

An Indian-Australian research partnership

Project Title:

Complex and Intelligent Data and Knowledge Repositories for Novel Farming Advisory

Project Number

IMURA0255



Monash Supervisor(s)

Yuan-Fang Li

Monash Primary Contact:

YuanFang.Li@monash.edu

IITB Supervisor(s)

Ganesh Ramakrishnan, Pushpak Bhattacharya, NL
Sarda

IITB Primary Contact:

ganesh@cse.iitb.ac.in, pb@cse.iitb.ac.in,
nls@cse.iitb.ac.in

Research Academy Themes:

Highlight which of the Academy's Theme(s) this project will address?

(Feel free to nominate more than one. For more information, see www.iitbmonash.org)

1. **Advanced computational engineering, simulation and manufacture**
2. Infrastructure Engineering
3. Clean Energy
4. Water
5. Nanotechnology
6. Biotechnology and Stem Cell Research

The research problem

Define the problem

Before delving into the problem definition, consider a scenario with regards seed quality. National Crop Research Labs (NCRL) of India test seed quality available in the market by conducting various experiments. If results of such tests were to be stored in a database against pictures of Logos (certificates) printed on seed bags, then a farmer could get first hand information about seed quality, by simply taking a picture of the logo (or certificate) and uploading it to a server. The server could pick the farmer image match it to one in the database and retrieve seed quality information stored against it. This could then be sent to the farmer by means of an SMS to his mobile phone. Such a system could be of great help to a farmer and increase his crop yield enormously. The objective of this project is to build revolutionary systems such as this.

To explain further, agricultural data is vast and exists in heterogenous forms such as audio (farmer queries and complaints), images (from remote sensing satellites and farmer camera's on the ground), numerical data (sensors of all kinds), and text (farmer queries, agro-best practices, agricultural publications). To build effective prediction models, render critical advice in response to fuzzy queries from farmers, evaluate agricultural yield and output, prevent endemic/pandemic plant disease, we need to be able to integrate this data and create effective knowledge repositories. This project aspires to create an integrated data and knowledge repository from farmer data that can be used by experts in the field to

answer questions. Intelligent systems that answer questions in the absence of experts can also dip into this knowledge base.

Project aims

Define the aims of the project

The following are the aims of the project

- Create a content base image retrieval system that can provide an automated response to an image uploaded by a farmer.
- Build an “intelligent” agriculture ontology that can help answer “fuzzy” query.
- Create a tool which generates “good” response to farmer’s query automatically which is available to agriculture graduate to advice farmer.

Expected outcomes

Highlight the expected outcomes of the project

- To create knowledge structures such as ontologies that can integrate heterogenous data
- Build efficient question answering and information retrieval platforms in the agriculture domain.
- Patents, journal articles and conference papers in the area of information retrieval and knowledge discovery with focus on the agriculture domain.
- M Tech and / or Ph D. thesis

How will the project address the Goals of the above Themes?

Describe how the project will address the goals of one or more of the 6 Themes listed above.

The key research issues in this project are:

- Content Based Image Retrieval
- Data and Information retrieval.
- Intelligent spatial and temporal databases.
- Intelligent ontology and fuzzy query interaction.

Hence the theme “Advanced computational engineering, simulation and manufacture”

Capabilities and Degrees Required

List the ideal set of capabilities that a student should have for this project. Feel free to be as specific or as general as you like. These capabilities will be input into the online application form and students who opt for this project will be required to show that they can demonstrate these capabilities.

Requires a student with a Masters degree in Computer Science with a background in data bases, knowledge discovery and information retrieval.