

# Agent based Decision Support System for Travelers

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## ABSTRACT

Nowadays, management of the travelers to support their recreation or holiday planning is increasingly becoming important and popular. Planning a trip needs to assemble a wide variety of information from a large number of sources, such as car schedule and prices, hotel locations, the map of traveled places, etc. Now, this information is available in this system and it can be used to decide a better plan traveler. Decision support systems are the type of information systems expressly developed to support the decision making process and to assist a decision maker. So, this system is implemented as the decision support system for travelling. Moreover, this system describes the use of intelligent agents for extracting and integrating data to improve the ability to plan a travel. These agents can extract data, integrate this data to support travel planning and monitor all aspects of a trip. Therefore, a traveler decision support system by using intelligent agents will develop to support travelers in making their decision on a suitable track when they are faced with a number of alternative track options.

**Keywords:** Agent, Traveler, Decision Support System.

## I. INTRODUCTION

Decision support systems comprise software systems that assist humans in making complex decisions in real-life problem domains. Decision support systems have been used to provide for many structured and un-structured problems such as strategic planning, investment planning, enterprise planning, knowledge management, case-based reasoning, help desk automation, and trip planning for tourists.

Intelligent software agents provide a technology that can be used to obtain knowledge from dynamically changing environments and thus potentially allowing decision support system (DSS) users to make more informed and accurate decisions. These agents can

enhance traditional DSS by rapidly updating and using knowledge and domain information from a DSS so that the agents can respond efficiently and accurately to user queries.

This system describes the use of intelligent agents for extracting and integrating data to improve the ability for travelling. Traveling is the activity undertaken by tourists, whether or not it is organized by the tourist industry. In this activity, planning a trip needs to assemble a wide variety of information from a large number of sources, such as car schedule and prices, hotel locations, the map of traveled places, weather conditions, etc. Now, this information is available in this system and it can be used that travelers to better plan and execute their trips.

An agent-based system can interact much more personally with the users. Agents are sophisticated computer programs that act autonomously on behalf of users because of the flexible and dynamic characters of agents. Agent-based technology can potentially solve complex and offer a new opportunity. Agents are able to work at run-time where each component can become commodity. Agents will be able to make decision at run to which resources and/or service to use for particular tasks. Intelligent agents for travel planning aim at enhancing the effectiveness and efficiency of information retrieval on tourism information. These agents can extract data, integrate this data to support travel planning and monitor all aspects of a trip.

So, this system proposed the decision support system for travelling by using intelligent agents. The proposed system targets to support travelers by providing up-to-date information about travel companies' performance and help them to advice right decision according to their requirement and preferences. By using decision support system based on agent technology, the proposed system will minimize users' effort time, money and look for their interest recreational places in a short time.

## II. RELATED WORK

In 2010, M. K. Hasan [1] presented a comprehensive framework for an intelligent decision support system (IDSS) for traffic congestion management system that utilizes a state of the art transportation network equilibrium modelling and providing an easy to use GIS-based interaction environment. The developed IDSS reduces the dependability on the expertise and level of education of the transportation planners, transportation engineers or any transportation decision makers.

In 2013, Y. N. Asafe and A. Bolaji [2] proposed the design of web-based expert decision system (WEDSS), to provide tourist to Nigeria and its environ essential data and tools to managing their tours and to base all

the decisions concerning to queries on the tourist centres and hotels based on the climate, road conditions, cultural aspects, lodging, health facilities, banking, etc. Web based tourist decision support system for Nigeria will be developed to allow the tourist to find their route in Nigeria and ask for information about sights, accommodations and other interest places.

In 2019, F. U. D. Ghauri and S. Rehman [3] proposed a multi agent based decision support system for prioritized evacuation during fire disaster. The proposed model is implemented to validate proposed idea in evacuation to ensure the safety and quick evacuation of evacuees, The disaster points can be relocated and changed to assess the effect on the model.

## III. DECISION SUPPORT SYSTEM

A decision support system (DSS) refers to a class of systems which support the process of making decisions. The emphasis is on 'support' rather than an automation of decisions. DSS allow decision makers to retrieve data and test alternative solutions during the process of problem solving. Effective problem solving is interactive and is enhanced by dialogue between the user and the system. A DSS consists of hardware, software, data, model, and people [4].

DSS types include as follows:

- Communication-driven DSS: A communication-driven DSS supports more than one person working on a shared task; examples include integrated tools like Microsoft's NetMeeting or Groove
- Data-driven DSS: A data-driven DSS or data-oriented DSS emphasizes access to and manipulation of a time series of internal company data and, sometimes, external data.

- Document-driven DSS: A document-driven DSS manages, retrieves, and manipulates unstructured information in a variety of electronic formats.
- Knowledge-driven DSS: A knowledge-driven DSS provides specialized problem-solving expertise stored as facts, rules, procedures, or in similar structures.
- Model-driven DSS: A model-driven DSS emphasizes access to and manipulation of a statistical, financial, optimization, or simulation model. Model-driven DSS use data and parameters provided by users to assist decision makers in analyzing a situation; they are not necessarily data-intensive [5].

#### A. DSS in Tourism Planning and Management

DSS approach is a rational process that provides organized ways of applying critical thinking skills to develop accumulating answers to questions about the problem. DSS approaches in tourism planning and management are as follows:

- Cost Benefit Analysis
- Planning Balance Sheet
- Goal Achievement Matrix
- Multi Criteria Analysis
- Bayesian Belief Network
- Agent-based Modelling Simulation
- Geographical Visualisation

Among them, the proposed system used agent-based modelling simulation approach for travelling [6].

#### IV. INTELLIGENT AGENT

One agent in computer science is software or other computational type entity with some intelligence characteristics. Therefore, an intelligent agent is a composition of hardware, software with some intelligent features. Each intelligent agent perceives its environment with collecting some information about that environment through its sensors attempt to achieve its goals by acting through its actuators.

Intelligent agents are having some internal characteristics (such as: autonomy, learning/reasoning, reactivity and goal oriented) and some external characteristics (such as: communication, cooperation, mobility) [7].

#### A. Properties of Agent

Properties of agent are as follows [7]:

- **Autonomy:** Autonomy is the capability of an agent to follow its goals without interactions or commands from the user or another agent.
- **Interaction:** Agents typically only have a partial representation of their environment, and are thus limited in their ability – in terms of their expertise, access to resources, location, etc. – to interact with it. Therefore, they rely on other agents to achieve goals that are outside their scope or reach.
- **Adaptability:** Users differ in their status, level of expertise, needs, and preferences. The issue of adaptability is that of tailoring information to the features of the user.
- **Reactivity:** Agent perceives environment and responds timely fashion to changes that occur in it.
- **Pro-activity:** agent is able to exhibit goal-directed behaviour by taking the initiative.

#### V. PROPOSED SYSTEM DESIGN

The proposed system is a decision support system for travelling by using intelligent agents. In this system, five agents play a major role of this system. Among them, user assistant agent, user requirement agent and travelling recommendation agent that act as user's personal assistant. And then, administrator assistant agent and administrator requirement agent that act as the administrator's assistant. These agents are interact and cooperate to achieve decision tasks. The proposed system advices which trip plans are appropriate for users (tourists).

In this system, there are two levels: admin level and user level. In the user level, there are three agents. In

the user assistant agent process, if user wants to check the place type or type of transportation, user assistant agent can show the traveling city information to the user. Moreover, if the user wants to know the detail city information, user can use and click “Read More” link to read this detail information.

In the user requirement agent process, the user requirement agent notifies users that fill up forgetting one if the user click “Search” button before filling and choosing the required information such as place type, transportation type, budget amount, number of persons and number of nights.

System flow diagram is shown in Figure 1. In the travelling recommendation agent process, after the user filling up all of travelling information, this agent suggests the city that corresponds to all of them.

In admin level, there are two administrator agents. In the administrator assistant agent process, this agent can assist the administrator to know what user sees in our website. If admin wants to add, update and delete the travelling information, this agent can allow the administrator. If admin forget one, the administrator requirement agent notifies the administrator that fill up forgetting one.

### VI. EXPLANATION OF THE SYTEM

The proposed system is based on intelligent agent that acts as user’s personal assistant. An agent consists of the program execution states (the current input values, next instructions to executed, etc). Five kinds of agents are used to implement our system. These agents are interacting and cooperate to achieve advising tasks.

#### A. User Assistant Agent

This system allows the user to choose the desired travelling place. In this system, there are four types of travelling places. These are the cool place, famous place, historical place and beach place. After the user has chosen the desired place type, the user assistant agent must show the detail town list within the user chosen place type. Moreover, the user assistant agent can show the detail town list that is equivalent and suitable to the user chosen transportation and place types. In this system, the user can use the desired transportation type such as flight, car and train. Process of user assistant agent is shown in Figure 2.

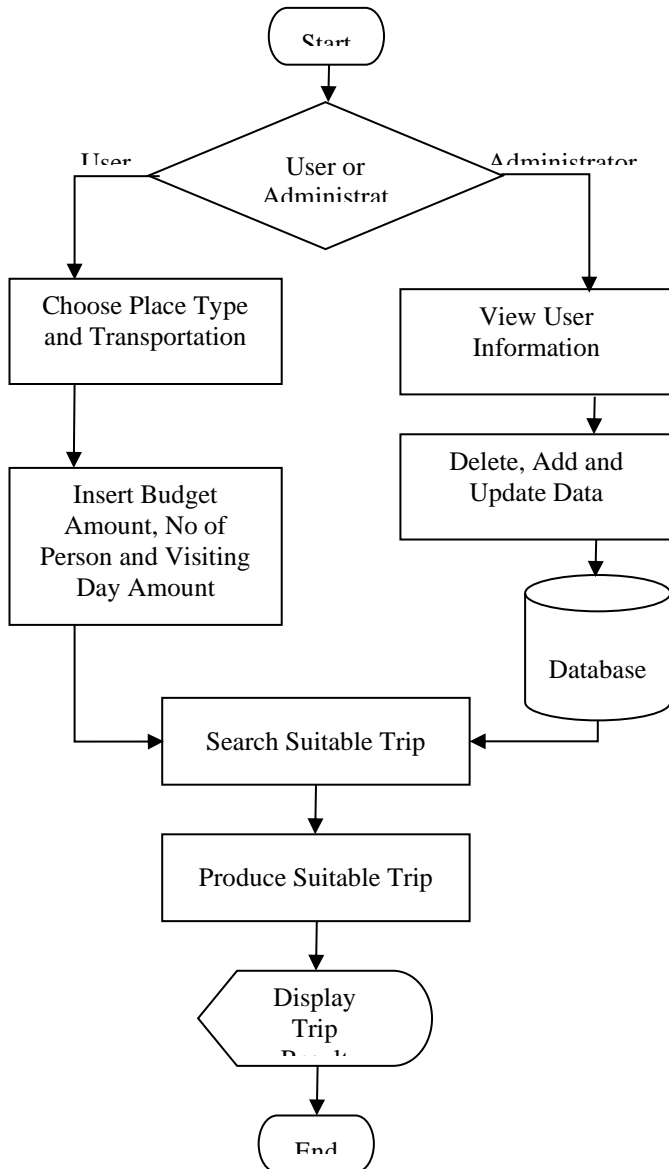


Figure 1: System Flow Diagram

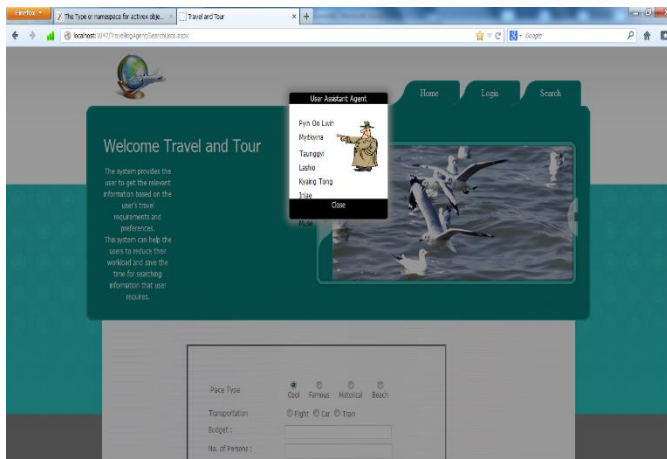


Figure 2: Process of User Assistant Agent

### B. User Requirement Agent

This agent must allow the user to fill and choose the requirement traveling information such as travelling place type, type of transportation, amount of budget, number of passenger (travelling person) and amount of visiting day (night). Process of use requirement agent is shown in Figure 3.

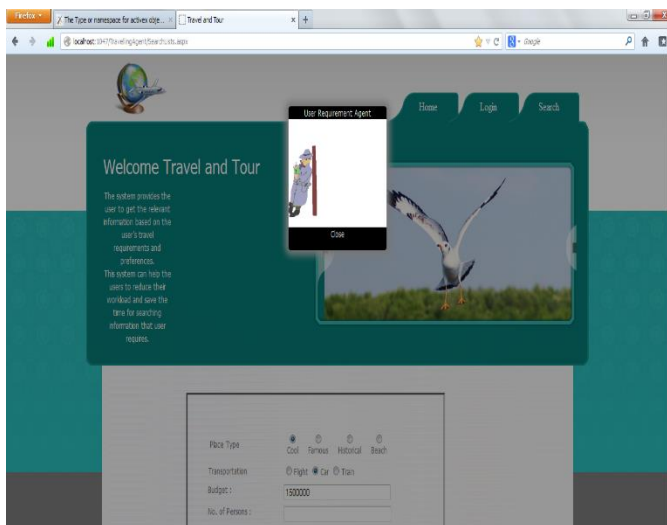


Figure 3: Process of User Requirement Agent

### C. Travelling Recommendation Agent

This agent decides which place is appropriate for the user based on the user information. Process of travelling recommendation agent is shown in Figure 4.

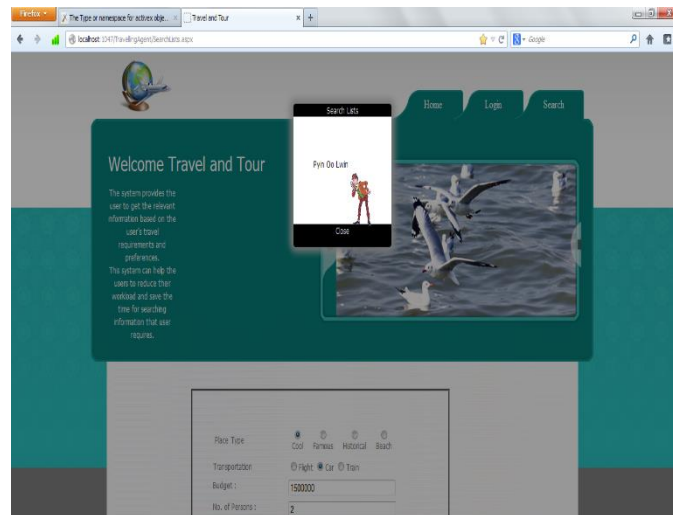


Figure 4: Process of Travelling Recommendation Agent

### D. Administrator Assistant Agent

This agent can advise the administrator to know the amount of user and the amount of visiting by one user in this web site. Moreover, this agent can help the administrator to update, add and delete travelling data and information. The process of administrator assistant agent is shown in Figure 5.

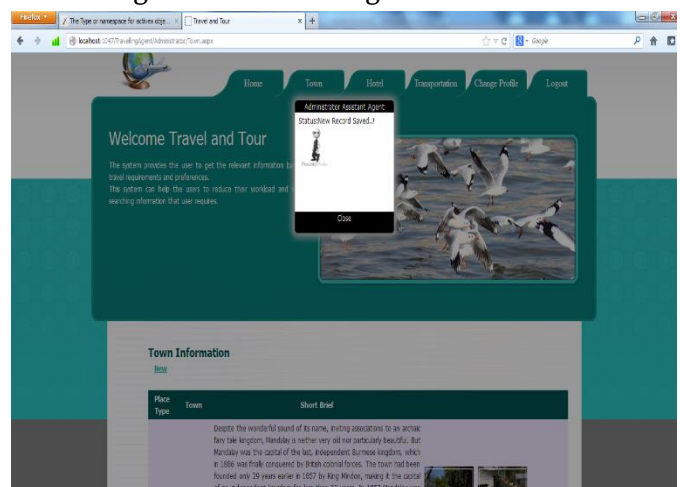


Figure 5: Process of Administrator Assistant Agent

### E. Administrator Requirement Agent

This agent can notify the administrator who forgets his/ her work. Process of administrator requirement agent is shown in Figure 6.

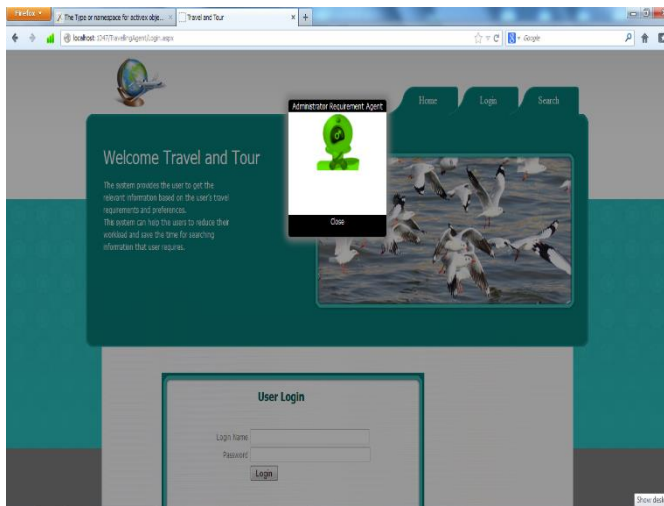


Figure 6: Process of Administrator Requirement Agent

## VII. CONCLUSION

The proposed agent based decision support system provides the user to get the relevant information based on the user's travel requirements and preferences. This system can help the users to reduce their workload and save the time for searching information that user requires. This system can assist any users who don't know about Travel Company in Myanmar. This system can advise which travel plans and accommodations are suitable for user. The proposed system is intended to help online travelers to overcome information overload and to support them in decision-making process.

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