, though geometrical location authority is easier to develop and use for computers and easily manipulated graphically for humans, it is however deficient in conveying intrinsic meaning to ordinary humans (Shafer, 2003). This necessitated the idea of introducing topological referencing to cater especially for indoor environments where GPS systems may not be adequate. Topological on the other hand, can be expressed in hierarchical, descriptive or symbolic form, such as room name, in a particular floor, in a particular building or expressed as a displacement from some landmarks (Mantoro, 2006). Topological systems utilize symbolic location labels to augment geometric systems or provide expressive location. This approach expresses location as a set of atoms in the location authority which are more meaningful to humans yet lack universality at present and are more complex to implement. In some cases, it might be added to provide names or labels to geometric location authority to facilitate better understanding by users. More specifically, hybrid location authority adopts or combines both approaches and it is the approach used by most powerful location authorities (Shafer, 2003).

Furthermore, topological referencing employs names of places to identify locations rather than coordinate systems. Applications of topological or symbolic locations are prevalent in indoors as well as some outdoor spaces depending on the type of applications. Later extension to topological systems includes quantitative reference to landmarks, such as 20 metres to or away from a certain 'important' points often referred to as landmarks. This is due to the fact that some locations can only be referenced relative to a conspicuous location or landmark in its proximity. However, it is believed that numerical reference relative to landmark is not sufficiently human friendly. This is because generally, when responding to the question "where are you?", people respond with a spatial frame in mind relative to the enquirer. The emphasis undertone the scale between the respondent and the questioner as well as the distance apart or relative to a well know location. In this viewpoint, such response is different for two people inside a building, indoors; or for two communicators in the same locality, or two people in places link up by main roads, or two people in different points in a big city or from different geographical boundaries. Therefore, factors such as relative sizes, point of view and so on, help determine the scale of reference and are crucial to understanding spatial reasoning. Hence, modelling location authority in these scales should be distinct as well as requires intricate efforts.

This work introduces a linguistic or qualitative reference to landmarks as an imperative, though complicated in implementation, to foster more meaningful location authority. The methodology employs perception-based linguistic approach to locations relative to landmarks to extend location authority with a view to making it more user-friendly. This is vital because when people respond to the question "where are you?" They naturally respond in linguistic labels or statements such as "I am close to Landmark A" rather than "I am 5m to Landmark A" etc, when topological extension is adopted. Therefore, it is argued that positioning and navigation systems should incorporate linguistic description of distances rather than the present quantitative distances, such as 5m to Landmark A to describe displacement from landmarks. This study underscores the relevance of computing with words (CWW) approach to model locations relative to landmarks to provide linguistic referencing for mobile navigation systems as an 'interpretation'