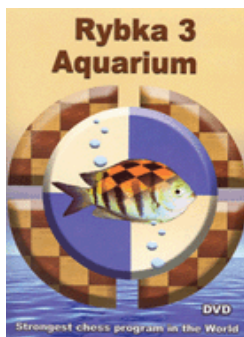




COLUMNISTS

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Dadi Jonsson



CHESS THEATRE

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Game Analysis with Rybka Aquarium

Rybka Aquarium offers new analysis methods as well as improvements to older methods. In previous columns we examined [Interactive Deep Analysis](#) (IDeA) and [Infinite Analysis](#). This month we take a look at Game Analysis.

Aquarium's Game Analysis

Aquarium's Game Analysis is an advanced analysis method that performs an automatic analysis of one or more chess games from a database.

In most chess GUIs, game analysis is a simple process where a chess engine analyzes each position for a fixed length of time. If a better move is found, its evaluation is compared to the evaluation of the move played. If the improvement exceeds a predefined value, the engine variation and evaluations are added to the game notation. Aquarium's Game Analysis uses a more advanced, dynamic approach, consisting of several stages.

First, Aquarium scans the whole game quickly to get a bird's eye view of how it developed. If one of the players had a completely winning advantage in the final moves of the game, those moves will not be analyzed further. The same applies to the opening moves of the game that are instead annotated with reference games, human evaluations, and stored engine evaluations.

After selecting the positions that will be analyzed further, Aquarium analyzes each of them more deeply. They are analyzed for the same length of time – calculated from the analysis time specified by the user and the number of positions.

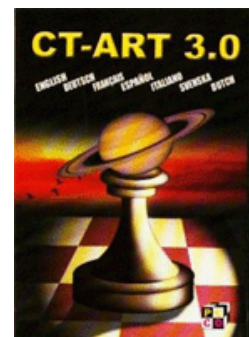
In the next phase, Aquarium goes to work on the most interesting parts of the game. It digs into the improvements suggested in the previous phase using auto-play, leading to a more reliable assessment. In case there are many blunders the most important ones are assigned a higher priority.

Prioritization and other decisions related to the analysis are based on so-called mini-max evaluations that come from iterative deepening and the analysis of whole variations instead of single positions. Consequently, some mistakes that appeared to be minor during initial analysis may turn out to be major blunders after deeper analysis and vice versa. This unique feature of Aquarium's Game Analysis sets it apart from other implementations.

In the final phase, Aquarium inserts the results of the analysis into the game as variations and evaluations. The user can choose settings that affect the annotations, such as the number of variations added to the game. If the number is set to a low value, only the most important blunders will be annotated. Otherwise all of them will be annotated.

One interesting feature of Game Analysis is the annotation of "tempting" moves that actually are blunders. Let's say a player had a chance to capture a piece with a pawn, but didn't do it. If the capture would have been a mistake, Aquarium will show the capturing move (with a "?") and the variation that refutes it.

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Running Game Analysis

If you are viewing a game when you start Game Analysis, only that game will be analyzed. If you want to analyze multiple games, open a list with the games and then start the analysis.

| Games list | | | | | | | |
|------------|--------|-------|-----------------|----------|-----------------|----------|-------|
| | GameNo | Flags | White | WhiteElo | Black | BlackElo | Score |
| 1 | 10 | | Karpov Anatoly | 2700 | Korchnoi Viktor | 2695 | 1:0 |
| 2 | 11 | | Korchnoi Viktor | 2695 | Karpov Anatoly | 2700 | 0:1 |
| 3 | 15 | | Korchnoi Viktor | 2695 | Karpov Anatoly | 2700 | 0:1 |
| 4 | 17 | | Korchnoi Viktor | 2695 | Karpov Anatoly | 2700 | 1:0 |
| 5 | 21 | | Karpov Anatoly | 2705 | Kasparov Garry | 2715 | 0:1 |
| 6 | 23 | | Karpov Anatoly | 2705 | Kasparov Garry | 2715 | 1:0 |

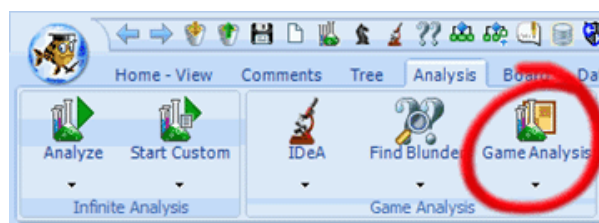
Game Analysis will analyze all six games

If some of the games in the list are marked, then only those games will be analyzed.

| Games list | | | | | | | |
|------------|--------|-------|-----------------|----------|-----------------|----------|-------|
| | GameNo | Flags | White | WhiteElo | Black | BlackElo | Score |
| 1 | 10 | | Karpov Anatoly | 2700 | Korchnoi Viktor | 2695 | 1:0 |
| 2 | 11 | | Korchnoi Viktor | 2695 | Karpov Anatoly | 2700 | 0:1 |
| 3 | 15 | | Korchnoi Viktor | 2695 | Karpov Anatoly | 2700 | 0:1 |
| 4 | 17 | | Korchnoi Viktor | 2695 | Karpov Anatoly | 2700 | 1:0 |
| 5 | 21 | | Karpov Anatoly | 2705 | Kasparov Garry | 2715 | 0:1 |
| 6 | 23 | | Karpov Anatoly | 2705 | Kasparov Garry | 2715 | 1:0 |

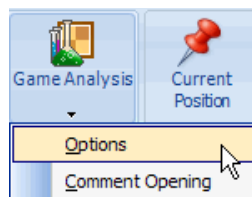
Game Analysis will only analyze the two highlighted games

Game Analysis is started from the Analysis tab, as you might have guessed.



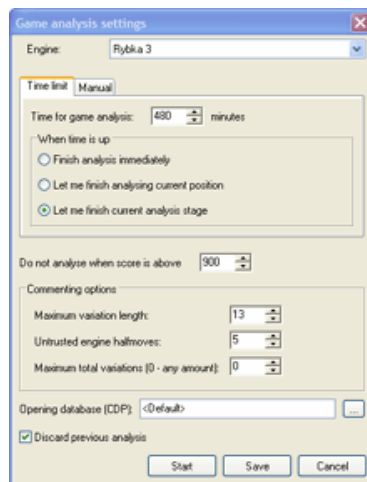
Game Analysis is started from the Analysis tab

The Game Analysis button is a split button. Clicking the downward pointing triangle will drop down a menu as shown in the next image. Clicking somewhere above the triangle will start Game Analysis using the current settings.



Comment Opening adds opening commentary to the current game. The commentary consists of human evaluations, reference games, and pre-computed engine evaluations.

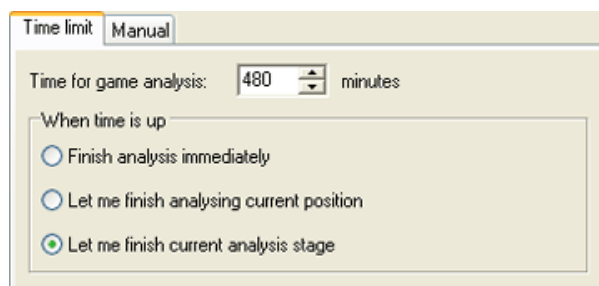
Clicking *Options* on the Game Analysis drop-down menu opens the game analysis settings.



Game Analysis settings

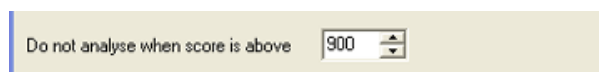
At the top of the window there is a drop-down list (“Engine”) with all installed chess engines. Select the one you want to use for the analysis.

Below the engine there are two tabs, “Time limit” and “Manual.” There is no interaction between these two tabs, so the time settings will be based on the tab that is active when you close the dialog box. In this article I will only discuss the Time limit tab. The reason is that it is simpler and I still haven’t found manual settings that outperform Aquarium’s automatic time allocation.



Game Analysis time settings

“Time for game analysis” specifies the total analysis time in minutes. In this example I have set it to 480 minutes, which is suitable for overnight analysis of a single game. The time specified should be considered approximate. Therefore, Aquarium gives you the option to decide what happens if the analysis is still running when it has used up the allocated time. The available options are listed in the “When time is up” pane. My experience shows that Aquarium seldom oversteps the allocated time by more than a few minutes when I select “Let me finish current analysis stage,” so that is my preferred setting. If you are in a situation where it is important to have the analysis results after exactly the specified time you should choose “Finish analysis immediately.” The option “Let me finish analysing the current position” stops after completing the analysis of the position that is being analyzed when the time runs out.



“Do not analyse when score is above” tells Aquarium to skip the final moves of the game if the same side keeps the advantage and the evaluation (in centipawns) stays above the specified limit. In this example it is set to 900 centipawns or nine pawns.

Rules for adding analysis results to the game

The “Commenting options” shown in the image above do not affect the analysis itself. But after the analysis is finished, they instruct Aquarium how the results should be treated and added to the notation as commentary.

Maximum variation length specifies the maximum length of variations copied from the analysis into the notation.

The variations produced by chess engines can be quite long and the first moves of the variation are usually more accurate than later moves. The *Untrusted engine halfmoves* specifies how many moves should be eliminated from the end of the engine variations.

The number of variations that Game Analysis adds to the notation will never exceed *Maximum total variations*. Setting it to zero allows Game Analysis to decide how many variations will be added.

One of the features of Game Analysis is adding reference games to the opening phase of the analyzed game. This allows you to see how others have played the same opening, where they have tried different moves, etc.

The database for reference games

You can use the default database as shown here, or any other CDP database. This allows you great flexibility in controlling what types of games are referenced. You could, for instance, use a database of recent games by top players. If you are analyzing and publishing games from an ongoing tournament, you might want to add games by the participants to the database. This could be games played previously as well as games played in the tournament itself. Finally, if you are analyzing a local tournament, it might be interesting to have games played by local players in the database.

One of Aquarium’s unique features is that it saves all its analysis to disk. This means that your analysis isn’t lost even if you accidentally turn off your computer while Game Analysis is running. When you resume the analysis, it continues from where it left off. In some cases, however, you may want to repeat the analysis and discard previous results. In that case select “Discard previous analysis.”

After setting all the parameters for Game Analysis, you can “Start” the analysis or “Save” the new settings. Clicking “Cancel” discards any changes you have made.

The Results of Game Analysis

When the analysis is finished, the commentary is automatically added to the game. Before the first move of the game, Aquarium adds information about the computer that was used to run the analysis, the engine, and the analysis time as shown in the image.

Game analysis
Processor: Intel(R) Xeon(R) CPU X5355 @ 2.66GHz
Engine: Rybka 3
Analysis time: 1:03:22

This information can be a helpful reminder at a later time.

The opening moves of the game are not analyzed by the engine. Instead Game Analysis draws information from several sources.

```
[...] 1.e4 c5 2.♘f3 e6 3.♘c3 ♘c6 4.♗b5=
♘d4 5.♘xd4 -0.26 cxd4 6.♘e2 ♖g5 7.
♘xd4 -0.52 N
[7.♗c4 ♖xg2 8.♘g3 ♖h3 9.d3 ♘f6 10.
♗d2 h5 11.a3 b5 12.♗xb5 ♗b8 13.♗a4
♗d6 14.♖f3 h4 15.♗e2 ♘g4 16.♘f1
♖xf3+ ...0-1, Malaniuk Vladimir P 2495 -
Ivanchuk Vassily 2729 , Kiev 1984 Ch
Ukraine]
7...♖c5 8.♘xe6 fxe6 9.a4|-0.76 CAP 9...a6 N
```

Human evaluations. As you can see in the image above the position is evaluated as equal after 4.Bb5. This evaluation is taken from [Chess Databases 2008](#).

CAP evaluations. Aquarium comes with two analysis trees, containing previously analyzed positions, mostly from the opening phase. The smaller one contains 20 million positions analyzed by Rybka and the bigger one has 44 million positions analyzed by Rybka, as well as other engines. You can see examples of evaluations coming from the Rybka tree after White's fifth and seventh moves, as well as the final CAP evaluation that follows White's ninth move and is marked with "CAP."

Reference games. As was mentioned above, you can specify a database that Aquarium will use to add one or more reference games to the opening (*Opening database (CDP)* in the Game analysis settings). An example is shown above after White's seventh move, where a game fragment between Malaniuk and Ivanchuk has been inserted.

Novelty. Aquarium searches for two types of novelties. The first uses a tree created from HugeBase (Atrees\statistics\d2m). In the game above, 9...a6 is a novelty that was not found in the tree. The second one uses the opening database from which the reference games are taken. The move 7. Nxd4 was not found in the database, so it is marked with an 'N' and a reference game follows. Note that if I had chosen HugeBase as a reference database, there would be only one 'N' as the tree is built from that database. In that case Aquarium would insert a different game after 9...a6, probably played by much lower rated players. Another idea is to use a database with your own games. In that case you would immediately see where the game deviates from your own, and how your game continued at that point.

After the opening, the engine analysis takes over. The image below shows an example of analysis by Rybka.

10.d4 ♖c7 11.♙d3 d6 12.O-O ♙d7 13.
 ♙e3 ♜f6 14.f4 d5? +0.68
 [14...g6! 15.c4 ♙e7 16.e5 ♜h5 17.g4
 ♜g7 18.b4 O-O 19.b5 dxe5 20.fxe5 ♖a5 -
 0.60]
 15.e5 ♜e4 +0.93
 [15...♜g8 16.♖h5+ ♜d8 17.f5 exf5 18.
 ♙xf5 ♜e7 19.♙xh7 ♖b6 20.♖g5 ♖h6
 21.♖xh6 gxh6 +0.68]
 16.c4 g6 +1.72 17.♖c2?? +0.00
 [17.f5! gxf5 18.♖h5+ +1.72]

Here we see three variations which have been inserted by Game Analysis. Let's take a closer look at the last one. White's move 17.Qc2 is adorned with a "??" meaning that it is a blunder. Rybka's evaluation of the position after that move is +0.00 (=). As an improvement, Rybka suggests the variation 17.f5 gxf5 18.Qh5+ with an evaluation of +1.72. This tells us that White would have had a much better game after 17.f5 instead of 17.Qc2.

Game Analysis is a valuable addition to other analysis tools available in Aquarium. It's fully automatic, so you can let it run overnight and have the completed analysis available in the morning. It gives detailed information about all phases of the game and its advanced analysis method means that it's more likely to give a realistic assessment of the game.

Major update to Aquarium

I recommend that you check out the new Aquarium version 3.07. It is a major update. It's free for existing customers and adds new features such as greatly enhanced database handling, printing and exporting (including web publishing). All the new features are explained in the Aquarium [FAQ](#).

The update can be downloaded through the ChessOK Downloader. For further information see the [announcement](#) on the Aquarium support forum.

Many of the Chess Assistant programs described by Dadi in this column are available in the [USCFSales Online Catalog](#).

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