TOWARDS BUILDING A FIELD DIAGNOSIS GUIDE FOR FARMERS[1]

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ABSTRACT

Indian farmers are facing several issues for acquiring actionable scientific agro-advisory for the crop problems in a timely and regular manner. Due to communication and perception problems, it is becoming difficult for farmers to acquire actionable agricultural information from several web-portal based knowledge repositories. We have to build efficient systems to provide actionable agro-advisory to farming community. To enable the farmer to identify the crop problem and get the agro-advice in an effective manner, we are investigating a framework to build a smart-phone based Field Diagnosis Guide (FDG). We share the initial experiences of developing FDG for cotton crop.

Index Terms— agro-advisory, agro-informatics, IT for agriculture, information dissemination, rural development

1. INTRODUCTION

Despite the variety of agricultural extension approaches which include IT-based approaches, the majority of farmers in India are not acquiring the actionable agricultural information [4]. Farmers are facing difficulty in acquiring actionable agricultural advice in a real-time manner from call centers and web portals [1] due to communication and perceptual issues. The radio, video, SMS and voice-based services push generic information to farmers [2]. The farm-specific advisory systems like eSagu [3] suffers from scalability issues. To enable the farmer to get the actionable agro-advisory, we are making an effort to build a smart-phone based Field Diagnosis Guide (FDG) by exploiting the progress in data science and mobile phone technology. In recent years, several rural farmers are purchasing smart phones. We are investigating methodology to build FDG for helping the farmer to identify the crop problem and acquire the corresponding solution. In this paper, we share the initial experiences of developing a framework of FDG for cotton crop.

2. BACKGROUND

Over three decades, several agro-information systems are being developed by exploiting ICTs. These systems can be divided into push-, pull- and hybrid systems.

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Under pull-based systems, it is assumed that farmers and other stakeholders pull the information from the system. Call centres and several web portals [1] operated by central government and state governments in India fall under this category. Notably, it is difficult for the majority of illiterate and semi-literate farmers to pull the actionable agricultural advice through such systems due to low knowledge levels and, communication and perceptual problems.

Under push-based system, it is assumed that the system push the agricultural information to farmers' door-step. The push-based systems vary with respect to the degree of generalization to personalization. The radio, video, proactive SMS- and voice-based services push generic information to farmers [2]. The eSagu system (Here, the word `Sagu' means `Cultivation' in Telugu language) is a "personalized farm-specific push-based system" with the feedback [3]. In eSagu, agricultural experts generate expert agro-advice based on the latest information about the crop situation received in the form of both digital photographs and text. The scientific agro-advice is provided to every farm (or field) at regular intervals, i.e., once in every 10 days from sowing to harvesting. The eSagu system has scalability and sustainable issues.

There are efforts to build a hybrid system by combining the concepts of push- and pull- based systems. The "Village-level eSagu system" [5] is an example of the hybrid system. In this system, a sample number of farms are selected for each major crop of a location (a group of villages). The agricultural experts provide expert advice to these farms at regular intervals based on photographs and text. The expert advice is made available to all the farmers in the village by displaying color printouts of both photographs and advice text on the notice boards in the corresponding villages.
Overall, it can be observed that farmers are following unscientific practices since actionable agro-advisory are not reaching majority of farming community in a timely manner. The farmers are also suffering from the issues of knowledge gap and communication gap. We have to investigate the building of efficient systems to enable the farmer to acquire actionable agro-advise in a timely manner.

3. BASIC IDEA AND METHODOLOGY

It is identified that a typical farmer is having difficulty in explaining the field problem to an agriculture expert through cell phone due to perceptual issues in identifying the field problem. Further, farmers are also suffering from the language and dialects related issues to communicate the crop problem to the scientist.

By exploiting the latest developments data science and smart phone technologies, there is an opportunity to build a system to enable the farmer in identifying the crop problem and getting the agro-advice. It is assumed that the farmer possesses a smart phone with Internet connection and visits the field. The issue is to propose a framework of smartphone based field diagnosis guide (FDG) for guiding the farmer to identify the field problem and acquire the actionable agro-advice.

The basic idea is as follows. A field problem is a combination of a set of visual perceptions. The farmer identifies the visual perceptions of the field problem through smartphone, and identifies the field problem and acquire the agro-advice.

The methodology to develop FDG is as follows. Being semi-literate, a farmer is able to identify the generalized visual perceptions (or symptoms) of the crop. The low-level visual perceptions of field problems of the given crop can be collected from subject matter specialists. The proposed FDG contains an hierarchy of visual perceptions of field problems that consists of generalized, middle-level, and lower-level perceptions. The FDG helps the farmer to identify the field problem by confirming the corresponding low-level perceptions and acquire the agro-advice [6] [7].

4. IMPLEMENTATION EXPERIENCE

By considering the Cotton crop, a preliminary prototype of FDG is being built. Based on the field study, it was found out that the farmers have generalized perceptions on crop problems. For example, the farmer can identify a field problem through an high level perception like "Leaf Curl". However, the problem could be one of the following field problems: *White Fly*, *Aphids*, *Jassids*, *Thrips*, *Zink Deficiency*, and so on. Each of these problems is can be expressed as a combination of low level visual perceptions. For example, *Aphids* problem can be expressed as a combination of the following low level visual perceptions: "Presence of insects", "Black insect colour", "Black sooty growth", "Reduction of leaf size". We have developed a question popping algorithm which enables the farmer to identify the field problem. It was found out that the farmers are able to identify the field problem based on low level visual symptoms.

5. CONCLUSION

A framework of Field Diagnosis Guide (FDG) has been proposed which enables the farmer to capture the crop problem using the smartphone. The initial results are encouraging. The proposed system exploits the progress data science and mobile phones and complements the existing push- and pull-based systems to improve the delivery of actionable agricultural information to farmers.

6. REFERENCES

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