Theme 3: Agricultural Informatics

T3.1P

An Insight into the Similarity Aspects used on Web

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The question of similarity is a heavily researched subject in the computer science, artificial intelligence, psychology, and linguistics literature. Typically, these studies focus on the similarity between vectors, strings, trees or graphs, or simple objects. Good similarity measures are central for techniques such as retrieval, matchmaking, clustering, data-mining, ontology translations, automatic database schema matching, and simple object comparisons.

Similarity considerations play most important role in web mining for returning the relevant web documents based on the query defined by the user. Depending on need and applications different similarity measures have been used by researchers working on web. However in our knowledge no serious attempt has been made to address the question of similarity as such. Therefore, anyone who wants to enter into the field of web mining remains confused about the similarity issues. In this paper we made an attempt to fill this gap by covering some important similarity measures that have been used in the context of web documents, categorize them, present basic idea behind them and discuss their significance and applicability. As innumerable similarity measures have been used, therefore in no way we claim to cover all similarity measures. Instead our attempt is to provide an insight into similarity aspects on the web so that these similarity measures can be used in a more meaningful way.

T3.2P

Gender Distribution of ICAR Personnel using PERMISnet

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PERMISnet system contains data of 26,859 ICAR personnel comprising of 4403 scientists, 7609 technical and 14847 administrative & supporting personnel. In this paper analysis has been done on PERMISnet data collected up to August 2006 to access the gender distribution of ICAR personnel. Analysis of the data reveals that male and female ratio in total staff strength is 88:12. Further examination of data revealed that female personnel are contributing 12% in scientific services, 7% in technical services and 15% in the administrative and supporting services as compared to their male counterpart. It is further observed that among different subject matter divisions, animal science and natural resource management divisions have less number of female scientific personnel. Reservation of personnel in general, schedule caste, schedule tribe and other backward class categories shows their distribution of 77:9:2:12 in scientific, 54:20:6:20 in technical and 48:26:7:19 in administrative & supporting services.

T3.3P

Support Vector Machine (SVM) for Classification of Spatial Data
Spatial data mining is the process of discovering interesting and previously unknown, but useful, patterns from spatial datasets. One of the aspects of spatial data mining is to give the information about the data that a user can interpret. Classification is the most popular way to obtain a structured view of the data. In a given spatial data set (a training set) with one attribute as the dependent attribute, the classification task is to build a model to predict the unknown dependent attribute values of the future data based on other attribute values as accurately as possible. Support Vector Machine (SVM) is one example of machine learning algorithms that has emerged as one of the promising options for classification. SVM represents a group of theoretically superior machine learning algorithms that employs optimization algorithms to locate the optimal boundaries between classes. Statistically, the optimal boundaries should be generalized to unseen samples with least errors among all possible boundaries separating the classes. SVM have already been used in a wide area of applications to classify the data. This paper is an attempt to explore the applicability of support vector machines for classifying spatial data.

**T3.4P**

**Ontology Based Knowledge Management in Agriculture**

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Efficient and effective search for knowledge requires knowledge management. Standard information retrieval mechanisms when applied in on-line learning environments do not offer access to semantic relationships between knowledge items, and thus are unable to put query results in context. Ontology and semantic web are emerging as key technology to help user in accessing relevant information when required. This study describes an ontology-based approach for semantic retrieval of agricultural research web pages. Ontology for various concepts and relationships in agricultural research management has been proposed using Simple Hypertext Ontological Extensions (SHOE), a knowledge representation language. SHOE based annotation of a home page of an agricultural research project has been described along with tools for its semantic searching. This approach has potential for researchers, policy makers and students in agricultural and allied sciences for the retrieval of knowledge from fast growing medium like World Wide Web.

**T3.5P**

**A Windows-Based Software for Cataloguing and Generation of Repeated Measurement Designs**

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Designs in which each experimental unit receives some or all of the treatments, one at a time, over a period of time are called repeated measurements designs (RMDs). Various classes of RMDs are scattered all over literature. There is a need to catalogue these designs at one place for easy selection of a suitable design in a given experimental situation. At present, no software seems to be available for cataloguing and generation of these designs. We describe here windows based software, for cataloguing, generation and randomization of RMDs, developed using Microsoft Visual Basic 6.0 programming language for Win98/WinNT. This software is completely menu-driven and offers a user-friendly interface for its easy operability. This software is highly helpful to the statisticians and researchers in the areas like animal nutrition experiments, clinical trials in medical research, and long term fertilizer experiments in agriculture, educational studies, bio-equivalence trials etc.

T3.6P
Software for Imputation of Non-Response in Survey Data
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In surveys, the sampled units may not provide answers for all the survey items. Missing data are often contained in data sets and this makes prediction of the parameters difficult. Imputation is frequently used in survey research to assign values for missing item responses, thereby producing complete data sets for general analysis. This paper describes a stand alone software for imputation of non-response items in a collected survey data set based on a number of sampling designs such as simple random, stratified, cluster and stratified cluster. This software can impute non-response data items using imputation methods such as mean, zero and mean of neighboring units. The software has a spreadsheet like data management module to import input survey data from MS-Excel sheet, MS-Access database and text files. A class library containing imputation methods for above mentioned sampling designs has been developed. This software is developed using .NET framework with C# language. This is a user friendly software that generates the imputed data in a new column and can be repeatedly used to carry out imputation with different designs on same input data.

T3.7P
Automatic Knowledge Acquisition System for Pulse Diseases
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Knowledge acquisition is one of the most difficult and error-prone task that a knowledge engineer does while building a knowledge-based system. The cost and performance of the application depends directly on the quality of the knowledge acquired. An Automatic Knowledge Acquisition System for pulse disease (AKAS-PD) facilitates the encodement of expertise into a pulse disease knowledge base (PD-KB). The objective of the proposed system is to overcome the problem of knowledge acquisition for pulse disease diagnostic domain by developing an automatic system which can be used for all type of pulse crops in the country. Here, we present the design and development of an automatic user-friendly interactive knowledge acquisition system having the facilities of adding, viewing, modifying
and deleting both types of knowledge (i.e. textual and pictorial). The system also assists the
domain expert and the knowledge engineer to feed knowledge in the knowledge base in a
structured form and in maintaining consistency of the encoded knowledge. The basic
structure of the knowledge base is designed by the knowledge engineer on the basis of
different types of knowledge needed for the identification and control of pulse diseases.

T3.8P

Thesaurus: A Source for Selecting Terms in Query Expansion

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The explosive growth of the World Wide Web is making it difficult for a user to locate
information that is relevant to his/her interest. Though existing search engines work well to a
certain extent but they still face problems like word mismatch [16], which arises because the
majority of information retrieval systems compare query and document terms on lexical level
rather than on semantic level and short query: the average length of queries by the user is less
than two words [12]. Short queries and the incompatibility between the terms in user queries
and documents strongly affect the retrieval of relevant document. Query expansion has long
been suggested as a technique to increase the effectiveness of the information retrieval. Query
expansion is the process of supplementing additional terms or phrases to the original query to
improve the retrieval performance. The central problem of query expansion is the selection of
the expansion terms based on which user’s original query is expanded. Thesaurus helps to
solve this problem. Thesaurus have frequently been incorporated in information retrieval
system for identifying the synonymous expressions and linguistic entities that are
semantically similar. Thesaurus has been widely used in many applications, including
information retrieval and natural language processing.

T3.9P

A Conceptual Innovative IT Enabled Framework
for Managing Agriculture Resources – ARP

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Agriculture happens to be the mainstay of Indian Economy. Even today seventy percentage
of the population depend on agriculture as the core economic activity. Nevertheless as the
commodity market is the farmers – particularly the small farmer are unable even to cover
their cost of production. Unlike in US-EU they do not have a back up of significant subsidy.
The result is a diminished attractiveness of agriculture as a paying industry. The farmers
mostly operate in production segment of the value chain and as such is not in a position the
capture major share of the total value created. In fact much of the value created by this chain
is captured by the segments both upstream & downstream of this chain. It is a fact that in the
current scenario – the powerless (economic) farmers cannot do much because of immense
competition in the production segment. However this paper makes an attempt to capture some
more value with the help of some more knowledge captured through an IT platform.

This paper proposes an economic model that integrates through a computer network some of
the upstream segments like the producing centers, Market, logistics so that the farmers can
capture some more value. This paper proposes a network environment for the producers as well as the marketing associates which can use the IT tools to forecast commodity prices in different markets and accordingly advice the farmers to shift this producer to a particular Mundi for an expected price recovery. ARP – as its called (Agricultural Resource Planning) will help the farmer to the extent that the latter knows that for maximization of value capture he needs to sell his commodity in which market. This also calls for free movement of grain / commodity to different market. This exercise will help reduce some of the uncertainty associated with today’s production-logistics-sale-scenario. This model is proposed and not tested yet. Model results can be discussed once it is put on test at least with a control group of farmers.

T3.10P
Online Soil Test Based Fertilizer Recommendation System for Targeted Yield Using Soil Fertility Maps - An Attempt to Bridge the Web Technologies with the GIS

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Optimum return on the investment and minimum environmental pollution are major issues to be addressed while giving soil test based nutrient recommendations. The web based online nutrient recommendation system discussed in this paper is an online solution which provides an easy mechanism to recommend the major fertilizers N, P and K for various crops in different States based on available nutrients in the soils and for targeted yield of crops. This system is user friendly and can be operated without any scientific knowledge. The software has been developed with the help of information available from AICRP on of Soil Test Crop Response correlation (STCR) project. Software is implemented by designing a database for fertilizer recommendation for different states of the country. A user-friendly interface for the database management and efficient data retrieval has also been developed.

T3.11P
Design and Development of Data Mart for Field Crops in India

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A data mart on field crops in India is a logical subset of data warehouse on agricultural resources in India. This data warehouse has been developed in sub-project under National Agricultural Technology Project (NATP) entitled “Integrated National Agricultural Resources Information System”. The mission set for this project was to design and development a flexible Central Data Warehouse (CDW) of agricultural resources of the country at IASRI, New Delhi (lead center) and databases on different subjects at respective co-operating centers. The target users of information systems and decision support system developed under this project are (i) Research Managers (ii) Research Scientists and (iii) General Users. In this project a state of art Central Data Warehouse (CDW) of agricultural resources of the country has been developed at IASRI, New Delhi. This is probably the first attempt of data warehousing of agricultural resources in the world. This provides systematic
and periodic information to research scientists, planners, decision makers and developmental agencies in the form of On-line Analytical Processing (OLAP) decision support system. In this paper, an attempt has been made to present various steps that are needed in designing, developing and implementation of data mart on field crops in India. Attempt has also been made to provide an overview about the reporting and cube building through which user is enabled to do Online Analytical Processing (OLAP) on field crop data mart of this data warehouse.

T3.12P

An Application of Vague Set Based Model in Students Evaluation

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In this paper we considered three existing approaches for evaluation of students’ answer scripts (traditional marking method, grading method and fuzzy evaluation method) and a better method of evaluation called VEM (Vague Evaluation Method) is a computer and vague set based approach where a vague valued (satisfaction based) marking is used. The paper shows a good and successful application of vague set theory described by Gau et al. in 1993.

T3.13P

A Perspective on the Distribution of Personnel Visited Abroad from the ICAR

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To provide accurate information of its employees instantly to the management for systematic planning and management of human resources in ICAR, making projections and catering to the personal and professional needs of its employees, an “Online Personnel Management Information System for ICAR (PERMISnet) has been developed. The site is currently hosted at the IASRI server and can be accessed through the web address www.iasri.res.in/permisnet. Till date personal information of about 28,186 employees of the Council (including retired personnel from the year 2002) have been entered into the system. In this paper an attempt has been made to extract the information available in the PERMISnet system till September 2006 and throw some light on the facts and figures related to visits abroad of ICAR personnel. The paper takes into account the total visits abroad by ICAR personnel from the date of joining the Council till date. The content in the paper covers different aspect of information available on visits abroad. Modal age of the personnel visited abroad from the Council at the time of visit is found to be 40 years. The results from the various tables and figures shows that large number of personnel from ICAR visited abroad from all the subject matter divisions of the Council and the number of visits from each division is proportionate to the staff strength of that particular division. The female employees in the Council constitute 12% of the total staff strength of the Council. Out of the total visits abroad from the Council the contribution of female employees is found to be 8.8% only. The Female: Male ratio of the total visits abroad by ICAR employees is 0.09 whereas the overall Female: Male ratio of ICAR employees is 0.13. This signifies that there has been no gender discrimination in total visits abroad.
Maximum numbers of personnel visited abroad were found to be in the age group of 31-40 years, which accounts for 42.1 percent of the total population visited abroad. It indicates that the Council had followed the policy of encouraging and promoting visits at younger age. Also the maximum visits from the Council had been for training purpose in all the service type and these visits have been across the continents covering the entire globe.

T3.14P


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Decision Support Systems (DSS) are defined as computer-based systems that integrate data sources with modeling and analytical tools to facilitate decision making under a variety of situations. The paper describes the designing of the framework for DSS for water management and crop planning utilizing mathematical and simulation models. The structure also includes special features for users with crop management knowledge. The developed system is capable of predicting climatic data for various time periods and estimating the water requirements of different crops during the season. The system carries out feasibility analysis and evaluation of alternative options in order to arrive at an optimum course of action. A user-friendly interface enables the lucid interaction with the system and visualization of the results for the users.

T3.15P

Online Agricultural Research Farm Management Information System (ARFMIS)

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Research farm management of I.A.R.I. is a complex procedure in which there are often contradicting demand which leads to complication and comes in the way of smooth functioning of research work of scientist and project leaders. Allocation of laborers, fertilizer, insecticides etc. is the main work of farm management. Project leaders give their indent one day in advance and the request is fulfilled subject to the availability of resources. But all the queries on the laborers, fertilizers etc. cannot be fulfilled at a particular point of time. The information on various aspects required for farm manager are kept in register or paper files from which it is very difficult to provide needed information quickly and plan for activities. Farm managers at the Research Institutes or State Agricultural Universities have to provide land and other resources to research workers who are conducting experiments in the field. Farm manager would require optimizing the resources available to him so that he is able to meet the requirements of all the research workers. Computer software of all these activities that need storing information on a farm will help the farm manager in this endeavor. Research workers may also need information on the activities carried out in the past on the field so as to plan their research programs and layout on the field. It is, therefore, desirable to develop an Agricultural Research Farm Management Information System (ARFMIS).
T3.16P
A Computer Software for Maintenance and Retrieval of Weather Information

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Weather information is an important part of agricultural and biological research. Increase or decrease in insect / pest population or disease incidence depends on various climatic factors as maximum temperature, minimum temperature, humidity, pan evaporation, vapor pressure, rainfall, sunshine hours, wind velocity and wind directions etc. All these different weather parameters recorded in observatory daily. Day to day maintenance and retrieval of these meteorological data for transmitting to various agencies and researcher becomes very difficult. We have developed PC- based software for maintaining and retrieval of meteorological data. The software also generates the different kind of weather report as required by the researcher and other agencies. Proper software engineering techniques and design is adopted for the development of this software. According to the requirement and utility of weather data , software is developed in different phases like-Data Entry phase, Data Editing phase, Data Retrieval phase, Query phase, Authentication phase and Help phase. This software is developed in front end tools as Microsoft Visual Basic 6.0 and back end tools as Microsoft Access 97. The software runs under Windows 95 or its later version. The minimum hardware required to execute this software is 80486 possessor and above, 16 MB RAM. User can generates various reports like, day to day , monthly mean, weekly mean, yearly mean meteorological data and general queries by using this software. The software is completely user friendly and menu driven and requires minimum key board inputs.

T3.17P
Providing Localized Package of Practices to Growers through Scientific Gateway using Information Technology

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Farmers in India face a battle for land productivity due to poor practices and increasing soil degradation. Some farmers battle these problems using Package of Practices (PoPs) for a particular crop. A great deal of research has typically gone in developing these practices at a National and State level, with some further localisation depending on the spread of good agricultural universities and KVKs (Agriculture Science Centres).

Though these Packages of Practices are very valuable for each state, they are effectively static in nature, providing broad guidelines on fertility, water and pest inputs for an often large region and rarely for individual varieties of a particular crop. These static PoPs (sPoPs) are a vital first source of information for management practices in the State, but we need to break these down to their constituent parts for evaluating them as per local conditions.

By assessing the local conditions prevalent where these sPoPs are applied, we can bring another dimension into the analysis allowing us to then begin to tailor them to the local environment. In this connection we are trying to build an iPoP (Integrated, Interactive, Individual) based on a farmers specific local soil, climate and inputs history etc using
statistical tools to manage multiple variables across a wide number of crops. Further we will upgrade these models through statistical evaluation in an ongoing basis.

**T3.18P**

*Application of Differential Global Positioning System, Laser Surveying System and Handheld Computers in Precision Agriculture in a Watershed*

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Precision agriculture plays an important role in enhancing crop productivity by improving input use efficiency in sustainable production system. The importance of emerging tools of information technology namely differential global positioning system, laser surveying system and handheld computers is paramount in agricultural research in general and precision agriculture in particular. These tools are successfully employed for developing natural resources inventories and its management, development and updating of cadastral map, preparation of thematic maps under participatory geographical information system etc. In this paper, an attempt has been made to critically review and demonstrate the application of these emerging tools of information technology in precision agriculture considering watershed as a unit for collection of attribute and spatial data. It is concluded that such information can be used for developing relationship and testing of scientific hypothesis concerning crop productivity to biophysical and socioeconomic factors considering plot-level crop productivity data.

**T3.19P**

*Cropping Systems Analysis of Indo-Gangetic Plains of India Using Remote Sensing and GIS*

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Cropping system refers to an arrangement of crops in temporal and spatial dimensions on a given piece of land and their interactions with farm resources and available technologies. It is highly site-specific and in stricter sense, varies from farm to farm. But in broader sense, cropping systems of a region are decided by and large by a number of soil and climatic parameters which determine overall agro-ecological setting for nourishment and appropriateness of a crop or set of crops for cultivation. Under influence of all above factors, cropping systems remain dynamic in time and space, making it difficult to precisely determine their spread using conventional methods. Information on existing cropping system is vital for supporting agronomic management decisions like substitution of an existing inefficient cropping system with new improved cropping system by introduction of new crops. The present paper deals with the integrated use of remote sensing and GIS in cropping systems analysis of Indo-Gangetic Plain (IGP) of India. In this paper, five major cropping systems of the region based on area have been identified and different resources have been characterized.

**T3.20P**

*User Profile for OLAP Operations*
A need for user-centered access paradigm has gained attention in the area of information systems. We extend this paradigm to a data warehouse. In this work we incorporate preferences of a user in terms of dimensions, members, conditions on these as well as measures of a data warehouse. Preferences are stored in user profiles. At query time, user profiles are used at two stages: (a) in determining the part of the data warehouse that the user can view and (b) preference integration into the original OLAP query. A GUI interface is developed which helps in defining and updating user profile. This stored user profile is subsequently integrated into the query before executing it.

T3.21P
**Decision Support System for Streamlining Infrastructural Facilities in Indian Agricultural Education**

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In general, Infrastructure is a set of interconnected structural elements that provide the framework supporting an entire structure. Unfortunately in agriculture education system in India, there is a lot of imbalance among different Agricultural Institutions with regard to existing infrastructure. Therefore, for a quality education in agriculture, there is an utmost need of streamlining infrastructure in Agriculture Education System. In this regard, National Statistical Commission (NSC) and the Department of Secondary & Higher Education of the Ministry of Human Resource Development, Government of India emphasized the need of a national information system on agricultural education for various policy and planning purposes in the country.

The project “National Information System on Agricultural Education Network in India (NISAGENet)” is an endeavor to develop a unified information base for collection, compilation and analysis of information about the activities of the agricultural education system in India. The NISAGENet will provide the information of existing Infrastructural facilities in the Institutions basically engaged in providing agricultural education in the country.

T3.22P
**Indian Information System as per DUS Guidelines (IINDUS) for the Protection of Plant Varieties and Farmers’ Rights Authority**

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General Agreement on Tariffs and Trade (GATT) negotiations in Uruguay Round (1984-1994) led to the establishment of World Trade Organization (WTO) in January 1995, of which India is a signatory. Having ratified the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPs), the Government of India decided to give effect to the
clause 27.3b of World Trade Agreement in Agriculture and enacted the legislation "Protection of Plant Varieties and Farmers' Right Act 2001" (53 of2001). The Rules of the Act were notified on 12th September, 2003 and an Authority known as "Plant Varieties and Farmers' Right Authority" was established by the notification in the Official Gazette (No. 1183 dated 11 November 2005). Under the Act the government of India has decided to implement plant variety protection regimes which seek to provide protection to plant breeders and to farmers. Thus, the Indian plant varieties protection regime introduces both plant breeders' (PBRs) and farmers rights.

The purpose of the PPV&FRA is to “provide and promote an effective system for Plant variety protection for India with the aim of encouraging the development of new varieties of plants for the benefit of Society.

Any new variety before registration must conform to the criteria of Distinctness, Uniformity and Stability (DUS) in suitable tests before it is eligible for protection. The Department of Agriculture and Co-operation, Ministry of Agriculture has entrusted NBGPR with the “Development and Digitalization of Extant –Notified Plant Varieties” activity. Under this activity, a software “IINDUS” (Indian Information System as per DUS Guidelines) for the documentation of the Extant notified varieties in accordance with the guidelines developed for various crops has been developed by using vb.net and Oracle relation database. The system is available on the web address http://www.nbpgr.ernet.in/nbpgr/index.aspx.

The software IINDUS has been tested by all the DUS Centres located in various ICAR Institutes and Universities. The complete data of extant and notified varieties which has been grown by DUS centres about 40) in India as per the guidelines fixed for various crops by the PPV&FRA is being documented through this software. The IINDUS shall help the PPV&FRA in identifying the reference varieties to be grown with any new variety/ies (as a candidate) which shall be submitted for registration. The system shall be linked with the other information systems being developed for the management of the PPV&FRA activities like National Plant Variety Register, DNA Fingerprinting & Molecular Biology information system, Digital Herbarium, Gene Bank information including Bar Coding and Online e – journal.

T3.23P
Knowledge Management through National Information Sharing Mechanism for Plant Genetic Resources

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The Global Plan of Action (GPA) for conservation and sustainable utilization of Plant Genetic Resources for Food and Agriculture (PGRFA) is an Food and Agriculture Organization (FAO) initiative, signed by 150 countries at Leipzig, Germany in 1996. It was adopted after serious concerns were raised about the loss of intra- and inter-specific diversity in crop plants important for world food security. It recognizes the interdependence of countries with respect to genetic resources for development of new crops varieties and brining in new plants into agriculture. A lot of germplasm has been conserved ex situ, but it is not being utilized to its maximum potential for lack of characterization data. The GPA is a framework of activities encompassing development of in situ conservation of PGRFA, sustaining existing collections, enhancing utilization and increasing capacity of countries
regarding education, public awareness and training on these aspects. FAO has also developed a monitoring process of implementation of GPA in different countries through a mechanism called National Information Sharing Mechanism (NISM) for monitoring the implementation of GPA.

For monitoring this activity by using NISM, all activities which were coordinated by the National Bureau of Plant Genetic Resources (NBPG) by dividing three distinct phases: (i) a preparatory phase, (ii) an implementation phase and (iii) a conclusion/reporting phase.

During the preparatory phase, work was focused on reviewing all materials, briefing and raising awareness of authorities and getting necessary permissions to undertake a collaborative information sharing process that includes the national PGR programme, the private sector, NGOs’ and other public sector organizations and cross-ministerial collaboration. A committee of key stakeholders was formed to guide the GPA monitoring process and the Country Report preparation, and to identify stakeholders to be involved into this process. A total of 114 stakeholders were identified during the preparatory phase.

During the implementation phase a number of meetings and workshop were held to explain the process and build capacity of stakeholders in the use of the computer application for gathering information. Direct technical assistance to stakeholders was also provided during this phase.

During the conclusion/reporting phase, data gathered from stakeholders were analyzed and two reports were produced and discussed with participating stakeholders. A web site for describing the Mechanism and including a database search engine was developed and made available to the users. Compact discs including the complete database of the Mechanism were produced and distributed to the stakeholders involved in the process.

This paper gives details the implementation of this mechanism in India and its outcome which can be a good case study for the knowledge management through computers. The efforts of India in this direction have been greatly appreciated by the Chief Technical Advisor, FAO Regional Office, Bangkok.

T3.24P

Classifying Forest Cover Type using Approximate Core

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Classification is an important research topic in the field of data mining and knowledge discovery. There have been many data classification methods including decision tree methods, statistical methods, neural networks, rough sets, etc. A reduct in rough set theory refers to the dominant attributes in a dataset. A dataset may have zero, one or multiple reducts. A classification problem utilizing information contained in a single reduct is well examined in rough set literature. However it means ignoring the available knowledge from the multiple reducts. Approximate core is proposed as an important tool to deal with the dataset having multiple reducts. In this paper, Forest cover type, a large benchmarking dataset having multiple reducts is used for experiments. The performance parameters - accuracy, complexity, number of rules and number of attributes in the resulting classifiers
are compared among various algorithms employed. The results using approximate core are comparable with the other published results for this dataset.

**T3.25P**

**Present Scenario and Future Prospects of Poultry Informatics in India**

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Pilot studies on Poultry informatics were initiated through collection of first hand information on the current status of poultry industry in India, developmental activities being undertaken in various states and about research endeavors, to pave way for instant retrieval of information and necessary decision making. A decline in the growth of poultry industry was recorded during the decade of nineties (5.89%) as compared to that in seventies (35.29%). Majority (23%) of the surveyed units wanted stabilized marketing systems whereas, 21.55% of them advocated for regular knowledge of modern technologies. Information from Directors of Animal Husbandry Departments revealed that Punjab, Karnataka, West Bengal and Gujarat could be front-runners of future poultry production among the responding states. Preliminary work on research informatics at CARI indicated the possibility of instant retrieval of database for better planning and management of research programmes. Intensive work on poultry informatics could be expected to provide impetus to the poultry production activities.

**T3.26P**

**Academic Information System for Agricultural Education in India**

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An academic information system for agricultural universities of India, capable of providing relevant information to the users of any level such as an academician, a student, a researcher or a policymaker, has been the need of the day. In the era of advanced information technology, an interactive and quick system is strongly needed which can provide the detailed information about the availability of an educational institute according to the user’s specific criteria. Especially the students, having an interest to join an agricultural university, were finding it hard to get the information about these universities. Therefore, an information system is presented here, which has a detailed information base containing detailed communication information (locality details) of universities, its faculties, departments and colleges. It also has information about the various levels of courses running at universities and their colleges, admission procedures for these courses, fee requirements, category-wise reservation details etc. Also, it would be able to show the placement details and students already placed in India and abroad. National Statistical Commission (NSC) and Department of Secondary & Higher Education of the Ministry of Human Resource Development, Government of India have indicated the need of such information system which can make available a report on the educational institutions classified by the management type, by area (rural or urban), by type of institutions (general, professional, technical or others), by category, by level of education and by type of education. The National Information System on Agricultural Education Network in India (NISAGENET), being developed and implemented at IASRI, New Delhi would be capable to meet the academic requirements.
T3.27P

A Framework for Fast Web Download

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One of the most dissatisfying web experiences is the slow download time of web pages which makes it unattractive and hence loss interest by the users and bogs down internet bandwidth. Although there are many factors responsible for this, we have discussed here the issues of content size on web pages. A framework has been presented for reducing the web contents from Web Designer viewpoint. Further, an application of the same has been demonstrated by developing a web site for IISR, Lucknow for dissemination of its research work and technologies related to sugarcane crop.

T3.28P

File Monitoring System of Sugarcane Research

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The present study is an attempt to design and develop File Monitoring System (FMS) to record and monitor the movement of research and establishment files (Research Projects, Field Experiments, Publication status, etc) related to sugarcane research of Indian Institute of Sugarcane Research. Monitoring such activities will make transparency in research work environment and timely disposal of assigned Sugarcane research and administrative activities. Proper software engineering practices, the standard architecture and design has been adopted for the development and implementation of the software. The relational approach and normalization theory has helped in enforcing security and organizational standards. The FMS solution would allow the organizations to maintain file movement information at central location, which can be used by the authorized persons in a decentralized fashion. Software has been developed keeping in mind the existing Desktop environment, thus FMS can be implemented in Microsoft Windows based environment.

T3.29P

An Object-Oriented Based Application Software for Analysis of Survey Data

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Estimation of the statistical parameters for the given population of interest using various sampling schemes play a vital role when the survey results are very close to the real situation. There are various sampling schemes available such as Simple Random, Stratified, Cluster, Stratified Cluster, Two-stage sampling etc. and each have its own methods of data collection and estimations of parameters. The parameters and their variances are estimated based on the respective sampling designs. This paper describes an object oriented approach using .NET framework with C# programming language for estimation of parameters of interest. In this approach reusable class libraries have been developed for each of these sampling designs, which are available in the form of subsystem functions called class methods. These libraries
contain methods for equal and unequal probabilities as well as with and without replacement available under most of the sampling scheme. These ready to use libraries can be utilized in other applications as well where sampling designs of these kinds are used as they are available in the form of dynamic link libraries (.dll). These dlls can be called just by including their reference in the software projects and passing the required parameters. These reusable libraries can be highly useful for programmers and statisticians who are involved in statistical software development.

T3.30P

Knowledge Management through Expert System in Agriculture

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Agriculture has emerged as a multidisciplinary complex science involving a number of crops and technology. Every crop has its own physiology and needs a specific environment and technology for its proper growth. A lot of information is generated by the scientists involved in Agricultural research which is not properly organized.

Knowledge Management is a conscious strategy of getting and extending the right knowledge to the right people at the right time; turning information into action to improve performance of Professionals. Agricultural institutions should apply modern IT based tools to the develop Information Systems, Decision Support systems and Expert Systems for Knowledge management.

“Expert System on wheat crop management” is an integrated system which addresses all aspects of wheat crop management in India. This system is subdivided into four modules Variety selection module, Plant protection module, Cultural practices and Harvesting technology. The system has a data management module that manages the knowledge base of the expert system. It takes information from the experts, updates it, creates and updates rule for all the modules of the expert system. This is an excellent and unique example of knowledge management by an agriculture based expert system.

T3.31P

An Age based Platform for Manpower Management in ICAR

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Manpower management is an important activity performed by Human Resource managers. It’s a crucial task for an organization and can be influenced by many factors. Age is one such factor, based on which several important decisions can be taken. Using data from the Personnel Management Information System Network for ICAR (PERMISnet), this paper reviews the data collected on various professional parameters of personnel on the Age
platform. Then it tries to provide some important results and trends related to activities performed by scientific personnel in these age groups. In this study all the ICAR personnel have been categorized under four age groups. Under these age groups, information has been compiled for personnel under three service categories in different subject matter divisions (SMD’s). The average age of female and their male counterparts has been depicted for each service category. The status of scientific personnel in Research Projects as Project Investigator, Co Principal Investigator and Associate has been studied under different age groups under the SMD’s and a general trend has been depicted. A comparative study has been done on the number of publications published by personnel under different scientific categories and age groups and presented using Bar-diagram. An analysis of data has also been done to exploit the ratio between numbers of trainings organized by personnel under different scientific categories and different age groups. The ratio depicts that young scientific personnel are taking more initiatives in organizing the training programmes as course coordinator. All the results have been presented using tables or charts and most of the results envisaged that the young generation though less in number, is coming forward and taking initiatives in almost all scientific activities.

T3.32P

An Information System on Long Term Fertilizer Experiments in India

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In the last few decades the country has made impressive progress in food production which is one of the most vital sectors of Indian economy. This has been possible due to the research undertaken by different research institutes under ICAR set up and State Agricultural Universities. Consequent to the green revolution in India fertilizer use was becoming a key factor for increasing agricultural production. So, fertilizer use and consumption in agriculture was increasing rapidly, thus a need was felt for studying the impact of fertilizers not only on crop yields and quality but also on soil and environment under input intensive cropping system. A large number of long term fertilizer experiments (LTFE) on various Food, Horticulture and Commercial Crops are being conducted at different ICAR Institutes and various SAU’s. Usually the information generated from these experiments is not available in compatible form at one place to the scientific community working in National Agricultural Research System (NARS). Also planners/ Research workers may be interested in this information because this will help them in planning/conducting the future long term experiments.

Keeping the importance of this information in view, a web based information system entitled “National Information System on Long Term Fertilizer Experiments (NISLTFE)” has been developed and installed at IASRI domain http://www.iasri.res.in:8081/nisltfe/.

NISLTFE would generate information for various policy decisions in the context of achieving higher productivity and maintaining sustainability under modern intensive cropping system based on high external inputs of fertilizers, agro-chemicals and high yielding cultivars under irrigated/ rained conditions etc. Moreover, this information will be helpful in carrying out the mid-course modifications, without affecting the long term continuity and integrity of the ongoing experiments for studying the new emerging research problems therein.
This paper will focus on the variety of information provided by NISLTFE in the form of online reports. Emphasis will be there on parameters, such as crop, statistical design used, agro-ecosystem, weather, characters, mid course modifications and the field layout for the Long Term Fertilizer Experiments. Emphasis will also be there on the methodology provided by the system to analyze the reports data online.

**T3.33P**

**Rough Set Based Cluster Analysis for Soybean Disease Diagnosis**

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Clustering algorithms partition the data set into group of similar objects called clusters. Description of clusters is not generated by the usual clustering algorithms. In the proposed approach reducts from the rough set theory is employed for feature selection and description of clusters. The proposed multi stage approach of cluster description involves (1) data preprocessing using rough set theory, (2) cluster formation via clustering algorithm and (3) cluster description employing rough set theory. Soybean disease, data set from agricultural domain, is taken up for the case study. Results obtained by using the proposed approach showed the removal of 14 irrelevant features out of total 35 features prior to application of standard clustering algorithm. Further, the proposed method also helped in enhancing the interpretability of clusters obtained in terms of the characteristics of soybean diseases.

**T3.34P**

**Multi Agent System for Farmers: An Approach using Temporal Ontologies**

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Knowledge based personalized systems, which can recommend suitable practices, based on the basic needs and resources of the farmers are needed for sustainable crop production. In this paper, we present a multi agent system to assist farmers in solving the problems related to crop production. Seeing the potential of ontologies, we believe that ontologies will be build and maintained in agriculture knowledge domains for the semantic web and future applications. The presented system uses temporal ontologies that absorb the effect of the dynamic nature of domains and the changes in ontologies in addition to their other benefits. The presented multi agent system simulates the existing research and extension system in terms of agents and has different domain agents such as Farmer Agent, Extension Agent, Pathologist Agent, Entomologist Agent, Agronomist Agent Horticulturist Agent, and Economics Agent. The presented system can be scaled up by adding more domain agents specialized in different fields of agriculture for different crops.

**T3.35P**

**Task Allocation Distributed Computing VS Distributed Database Systems: A Comparative Study**
Task allocation in Distributed computing systems (DCS) is an important research problem. When resource to be shared in DCS is a database that system is classified as Distributed database system (DDBS). Here it is explained along with model of allocation and development of such a model in general. Related work done and issues in this research field are explained in detail... Characteristics of task allocation in DDBS problem are mentioned. In these systems Data & operation allocation are both closely interrelated and highly dependent on each other. Procedural steps in task allocation in DDBs are given along with the current issues in this recent research area. A general development of cost model used in this area is given. General models and objective function explained in this paper can be treated as basic platform for research in this area and depending upon the concerned research area, issues, and application the modification can be introduced. An objective function can be derived by modifying the terms present in it which in turn depend on characteristics of the system concerned ex. Distributed computing system, distributed database system, parallel system & multiprocessors etc.

T3.36P

**Rapeseed-Mustard (Area, Production, Yield) Information System**

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The computer technology can provide innovative services in almost every human activity provided one has the capability to use them properly according to their need. Information technologies have long been viewed as having great potential for improving decision making in agriculture. As data are the rich source of information for the interpreters (managers, researchers, educationist, etc.), systematic recording of data in agriculture greatly increases the amount of information that can be extracted regarding knowledge of crop potential. The overall aim to develop computer based information system “R&M (A, P, Y) Information System” is to facilitate decision makers (researcher, planners, etc) to know the potential and possibilities for rapeseed-mustard crop in terms of area, production and yield in world and different region of India. Although data of area, production and yield of rapeseed-mustard is exist in different forms and places, they need to be assembled and documented properly for making the information user-friendly. The software has been developed using windowing environment and thus provides enough facilities to update and present data easily and conveniently. The program has been developed specifically for the rapeseed-mustard but the concept could also apply to develop production information system to other crops, and the program would serve as prototype in developing the production information system for other crop commodities.

T3.37P

**Development of Software for Imputation using Back Propagation Neural Networks**

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In any survey or census, data are often collected on various characteristics of interest from a target population, wherein non-responses/ inconsistencies are very common. Various approaches exist for imputation of item non-response such as mean, random, regression, hot-deck etc. Imputation is the substitution of optimum value for a missing data point or a missing component of a data point. A possible and perhaps better alternative method of imputing item non-response is to use artificial neural networks (ANNs). In ANNs, input and output values of complete events are used to train a model to respond similar to the behavior revealed in the data. In this study, an attempt has been made to employ neural networks for imputation based on multi-layer perceptron architecture, trained using back propagation algorithm. The system is developed in Java open source platform independent technology. The Graphical User Interface (GUI) has been developed in Java Swing Package. The parameters of the training algorithm such as momentum, learning rate etc. can be customized by user.

T3.38P
Cost Effective Solution to Bridge Digital Divide for Rural Development in India

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In India, the farming is diversified in nature. The packages and practices for a particular agricultural commodity of one agro-climatic region may not be effective for other regions. To attain efficiency, profitability, environmental quality concerns and sustainability in rural agriculture, region-specific localized software systems like information systems/expert systems/decision support systems must be made available, which can cater the specific needs of the farmers precisely.

Information and communication technologies (ICTs) are widely recognized as tools contributing to the economy of developing countries. However, in terms of being well equipped to make informed decisions on ICT architecture and choice of platform, developing countries are lagging behind, and are therefore still unable to harness the full potential of these tools in the eradication of poverty. This knowledge arrear contributes to incompatible information systems, expensive and ineffective maintenance of ICT infrastructures and resource-draining software licenses.

Open source software is available to anyone (usually at little or no cost), it does not require license fees and it may be freely re-distributed. Open source software technology is at par or better than commercial software. Everything that is needed to develop a robust data-driven web enabled information system is available in public domain with its source code.

The cost incurred in establishment of site-specific village level information kiosks using the open source software will be mostly on hardware components whereas softwares are mostly available free of cost in public domain. Thus, could be a cost effective solution for filling the gap of digital divide in rural population of India.