An Ontological Approach to Meet Information Needs of Farmers in Sri Lanka

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Abstract. Farmers in Sri Lanka are badly affected by not being able to get vital information required to support their farming activities in a timely manner. Some of the required information can be found in government websites, agriculture department leaflets, and through radio and television programs on agriculture. Due to its unstructured and varied format, and lack of targeted delivery methods, this knowledge is not reaching the farmers. Therefore, this knowledge needs to be provided not only in a structured way, but also in a context-specific manner. To address this shortcoming an international collaborative research project was launched to develop a Social Life Network to provide necessary information to farmers using mobile devices. Agricultural information has strong local characteristics in relation to climate, culture, history, languages, and local plant varieties. These local characteristics as well as the need to provide information in a context-specific manner made us to develop an ontology for agriculture. In this paper we present the approach we used to derive contextual information related to the farmers and the ontological approach that we developed to meet information needs of the farmers at various stages of the farming life cycle.

Keywords: agricultural information, contextual information, knowledge representation, ontology, ontology development.

1 Introduction

In many developing countries, agriculture plays a major role in the country's economy; Sri Lanka is no exception. The agriculture sector in Sri Lanka is the main source of livelihood for the rural population, which accounts for 70% of the total population. Often we hear news about farmers in Sri Lanka not being able to sell their harvest due to oversupply or not getting the planned harvest, selecting the wrong seed types, or lack of necessary information at the right time such as information about market prices [1]. Therefore, flow of information in the agriculture sector must be strengthened to attain higher growth rates and to contribute to the overall economic development of the country. There are many issues to be investigated to achieve a successful delivery of information from agricultural experts to rural farmers. Some important issues are: what information is required, what should be the delivery

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methods, and how to customize the information to meet the needs of farmers in different regions. From time to time farmers need information such as accurate market prices, current supply and demand, seasonal weather, best cultivars and seeds, fertilizers and pesticides, information on pest and diseases and their control methods, harvesting and post harvesting methods, and information on farming machinery and practices, to make informed decisions at various stages of the farming cycle [2], [3]. Some of this information is available from government websites [4], [5], leaflets, and mass media in several different formats; text, audio, video. Sometimes different terminologies to express the same concept have been used. Due to its unstructured, varied formats, general nature of information, and lack of appropriate delivery methods this knowledge is not reaching the farmers.

Glendenning, Babu, and Asenso-Okyere [6] discussed clearly the importance of contextualized information and knowledge for the farmers in India. They further explained how effective this knowledge on their productivity and income since this information is more relevant to their farm enterprises and better reflects needs of the farmers. They therefore recommend that the existence of context-specific and relevant information should be considered when developing approaches for farmers as an agricultural extension.

According to the above analysis, we have identified that, farmers need information relevant to their context rather than generic information. For instance, farmers need agricultural information relevant to their situation such as the location of their farm land, their economical condition, their interest and belief, need and available equipments and so on. Then, this information would be more relevant and appropriate to farmers' needs and also could have a greater impact on their decision-making process.

Since context-specific information is more important to farmers for successful farming, we need a novel way to deliver agricultural information to farmers in a context specific manner. Social Life Networks for the Middle of the Pyramid (www.sln4mop.org) is an International Collaborative research project aiming to develop mobile based information system to support livelihood activities of people in developing countries [7]. Our research work is part of the Social Life Network project, aiming to provide information to farmers based on their context.

The idea of term *context* is treated in different ways in the literature [8], [9], [10]. One such definition is as follows [10]:

"*Context is any information that can be used to characterize the situation of an entity. An entity is a person, place or object that is considered relevant to the interaction between a user and an application, including the user and applications themselves*".

This definition describes context clearly and generally as it can be used to describe the situation of a participant in interactive way.

In this paper, we describe *context* specific to the farmers in Sri Lanka and the approach we developed to design the ontology to provide context-specific information and knowledge to farmers. It further discusses methodologies that were used for designing, technology selection for implementation as well as validation and evaluation techniques. The remainder of the paper is organized as follows. Section 2 describes the modeling of farmer context for this application. Section 3 presents the need for an agricultural ontology and related research in this field. Section 4