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Use of Software Agents for Handling Information Overflow in Village Administration

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Abstract: This paper proposes the use of Software Agents to control the information overflow in village Administration. It will work like a filtering agent which will filter the useful information for a particular village. Successful implementation of such agents can be very useful in bringing e-governance to real life. Many a times, information provided by the Government to village administration, in the form of policies and plans, is very generic. And concerned human beings have to go through large number of long documents to realize that this information is not relevant to them or their village. This results in a lot of wastage of time and efforts. Also while going through not so useful policies and plans, administration can miss some important or useful information. A Software Agent can compare the documents with some specific needs and details of village and will filter only those policies and plans which can be beneficial to that village. For this an exhaustive database of attributes is to be prepared which will specify the needs of a village and will be a virtual existence of same. Additional, two Software Agents can be programmed, one for information gathering and other for information filtering.

Keywords: Software Agent, ICT, Village Administration, Information Overflow, Social Filtering.

1. INTRODUCTION

In India there is very wide scope to implement automated systems in governance. Such systems can reduce work and save time. India being a country with large population, use of Agent based application has a wide scope. Agents can be significantly used to reduce the human work. For this an application needs repetitive behaviour which is important for a consistent situation-action pattern for agent to learn (1). And in a large country like India any application will get this advantage.

We are focusing here on type of software agent which can decrease the burden on government whether it is on local, state or national level. Proposed agent based system is capable to filter the information for a particular village, based upon some pre-defined parameters.

2. RELATED WORK

Modern application designing is focused towards the development of systems which are able to act in a manner which serves its users' interest to the maximum possible extent, which can work on behalf of its human user. So

much work has already been done in the field of agents. Here are few concepts related to software agents which are inspiration behind the idea of proposed system.

Agents are the systems with a view “When given a goal, could carry out the details of the appropriate computer operations and could ask for and receive advice, offered in human terms, when it was stuck. An agent would be a ‘soft robot’ living and doing its business within the computer’s world.” (2).

Such systems, apart from being intelligent should also include good user interface. Hence the designer has to insert the capabilities of story generation and character representation in an impressive way. This is very much important to understand the overall behaviour of an agent (4).

It is also very important that the agent should work exactly as per the real life model. Then only user will feel it comfortable to use software agents. It should suits to the belief, expectations and predictions of the user. More degree of such feature we will succeed in implementing, more usable our agent will become (5).

If we expect an agent to be useful to its best capabilities for its user, delegation is must. As per Nicholas Negroponte (1997), a long time champion of agent technology, “The best metaphor I can conceive of for a human-computer interface is that of a well-trained English butler. The “agent” answers the phone, recognizes the callers, disturbs you when appropriate, and may even tell a white lie on your behalf. The same agent is well trained in timing... and respectful of idiosyncrasies. People who know the butler enjoy considerable advantage over a total stranger. That is just fine.” (6).

Usability of agents is also affected by the translation distance from what user knows or thinks to what system accepts. Hence, the acceptance of inputs and representations of output should be as close to problem domain as much possible.

To assure a comfortable agent-human interaction we have to consider certain important issues like control over the activities performed by the agents, balance between expectations and actual performance of agent, safety and privacy etc. These issues are of major concern for a user if compared with ease or usability (7).

Completeness is another feature of a useful software agent system. It defines some important attributes of a system such as visibility in user interface, creating an illusion to be aware and intentioned, and capable to demonstrate sufficient social and interactive behaviour towards the user (8).

3. REAL LIFE ISSUES AND MOTIVATION

Software Agents facilitate different behaviour for different users (1). This feature suits to our application as we want to create an application where Agent should behave differently according to the needs of a particular village.

- **Database Maintenance:** It is very difficult to maintain record of all the villages, their requirements and challenges and further sorting policies and plans accordingly. Also, using this information for desired purposes is almost impossible because every village has its different features.
- **Time consuming:** A panchayat chief and his team are responsible for frequent communication, decision making on communicated information and practical execution. It is a time consuming process to go through long documents only to find that it is not applicable for their particular village.
- **Information overflow Problem:** So much information flows. Ignoring useless information and utilizing useful information needs too much study and decision making. Hence it is a case of information overflow.

- **Low literacy rate of panchayat members:** In villages many a times people are not very literate. They are not good at reading documents and analysing them and filter information out of them. Proposed system can remove this inequality.

4. RESPONSIBILITIES OF VILLAGE ADMINISTRATION

Panchayati Raj Department is an important department related to the rural development. The main objective of this department is to strengthen the Panchayati Raj System, so that panchayats can realize the dream of rural administration and rural development with complete coordination and transparency. For this purpose the department has provided a Citizen Charter. For the sake of public convenience and knowledge, this charter has been divided into 7 subjects: - (10)

1. Financial aid to Gram Panchayats.
2. Rural Cleanliness Programmes.
3. Responsibilities of the Panchayats- (Transparency in work, rural administration & development).
4. Responsibilities of public towards Panchayat.
5. Decentralization Programme.
6. Control over the Gram Panchayats
7. Arrangement of Panchayat Help-line.

5. AGENT FUNCTIONALITY

Village administration has many responsibilities to perform simultaneously which includes a lot of field work for all the active members. To remain up-to-date about important facilities is an additional responsibility which they have to accept. But as per above discussed issues, it may become challenging if done manually. So we need an automated system which can share some load of work efficiently and effectively. Here is the overview of proposed system:

- First software agent receives the notification from the source that a new policy or plan has been added.
- Software Agent will perform a preliminary comparison on received information to determine if this information is suitable for that particular state, region concern* or some specific benefit or compensation.
- Depending upon this selection now Agent will perform another comparison to check if the policy or plan meet particular criteria of that village and will be useful for specific needs of that village. E.g. If policy is about education and for villages where school going children's population is more than 1000.
- If that policy is useful for our village then software Agent will extract that information and notify to concerned user.

6. POTENTIAL ISSUES

Implementing such system is also not very easy. For any successful system the environment should be appropriate. Hence some environmental and infrastructural changes must be done. Major issues which can become challenging for the working of proposed system are as follows:

- Large search space
- Exhaustive village specific attributes' list and information

- Social filtering will be challenging among villages with similar criteria
- Software agent would need specialized skills and knowledge in various area like communication technology, knowledge representation agent, communication languages and protocols
- How task are scheduled and how synchronization of task is achieved
- How all tasks are prioritized by our software agent
- How software agent can collaborate and recruit resources
- Software agent used its access methods to go out into the local and remote databases of information sources to fetch data.

7. CASE STUDIES

To understand the problem area more clearly here are two case studies which show the actual situation where proposed system can be helpful.

Case Study 1: It is an example of village Nidholi Klan Block of the district Etah. It has a total population around of 4000 people and its located 26 kilometres from Etah city. The geographical area of this Village administration is 3000 hectares.

Unemployment issue, health issue, Agriculture issue, Education issue are the need of the Village administration. The daily wages ranges of the Village administration Rs 150 to Rs 200. The Village administration has only 1 private and 1 government School and 1 government hospital. The Village administration source point (block of Village administration) is located 8 kilometres from Village administration.

There are around 25 hand pumps in all Village administration. The maintenance of all these hand pumps was the major challenge. The Village administration had not hired a regular mechanic for repairing the pumps. The Block of Village administration is having a new scheme related to water Supply. It was announced on the Government Website. Under this scheme, government was providing a mechanic to every Village administration But the Village administration was not aware about that new policy. It was very much needed for the Village administration.

The sarpanch who was newly elected did not communicate well with the Village administration source point (Block of Village administration). He was not aware of the rules and regulation of the Village administration including its functions. At the end of duration of that policy the president got to know about that policy from the neighbouring Village administration

Case Study 2: The Next Village administration is in Jashrana Block of the district Firozabad. It has a total population around of 6000 people and its located 20 kilometres from Firozabad city. The geographical area of this Village administration is 3500 hectares.

There are 10 wards in the Village administration all belong to General and Schedule Caste. Unemployment issue, health issue, Agriculture issue, Education issue are the need of the Village administration.

Last year because of the heavy rain all the wheat crop were destroyed. The total area of the Village administration approximate 1/3 was affected badly. Because some farmers who have their fields near the river were very much affected.

Government announced the subsidy for the farmer who was affected by the Rain. Government was gave responsibility to Block Panchayat (Source point of Village administration) to list out all farmers whose crops was destroyed. Block of Village administration announced that same on their Block of Village administration website with time duration.

At the end of the duration of the policy, the president of the Village administration gets to know about the Policy and all farmers not got the subsidy because of the president didn't aware about of the policy. Because she was not daily check the website of the Block of Village administration and also didn't know about all the rules and regulation and all the functions of all the Block of Village administration.

8. HOW SOFTWARE AGENT CAN OVERCOME THESE PROBLEMS

- Software agent work like an assistant. President of Village administration work as a user., who adds all the needs of his village.
- Agent system is connected to the information sources Village administration and received the notification about new policies. Our Software agent check that policies. Which type of policies it is?
- Then software agent finds concern of that policy like agriculture, education, women empowerment etc.
- Software agent check if these policies are suitable to a village or not. If found suitable then fetch all the rules and regulation related to that policy.
- If in case that policy is not suitable to a village in that case our Software agent will eliminate that village from list.

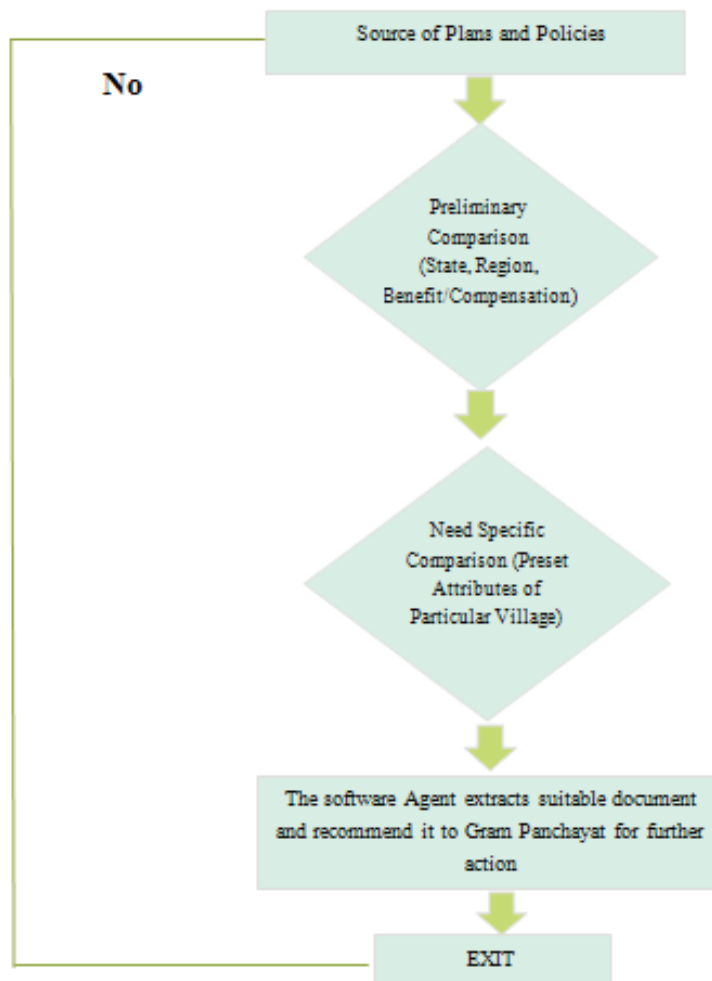


Figure 1: Purposed working of Agent Based System

9. PURPOSED SOFTWARE AGENTS

Purposed system is made up of two software agent:

1. Information Gathering software Agent
2. Information filtering software Agent

9.1. Working Of Information Gathering Agent

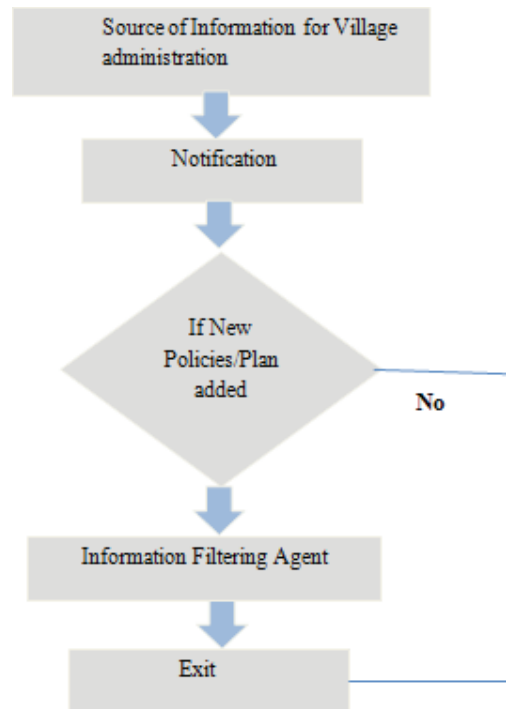


Figure 2: Information Gathering Agent Working

9.2. Information Gathering Agent Functionality

Software agents can provide expertise on a specific topic by drawing upon other information agents and data repositories “An existing database or program can be turned into a simple information agent by building the appropriate interface code, called a wrapper that will allow it to conform to the conventions of the (particular agent) organization... (Such an) approach greatly simplifies the individual agents since they need to handle only one underlying language. This arrangement makes it possible to scale the network into many agents with access to many different types of information sources.” Agents that answer queries but do not originate them are referred to as data repositories (9).

Information Agent is responsible to track any new changes in repository. Whenever a new policy, plan or announcement is added to the database, this Agent will notify that some new information has been added. Then this agent will extract that new document and will provide this information to filtering Agent.

9.3. Limitation of Information Gathering Agent

- Prerequisite for this Agent is that all the documents in repository have to be prepared using a predefined format so that attributes can be easily read and compared.

- This agent will be fetching details for recent dates only.
- Agent's search area will be only sites which we have predefined.
- Attribute selection and later Updation of attributes as well as their values need to be maintained very accurately.

9.4. Information Filtering Agent Functionality

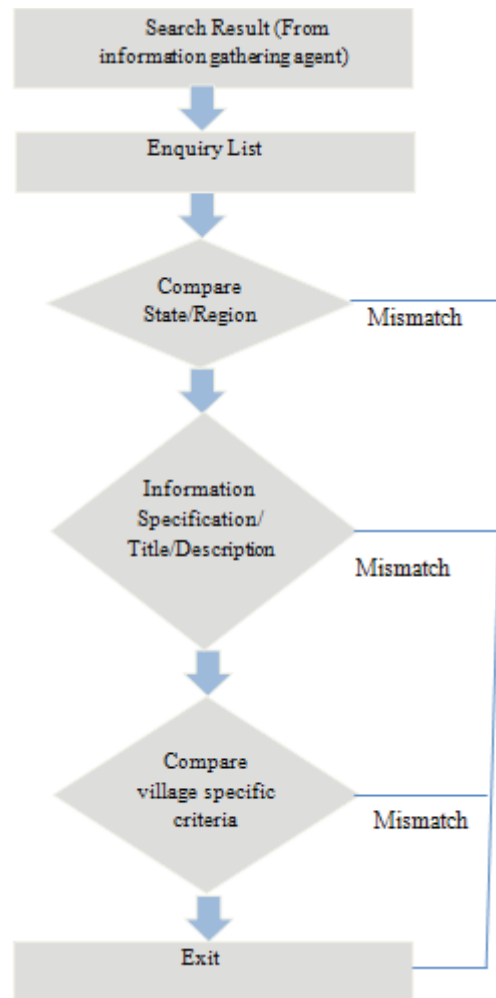


Figure 3: Information Filtering Agent

9.5. Information Filtering Agent Functionality

Information Filtering Agent plays main work for Village administration.

- Filtering Agent takes search results from the Information Gathering Agent.
- Analyse that document and search the enquiry list according to our requirements and match the policies.
- Check the document whether it is for our state/region or not. If yes then check further Information.

- After check all the necessary Information our filtering Agent filter the further Information according to title, description and specified criteria.
- Now agent checks what the concern of policy is. i.e. whether it is for Education, Welfare, and Agriculture etc. And if that is concern of my village?
- Then agent will search if that policy covers the specified criteria of my village.
- If that new policy does not match any of the queries, then that document will not be suggested to the user.

For Example:

1. If a plan is launched for north eastern state then its applicability will be checked in first comparison only and agent will not go for further checks.
2. If there is a plan for making bridge over rivers. If there is no river near the village then obvious this plan is not suitable.
3. If there is a plan like renovation of secondary schools in villages with students' strength more than 500. In this situation first check can be applied to see if there is a secondary school in village and secondly if the specified criteria of 500 students is satisfied or not.

10. CHALLENGES

Though after proper implementation this system will prove to be very useful for concerned area but we have to be very careful towards the design of such system. Designing an agent is far different than designing an application. We have to take care that agent should not overlap the role of humans in this application. Agents should not solve all/complex problems by themselves. Instead a boundary is to be defined to determine what the agent will do and what the users will do. We need not make agents perform things which human can easily perform instead agent should facilitate easy access to the information for users. (2)

11. CONCLUSION

We are trying to utilize this programming technique to solve a real life problem. Use of software agents in this area will be more useful because every village has its specific need and a generic application cannot be as helpful as a software agent can be. Initially we can prepare a basic model and later we can fill it with village specific details. This agent will work like a personal assistant to the specific village it is deployed in. Software agents can be trained according to the specific needs and will provide concrete and reliable results. Instead of manual filtering, agent based filtering will be less time consuming and will produce more specific information. As a result of this application, village administration can focus on focus on related information and more on execution part of the policies and plans. The things where human intervention is not required should be automated so that humans can perform jobs where software cannot provide very realistic results.

12. FUTURE SCOPE

Agent oriented programming is the emerging programming methodology. The software agent introduced in this paper provides an artificial intelligence research. Typically, we describe about a new area of application for expressing the preferences. Aggregation will initially be studied at the shallow levels. After which research will gradually move to in future at the deeper levels.

This paper will prove a great help to the village administration to manage the information provided to them. It saves time and let the user focus on what is concerned to them. For example, it will fetch all the information and filter the information according to the need of a village. In future most research focused on the Search domain. Search all the related information for Village administration or Villages.

In future, we can also think to implement the concept of social filtering (1) agents which pour the capability to collect data from other villages with specified similarities.

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