Water on the water: A hybrid approach using Intelligent water drops algorithm and cultural algorithm to improve a shoal in fishville

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Abstract. Many problems involve not structured environments which can be solved from the perspective of Cultural Algorithms (CAs) and Intelligent Water Drops Algorithm (IWD). In this research analyze a prototype of hybrid algorithm validated with improve optimization of a virtual shoal playing in the Facebook's social network game named FishVille. This prototype takes as input data a set of fish in FishVille (7000 different issues –but only 6750 issues available on 70 level- to combine in a shoal) and returns an organized the maximum shoals of 40 fishes each of different species. Using a generate and test method, guided by a set of construction heuristics obtained from the possibility of arrive at this ideal shoal, the prototype can operate in two modes: either generating an unrestricted set of fishes, or generating a shoal according to one of three predefined shoal structure. Seven different construction heuristics are tested over different combinations of two sets of initial data, one obtained from a classic and popular combination used in ichthyology to decoration and other using a Ichthyology Habitat patterns. A set of numerical parameters are extracted from each test, and evaluated in search of significant correlations. The aim is to ascertain the relative importance of size of initial shoal and construction heuristics with respect to the general acceptability of resulting shoal which are validated using Cultural Algorithms.

Keywords: Social Network Game, Intelligent Water Drops Algorithm and Cultural Algorithms.

1 Introduction

The Social Network Game are very popular in Internet (Used by a 2% of World Population); supported with Social Networking especially Facebook is recurring dream within the AI community, but it has always been assigned a very low priority. Practical applications in the area of analysis of Multiplayer game online, such as

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understand the behavior of the game and the way to provide more immediate rewards [1]. On one hand the automatic generation of Ichthyology composition involves advanced Biology and Environmental sense. On the other hand it involves an important amount of creativity and sensibility. These ingredients are very difficult to characterize formally, and very little is known about how they might be treated algorithmically. On the positive organize a shoal with different species not requiring exaggerate precision. If one accepts that the main aim of a shoal is the esthetic presentation, the general problem becomes tractable. The present paper considers how the different parameters that can be controlled by a hybrid algorithm affect the acceptability of the result. The set of parameters to be monitored are: size of shoal, species including, decoration, and enough feed. The elusive concept of acceptability of a shoal is determined by resorting to hand evaluation by a team of volunteers which has an account in Facebook. By searching for correlations between the strategy and initial data used to generate a shoal and the positive or negative evaluation of the resulting of it which is obtained about the relative relevance of these parameters to the end result.

The paper is organized as follows: in section 2 we analyze the Ichthyology Compositional Analysis. In section 3 we described the proposed prototype, in section 4, the results are evaluated, the paper concludes with section 5 explain the conclusions obtained.

2 Ichthyology compositional analysis.

Formal analysis of Ichthyology composition considers the position of a fish in a specific habitat. The period required to food is different in each specie and the time to arrive at adult age will be have a range from 3 minutes to 4.5 days, when a fish is bought is registered its specie, if you bought enough fishes is possible liberate new species of similar family. It is enough for certain strategic related with the organization of a shoal. The literature of multiagent system [3] describes a set of skills to obtain advantages when is bought an issue in this kind of games, in the figure 2 is shown the behavior of the game during 320 days of game using our proposal algorithm and the randomly of actions,

A shoal may be an unstructured sequence of fishes, but this paper is concerned specifically with shoals that make use of known compound-multi strategy (issues from different species supported similar at biological symbiosis). In such cases, the formal rules that govern the chosen Ichthyology form can be used to guide the generation process. A shoal may consist of single specie or several species together (in which case the different species are usually organized by their behavior). For the present purposes, only three of the simplest patterns be considered: Specie, Time to be adult, and quantity of food required.

3 Description of the System.

The prototype requires a set of initial data to start the generation process: a repository of fishes and a set of patterns associated with a shoal. The choice of buy a fish determines improve to realize and the topic of the shoal. The set of Ichthyology patterns can be considered as a set of descriptions of best shoal in the nature, in the sense that it encodes information about important parameters (time of life, quantity of food...) while allowing a certain leeway in terms of specific content (particular fishes species) of the present solution. The set of initial data is obtained as follows. Given a set of fishes, it is split into value of each one according the velocity of increase their size. All the issues in the repository will be included in the proposal shoal. The resulting values of the original issues are used to produce the reference patterns. In order to compare the effect of the choice of a fish from an Aquarium Repository, two distinct set of data are used to test the programs. The first set of data is obtained from a set of Ichthyology patterns. The second set of data is taken randomly from an academic work in the field of Ichthyology Habitat. A certain shoal [4] of equivalent size is chosen, all the fishes in this are included, and a set of reference patterns is built by splitting the shoal into triplets (a mini combinatorial shoal) with a required size and encoding the necessary information.

3.1 Hybrid Algorithm

This algorithm is composed by Intelligent Water Drop and Cultural Algorithms which permit organize the best strategies to reach the best shoal using the different ways to buy and sell fishes and other things related with an Aquarium. The IWD Algorithm work together to find the optimal solution to a given problem and the Cultural Algorithms to analyze each bought and sell.

Generation starts with the selection of appropriated Ichthyology patterns, based on criteria designed to ensure that there is a minimum of coherence across the issues in the shoal. From this pattern an empty draft of the current shoal is generated.

The elementary generation cycle can be described as follows:

1. Randomly choose from the given fishes in the repository that matches the first category of the current shoal according the level in the game
2. Append it to the draft of the current segment
3. Eliminate (bought) the corresponding fishes from the current segment pattern
4. Test whether the resulting shoal draft satisfies the conditions of the strategy being used – and the required size of segment in number of different species
5. If the conditions are satisfied, iterate from 1.
6. Shoal's issues that either violate the conditions to improve, or overshoot or fall short of the given number of value of bought are rejected

The generation of a shoal requires two additional features to be solved, both related to the restrictions imposed on each Ichthyology patterns. One concerns the choice of best fish to use for the next strategy related with the shoal. This issue is independent

of the particular goal. The other concerns the different value of each fish, and is governed by the particular rules of each shoal.

4 Evaluation of Results.

Three different sets of experiments were carried out. In each experiment of the first set, the versions of the system corresponding to different strategies for the build to best shoal with more different species using Cultural Algorithms for buying thus technique can simulate the recommendation of an artificial society. The experiments of the second set were designed to evaluate which of the strategies for validating the current draft to a proposal shoal gave better results using IWD. For both the first and the second sets of experiments, each competing issue was evaluated attempted to generate diverse scenarios, operating in standard style mode. A set of 150 fishes from FishVille was used to provide initial data, and Ichthyology patterns were respected. The third set of experiments was carried out using only a version of the system that combined the strategies that had obtained better results over the previous sets. Comparisons were established between results obtained for different combinations of initial data. In this set, each proposal shoal generates fifteen issues for each one of the possible scenario's tank.

Figure 1. *FishVille User'environment with all the information about the performance on the time in this Multiplayer Game Online.*

4.1 Shoals Generation and Initial Data

Different sources for initial data (fishes in three different repositories) extensions of the Ichthyology patterns search in an Aquarium, two possible ways of improve the shoal is determine which fishes is better bought and the time to will be adults to sell and obtain more resources. A total of 504 trials were carried out (14 combinations, and 116 different possible species to buy, and 12 combinations to organize). Many of the resulting shoals were either economically incorrect. For this reason, evaluation

took place in two stages. During the first stage every resulting shoal was assigned three numbers: (1) number of issues of the shoal, (2) a value for its economical correctness, and (3) a value for its esthetical rating. These values are used as a first stage of filtering to avoid wasting evaluation effort on shoals that are too short or without economic value. Values were assigned on first inspection by one sample of users (11 players).

A shoal is considered weakly connected itself, if it can be parsed in some way as a set of independent fishes. A shoal is considered strongly connected if at least some of the issues join together into a variety of species that make Ichthyology sense.

Esthetical rating was subjectively evaluated on the following scale:

1. ugly
2. mediocre
3. acceptable
4. pleasing
5. very pretty

4.2 Discussion of the Results

The results contain an enormous amount of information, only part of which has been mined at this stage. However, some very interesting conclusions can be drawn from the resulting facts. Since it had been assumed from the start that if the choice of a fish and/or the choice of Ichthyology patterns (for example the quantity of food in a day) play an important role in determining the quality of a shoal. This hypothesis is validated by the fact that only seven of the 45 acceptable shoals were generated using the set of initial data (the best Shoal is reach in the level 57 after 147 days playing the game). Overall, only nine of the combinations that were tried managed to produce a shoal that went into the final selection. Of these, only one of them was not using an extended version of the original repository (obtaining issues from gifts of another player). However, that very one did produce the top scoring shoal according to the evaluators. This suggests that in general terms the system performs better with a wider choice of options of fishes, unless the random factor in the generation process actually comes up with a shoal that closely mirrors the first randomly (which is what happened in this case). While it is clear that recovering the first shoal organized to give an acceptable result, this is hardly a desirable solution.

Two of the combinations that produced most top scoring shoals were working with repositories that had been extended with extra issues (fishes available in top levels and limited edition issues). These fishes tend to appear more often than others in the shoals. However, it produces very interesting results from an aesthetic point of view. While no way has been found yet to evaluate this fact numerically, it has been observed informally by many of the evaluators and it should be taken into account for further analysis.

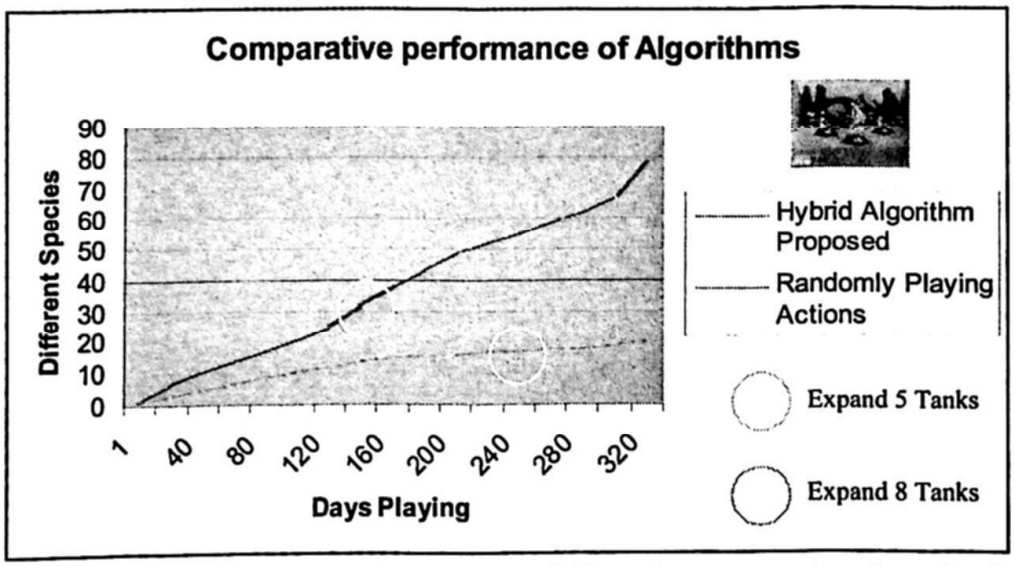

***Figure 2** Comparative Analysis of Hybrid Algorithm proposed and randomly selection actions in the game.*

5 Conclusions.

The present experiment is intended as preliminary work in a project in developing Ichthyology knowledge based on Evolving Compute. The results obtained will help to discriminate between the different possible strategies and stratagems in the game. Additional knowledge and heuristics governing the selection of appropriate selection of patterns to follow a given group of issues might be used either to guide shoal construction or to eliminate poor results. Several interesting insights have been obtained from the analysis of the results presented here. Better heuristics must be developed for the selection of appropriate pattern for the next shoal. Ichthyology patterns should be distinguished in some way according to whether they are beginning, middle or end sections of a game. The evaluation procedures are still subject to a great deal of improvement. In a matter where subjective opinion of the player, special effort must be made to devise an evaluation procedure that provides a rigorous rating without interfering with the natural attitude of the evaluator as user of this kind of Social Network Game, in another of this games is possible improve the selection of actions as Evony, Dygredis. Social City, Birland, Restaurant City or My Tribe. A future research is analyzed the Virtual Social Networking (27 people at level 57) organized in My Tribe to reach level 100 in the less time and the Social organization developed by this.

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