

Trading Agent Competition (TAC) – Report

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1. Introduction

Trading Agent Competition (TAC) is a game where eight agents compete with each other to provide services to the clients. The strategy of the agents is compared and the agent with best strategy wins the game. The main aim of the agent is to provide the best possible services to the client. The strategy is built upon this goal. The environment where the agent needs to provide services to the clients is a typical holiday trip. The agent needs to provide three types of services namely the flight tickets from TACTown to Tampa, hotel rooms for the clients to reside and finally entertainment tickets for their recreation.

The travel package is a five-day holiday trip from TACTown to Tampa. The agent initially needs to buy the flight tickets for a round-trip from TACAIR, an airlines company through bidding and auctioning and sell it to the clients. The clients have to stay at least one night in Tampa so there will be no out-flights on the first day and no in-flights on the last day. The next service provided by the agent is the hotel room service. As the client has to stay back at least for one night, he requires a hotel room to reside. There are two types of hotels, one being the high-level with more facilities and the other being the low-level with less number of facilities. The agent buys the tickets from the owners of both the hotels and sells them to the clients depending on their preference. The final service is the entertainment tickets. The entertainment tickets are of three types, alligator wrestling, amusement park and museum. The entertainment tickets are bought by the agent in a huge amount from the owner. These tickets are sold to the client if they wish to visit anyone of

these entertainments. It is up to the agent to decide whether the entertainment tickets are to be allotted to the clients without any charges.

It is all in the strategy of the agent to maximize the client utility value. On the basis of strategy of the agent the winner of the competition is declared. We have designed a strategy to buy the tickets from the owners in an efficient way to avoid loses and sell it to the client depending on their preferences. The ultimate goal is to increase the client utility value. The more feasible the package the more is the client utility value.

2. Agent Strategy

2.1 Flight service

The process of buying tickets of various services is accomplished through bidding and auctioning. The flight tickets are auctioned first. The TACAIR Company auctions its flight tickets. The agents need to quote a bid. The agent who quotes the highest price is allotted the tickets. In this scenario, we have designed an agent which initially identifies the category of the auctioning going on with `getAuctionCategory()` method. If the category of the auction is `CAT_FLIGHT`, our agent quotes a bid through `sendBid()` method to buy the flight tickets in an efficient way. The owner quotes a price initially which is considered to be the `askPrice`. If the `agentPrice` is greater than the `askPrice`, the owner allots the tickets to our agent for the `agentPrice`. This is accomplished through the `setAllocation()` method. The quantity of the tickets is also specified during the quoting. The number of tickets allotted is based on the quantity of tickets stated. On the other hand, if the `agentPrice` is less than the `askPrice` then our

agent updates the bid to a value which is 10 dollars more than the askPrice. As our agent is quoting a price higher than the askPrice the tickets are allotted by the owner. The updation of the bid is done through the updateBid() method. After the updation the bid is submitted through the submitBid() method. Thus our agent buys the flight tickets from the owner participating in the auctioning process. The next phase is to give away the flight tickets to the clients depending on their preference. The number of days for the trip, number of passengers and other details are enquired and the tickets are sold to the best possible price taking the client utility value into consideration. The travel package is made feasible so that the client utility value will be maximized. The process of selling flight tickets is accomplished through calculateAllocation() method.

2.2 Hotel room service

The next auction that takes places is the hotel room's auction. The owners of both the hotels quote their askPrice. If our agent identifies the category of the auction to be CAT_HOTEL with getAuctionCategory() method, then it enquires about the type of hotel. The type of the hotel is identified with getAuctionType() method. If the type is TYPE_GOOD_HOTEL, then our agent quotes the bid and deals with two cases. When the agentPrice of the hotel by the owner is greater than the askPrice then according to the norms the hotel room is allotted to our agent through setAllocation() method. On the other hand, if it is less, the bid is updated to a value which is 30 dollars more than the askPrice. The updateBid() method accomplishes this task. Once the updation is done, the bid is submitted to the owner through submitBid() method. When the getAuctionType() method results in TYPE_CHEAP_HOTEL, then our agent quotes the bid. If the agentPrice is greater than the askPrice, the hotel room is allotted to our agent through setAllocation() method. On the other hand, if it is less, our agent updates the bid to the value equal to the askPrice with the updateBid() method. This is submitted to the owner by submitBid() method. Thus all types of hotel rooms are bought by our agent. Now these rooms

are to be allocated to the clients based on their preferences. The agent looks for the clients who booked flight tickets for a higher price and allots rooms which are from TYPE_CHEAP_HOTEL. The clients who booked flight tickets for a lower price are allotted with rooms from TYPE_GOOD_HOTEL. In case the client is not satisfied with the allocation of the hotel room, he will be given an option to exchange the type of hotel according to his preference. This strategy makes a balance of the total amount spent by the client on the whole travel package. This in turn results in the increase of the client-utility value.

2.3 Entertainment service

The final auctioning is organized by the owners for the entertainment tickets. They quote their askPrice. If our agent identifies the category to be CAT_ENTERTAINMENT, then it quotes its bid, the agentPrice through sendBid() method. When the agentPrice is greater than the askPrice, the tickets are allotted to our agent. The bid is updated when the agentPrice is found to be less than the askPrice to a value which is equal to the askPrice. The agent will now sell the tickets which he bought through the auction. The clients who are allotted the GOOD_HOTEL are given the entertainment tickets of museum and amusement park for no price and tickets of alligator wrestling for a value which is equal to the askPrice. In a similar way, the clients who are allotted the CHEAP_HOTEL are given the tickets of amusement park for no price and tickets of alligator wrestling and museum for a value equal to the askPrice. As the prices are optimal and as the travel package is feasible, the client utility value is not decreased.

3. Agent Performance and Result

On the basis of the strategy, our agent's performance was not up to the mark. We were given a chance to participate in two games. The results of the first game were not deduced because of the error in connecting to the local server. The results of the second game turned out to be negative. The major drawback in the strategy was that, our agent bought many in-

flight and out-flight tickets which lead to a drastic increase in the cost spent. The hotel rooms were bought at a good rate but as there were many clients, the hotel rooms could not be allocated to all our clients. There was a similar issue with the entertainment tickets as well. The number of entertainment tickets bought was adequate but compared to the flight tickets, there was scarcity. As a whole the purchase of many flight tickets led to a poor performance of our agent. If the number of flight tickets purchased were less, then the whole strategy would have

worked out well leading to a good and decent performance. Other than the flight tickets, the hotel room tickets and entertainment tickets were purchased at good price and sold to the client according to their preferences. As these two services were feasible, the client utility value increased to an extent. But due to flight service, there was a negative impact on our agent's performance. Though there was increase in client utility value, flight service led to its decrease.

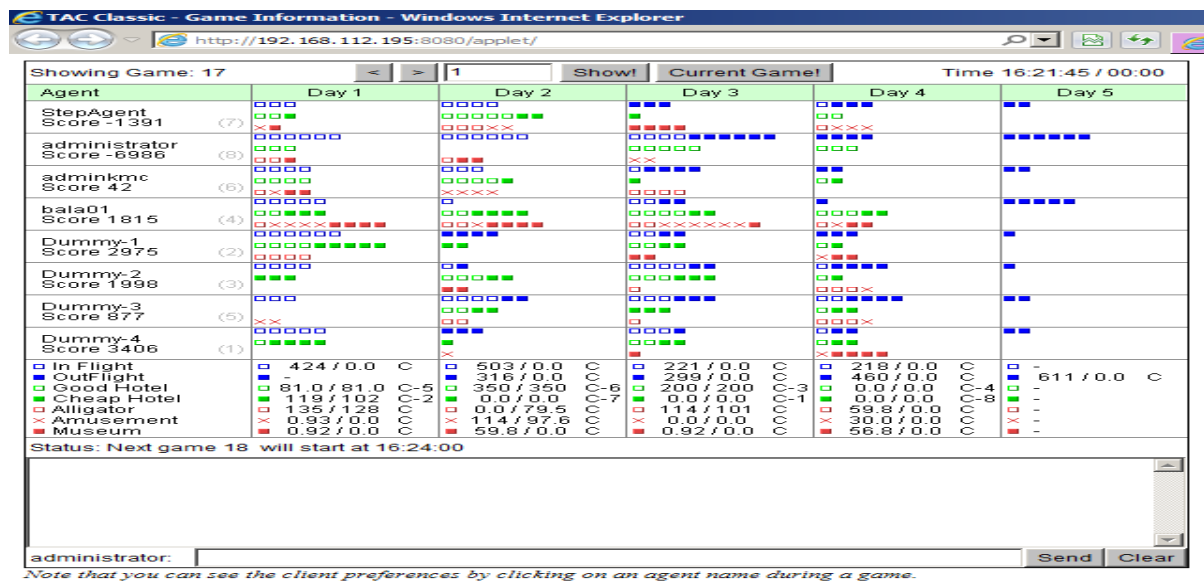


Figure1. Result of our agent in Trading Agent Competition (TAC).

The agent was designed in a proactive fashion. It was designed with a pre-plan. It had the strategy to react to the events that take place in the environment. When the prices fluctuate, the agent proactively reacts to the changes. The strategy is developed for the agent in such a way that it automatically react to situations instead of waiting for events to take place.

The strategy of our agent can be improvised by reducing the purchase of the flight tickets. If the number of flight tickets is reduced, there will be any overload on the availability of hotel rooms and entertainment tickets. Therefore, the hotel rooms and entertainment tickets can be allocated to the clients adequately. The reduction in purchasing the flight tickets will also result in decrease of the cost spent by the agent during

auctioning process. This will lead an overall increase in the feasibility of the travel package and also the client-utility value will be maximized.