Intelligent Personal Agent

Abdoali Bhinderwala
Computer, MHSSCOE.
704, building no.30,harsh vihar,sector 1,shanti nagar,mirar oad(east)

Nitin Shukla
Computer, MHSSCOE.
A102, Krishna deep, sai baba nagar,navghar road,bhayander(east).

Vivek Cherarajan
Computer, MHSSCOE.
Room no1637/4,wandrapada, gautham nagar,ambarnath(west).

ABSTRACT
A busy worker requires a personal assistant to help them in managing the overall workload. Since artificial agent can give a better and dynamic solution. The project is all about an Intelligent Personal agent (IPA) that will guide the busy worker in doing his daily work by suggesting which task is more important, and when to perform it. It divides the user's task in two categories Professional and Personal and accordingly assists him in achieving it. Most of the times user give less importance to professional activities and due to increase in the workload user even forget to complete the personal task. For e.g. Payment of home bills. Today's world is so busy that they need someone to do their work on behalf of them. The purpose of the agent is to help the user in his professional work simultaneously achieving the personal task also. Agent's reasoning and planning capability reveals its intelligent behavior. The learning capability of agent allows it to improve its performance by previous experiences. Thus the overall agent design guides the user in terms of managing, reasoning, planning, learning and improving its performance to user preference

General Terms
Artificial Intelligence used to develop a personal agent with intelligent behavior.

Keywords
Intelligent personal agent, assistive agent, autonomous software, artificial intelligence.

1. INTRODUCTION
The technologies are improving in such a way that, human assistance is not enough. Humans need a better assistance for managing thing in a busy environment. One such application is the Intelligent Personal Agent that is used for assisting a user in his professional as well as in his personal work. This agent can provide assistance to all kind of user but consider a busy user to illustrate the behavior of this agent. The main motto is reducing the user's work in doing any particular task [3]. It reduces the increasing load of information, manages task by considering its deadlines to be considered.

The IPA can perform task in three ways performing the task directly on behalf of the user, performing a task along with the user by taking instructions from the user and finally perform task at back end by providing suggestion and reminders to user work [3]. Thus, developing an agent which can handle the routine personal tasks of the user so, that the user can concentrate more on his professional tasks.

A typical user always has a burden of his household activities such as paying the electricity, water bills, doing recharge frequently. This reduces the performance of the user in his professional activities. The IPA supports user to handle simultaneous problem of handling the workload between personal and professional tasks. The key feature of the agent is its Intelligence that enables it to look at the problem more closely, think of the option available to solve it and finally take the action on its own. The project is more concerned about the intelligent behavior of the agent to increase the overall performance of the agent in assisting the user. The framework of the user allows it to reason the task it can perform and when it can perform. It's also indicates its potential to perform any critical task, based on load which it is currently handling. IPA assists the user in task management with the help of available knowledge.

An important issue in this IPA is handling knowledge. What idea the agent has about the world and its corresponding application area decides its learning capabilities, suggestion and reasoning capabilities. Ontology is the commonly used way to represent the knowledge. The use of ontology for representing domain knowledge and for supporting reasoning is becoming wide-spread. Knowledge depends on the problem domain. It could be about the system and about the system environment [1]. It could be given initially to the agent or learned by the agent itself by its past experiences.

Other kinds of knowledge might relate to the application domain, the system's structure, problem-solving strategies, the system's ability to communicate with other systems, and so on [1]. IPA cannot assist the user every time because; its contribution should be beneficial to the user. If IPA takes more time in performing a task on behalf of the user than the user actually performing it, then its contribution is of no use. Thus, the IPA has to decide when it can prove useful to the user and correspondingly assist him. The performance or effectiveness of the IPA increases With respect to time or as the agent interacts with the user more and more.

The IPA is capable of learning user interests, his likes and dislikes and his overall preference e.g. consider that whenever user wants to discuss about the project progress the user always prefers for office meeting and ask the agent to send mail to the project members rather than a conference chat. Now the agent knowing the interested of the user, whenever the user want to set a project meeting the agent first suggest for sending mail to the project members and then for conference chat.

2. AIM & OBJECTIVES
The aim and objectives of IPA system is described in this section. In aim section, short description of what will be actually developed is given and objectives are to concentrate on different intelligent behaviors of IPA.

2.1 Aim
Aim is to develop an intelligent agent which can perform task on behalf of the user and assist him in managing the task.

2.2 Objectives

Basically the task of the IPA is divided into two categories

1. Professional tasks.
2. Personal tasks.

Professional tasks include all kinds of user's work environment task like scheduling, planning suggestions for meeting etc. and Personal tasks includes form filling ,registering, payment of bills, email checking etc.

IPA which can has lot of autonomous behavior has to be developed. In many case it can think and act on its own. The agent is divided into different modules so that is it is easy to handle different tasks.IPA basically helps the user to completing the task on time by reminding the important task. This is regarding the professional task. It also helps in managing the user's day routine task. Many of the time the IPA and the user interact with each other to complete certain collaborative task.IPA is transparent enough indicating progress of the task and provides feedbacks, error messages [4] etc.

IPA will work in multitasking environment. The IPA will be accepting user input in the form of instructions then it will select the suggestions from the suggestion module. Hence increasing its adaptivity, learning, reasoning and its suggestion is main focus.

IPA does not provide assistances related to single application; rather it can provide assistance associated with multiple applications. It can interact with desktop applications like calendar, To-do list. It can interact with web applications like mails, shopping sites, online forms, and social sites and so on.

At any time the output of the agent is the final action or any kind of feedback. This is done by the Task Performer [3].task performer is assisted by a set of steps to be followed to complete the task. Management deals with ways to achieve the task with less effort e.g. IPA finds that for the current week the user is dealing with lots of professional task then it removes if any personal task is there and reschedules it to next week.

The effectiveness of the IPA increases only with its responsiveness. The challenge that has to be considered for Intelligence behavior is extracting new knowledge from existing knowledge. This indirectly depends on what idea IPA is having about the world.

3. EXISTING SYSTEM

The popular assistive agent launched by apple iOS is discussed in this section.

3.1 Siri

Siri is an intelligent agent that use natural language processing hence user interact with the agent in their natural language, it allows the user search, schedule meeting, place phone call and more. Siri basically accepts voice input process it and send an voice output to the user. But Siri has some drawback like sometimes it was not able to interpret the voice command, which resulted into unexpected output. Most of the search result defaults to restaurants and locations. Apart from this it does not have an interactive user interface. Siri cannot login into social websites using user id and password.it cannot update the status or send message in social websites.

4. PROPOSED SYSTEM

The following figure is the functional block diagram of IPA in which different task performed by the IPA is separated by dividing them in different modules. Basic idea used here is divide and conquer as it is divided into multiple modules, the task also divided into different parts according to their types. So it become more simple for IPA to perform it by traversing to different module as it has to search more if the task are in same module. Different module of block diagram is explained below:

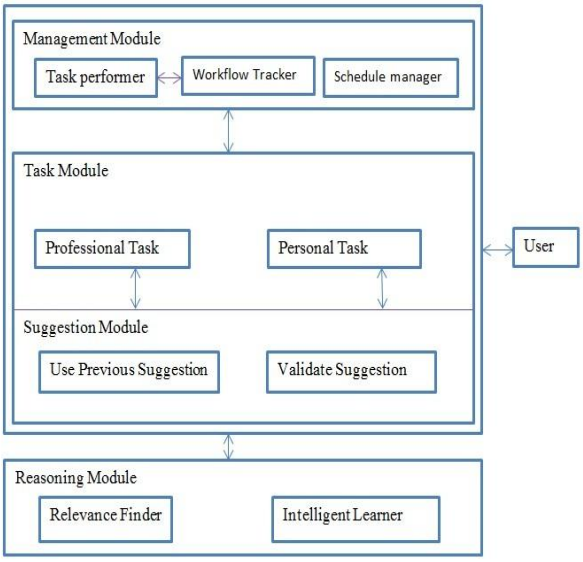


Fig 4.1: Block Diagram of IPA

4.1 Task Module

Task module is the module to which user interacts. This module performs separation of different types of tasks .This module is further divided into two parts they are as follows:

1. Professional tasks: These tasks are basically office related tasks some of them are like e-mail; auto-form fill ups etc. this block will consider all these types of tasks and neglect other tasks.
2. Personal tasks: They are basically person related tasks some are like account management; schedule management etc. this block will consider all these types of tasks and neglect other tasks.

4.2 Suggestion module

Suggestion model is actually the main module as it provide suggestion to user/system based on randomize algorithm which takes user description from task module and find relevant information according to users description and suggest them to user. This module is further fragmented in two sub parts they are as follows:

1. User previous suggestion: In this block previously stored suggestion is used as it might happen that same task need to be performed multiple time.
2. Validate suggestion: In this block it check the suggestion with user requirement if it find that it is relevant then it will suggest to user else it will put forward user request to reasoning module.

4.3 Reasoning Module:

This module is responsible for providing relevance knowledge to suggestion module this module store the relevance

knowledge as well as containing all the information of user tasks. This module is also responsible for learning from user's previous activity thus this module is fragmented in two parts, they are as follows:

4.3.1 Relevance finder

This block contain the relevant information of the tasks that user may perform. This contain all knowledge-based content in this relevant suggestions are present which it forward to suggestion module for providing suggestion.

4.3.2 Expertise learner

This block keep track of function performed by user or need to be performed. It stores the data every time user performs some new action.

4.4 Management Module:

Management module is performing different activities performed by user it also capable for performing management activities such as scheduling thus it named as management module. This module is divided in three parts they are as follows:

4.4.1 Task performer

This block is responsible for performing the tasks like mailing, auto-form filling etc. This block uses workflow for finding default steps for performing particular task.

4.4.2 Workflow tracker

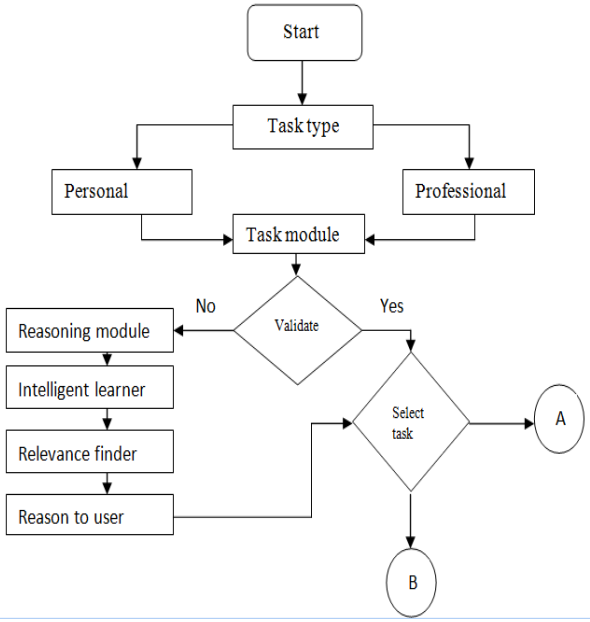
This is responsible for tracking different workflows steps for performing particular task present in the system and then passing particular workflow steps to task performer block.

4.4.3 Schedule manager

This block handle all schedule tasks like meeting arrangements, personal schedule etc. This block access schedule and update it according to user's task.

5. FLOWCHART

The Flowchart describes the sequence of actions that are performed and the flow of processes.



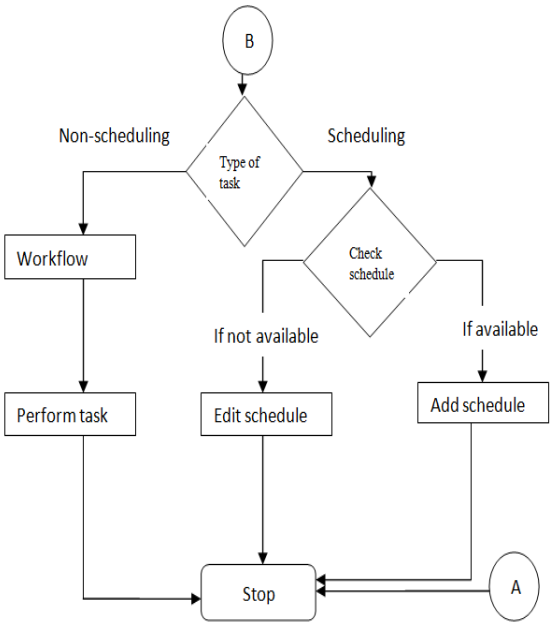


Fig 5.1: Flowchart for IPA

Basically there are three types of scenarios.

1. User enters a scheduling task:

   When the user enters a scheduling task, the agent first identifies whether it is a professional or personal task. After identification the schedule manager will update it in the calendar. If any better schedule is there for that task then it gives suggestion to the user.

2. User enters a non-scheduling task:

   When a non-scheduling task is entered, after identification the agent suggest a set of action that can be taken. User can select any suggestion. The agent checks the validity of the task whether it can perform or not, if yes then it follows the predefined steps to complete the task.

3. User enters an unknown task:

   When the user enters an unknown task the agent since has no information to suggest it, enters into the reasoning module to find new information from the existing information. It suggests some alternative action. If it could not find any suggestion then user can give any new steps to be followed to achieve that task which the agent while learn and add it into its workflow.

6. SECURITY IN IPA

Security is always a major issue in each and every domain of computers. As discuss earlier that IPA will send emails on user command. It is going to fill online forms. All this activities are done by the agent on behalf of the user. Now consider the first case where the user commands the agent to send an email to his friend, for this task the agent requires the email id and password of the user. In the second case for online form filling also the agent requires the user personal information. The personal information of the user should not be leaked or the agent should be programmed in such a way that it should not expose the user details to unauthorized persons or sites. The agent developed is more abstract. User has his code or password which has to be entered for doing

any task. This is a primary security function; there are some agents that uses face recognition to authenticate the user. Access right has to be defined carefully to maintain the confidentiality of data. The security constraints of the agent's application domain have to be studied so as to define the security constraints of the agent. Introduction of agent in the application domain should not degrade the current security of that domain. Agent deployment should not cause lack of confidentiality and integrity of data and resources. In this case the application domain is the simple user's desktop. Before the deployment of the agent user interacts directly with the operating system and then this operating system interacts with the system data and other desktop applications. But now the user is going to just interact with the agent and the agent is going to act on behalf of the user interacting with the other applications and data.

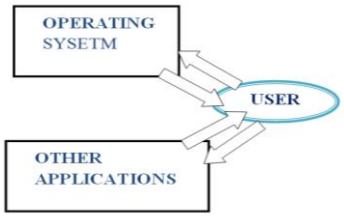


Fig 6.1: Before deployment of agent.

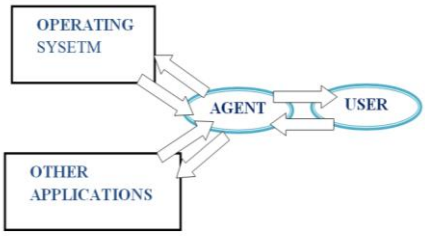


Fig 6.2: After deployment of agent.

From the above figure it is clear that the user is interacting with the agent and the agent is performing on behalf of the user.

7. ACKNOWLEDGEMENT

Thanks to Mohammed Haji Saboo Siddik College of Engineering, for providing the opportunity to do constructive work also anonymous reviewers for their constructive suggestions.

8. CONCLUSION

Thus, the need for the intelligent personal agent is increasing. The IPA helps the user to balance the personal and professional task, manage and plan task. It simply reduces the work done by the user and stress caused due to increasing workload. It allows user to concentrate on more important task. IPA stands for its intelligence and autonomous behavior. As stated earlier it has various features like mail sending, online form filling, planning and more. Aims and objectives of the IPA have been discussed, existing system and its limitations, the flowchart showing the basic functioning of an IPA. Security issues of IPA in its application domain. The security issues are still on search. IPA will play a very important role in the near future. Previous workers are appointed a PA to assist them, which increases the cost. We human take more time to solve a problem than the agent. Thus use of intelligent agent to assist reduces the cost and time. Most of the Organization is switching from human to intelligent personal agent. The added Intelligence, interactivity, autonomous behavior, adaptability, increases the scope of the IPA. In some applications intelligent agents are used to collect relevant data from internet. . Lots of time is wasted by the uses to get data related to his area of interest due to the bulk amount of information. One of its use is to make newspaper for the user. IPA is flexible enough that it can be used in other domains like networking, image processing, e-learning etc. Agent is also used for helping the user to shop, travel and so on. There are more such application areas of agents like help desk, visitor hosting agent where the agent host the events participated by the user and directs the user.

9. REFERENCES

[1]Emil Vassev and Mike Hinchey."Knowledge Representation and Reasoning For Intelligent Software Systems", by IEEE computer society 2011

[2] Michael Pardowitz, Steffen Knoop, Ruediger Dillmann."Incremental Learning of Tasks from User Demonstrations, Past Experiences, and Vocal Comments", IEEE Transactions On systems, man, and cybernetics—part b: cybernetics, vol. 37, no. 2, april 2007.

[3] Neil Yorke-Smith, Shahin Saadati, Karen L. Myers, David N. Morley."Like an Intuitive and Courteous Butler: A Proactive Personal Agent for Task Management". AAMAS 2009 • 8th International Conference on Autonomous Agents and Multiagent Systems • 10–15 May, 2009 • Budapest, Hungary

[4] Karen Myers, Pauline Berry, Jim Blythe, Ken Conley,Melinda Gervasio, Deborah McGuinness, David Morley,Avi Pfeffer, Martha Pollack , and Milind Tambe." An Intelligent Personal Assistant for Task and Time Management", AI Magazine Volume 28 Number 2 (2007) (© AAAI)

[5] SRI International. CALO: Cognitive Assistant that Learns and Organizes2003–2009.

[6]Emerson Cabrera Paraiso, Andreia Malucelli."Ontologies Supporting Intelligent Agent-Based Assistance".Post-Graduate Program on Informatics Pontifcia Universidade Catlica do Paran´a Av. Imaculada Conceio, 1155\ Curitiba, Brazil

[7] A. Fern, S. Natarajan, K. Judah, and P. Tadepalli. "A decision-theoretic model of assistance". In Proc. of IJCAI'07, 2007.

[8] M. Fleming and R. Cohen. "User modeling and the design of more interactive interfaces". In Proc. of UM'99, 1999.

[9] M. Gervasio, T. J. Lee, and S. Eker."Learning email procedures for the desktop". In Proc. of AAAI 2008 Workshop on Enhanced Messaging, 2008.

[10] Y. Gil and V. Ratnakar. "Towards intelligent assistance for to-do lists". In Proc. of IUI'08, 2008.

[11] A. Glass, D. L. McGuinness, and M. Wolverton. Toward establishing trust in adaptive agents. In Proc. of IUI'08, 2008.

[13] K. V. Hindriks and M. B. van Riemsdijk."Using temporal logic to integrate goals and qualitative preferences into agent programming". In Proc. of DALT'08, 2008

[14] Hongbo Deng, Irwin King, Michael R. Lyu." Enhanced Models for Expertise Retrieval Using Community Aware Strategies".-IEEE transcaction system,And cybernatics—PART B: Ccybernatics, VOL. 42, NO. 1, FEBRUARY 2012.