

# Contest Log Analyzer

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A Python-based tool for in-depth analysis and comparison of amateur radio contest logs. This application processes standard Cabrillo files to generate detailed reports, charts, and visualizations, providing deep insights into operator strategy and performance.

## Key Features

- **Data-Driven Architecture:** Uses simple JSON files to define the rules, scoring, and exchange formats for each contest, making the tool highly extensible.
- **Run/S&P Heuristics:** A sophisticated, multi-pass heuristic analyzes QSO timing and frequency to classify each contact as "Run," "Search & Pounce," or "Unknown," providing a clear picture of operating strategy.
- **Unique vs. Common QSO Analysis:** The analyzer precisely identifies "unique" QSOs (worked by only one of two logs) and "common" QSOs (worked by both), breaking them down by Run/S&P status to reveal strategic advantages.
- **Cumulative Difference Plots:** Goes beyond traditional rate graphs by presenting QSO and Point rate data in "Cumulative Difference Plots," which visualize performance trends and momentum shifts much more clearly.
- **Animated Hourly Replay:** Generates an MP4 video that visualizes the entire contest on an hour-by-hour basis, showing cumulative scores, QSO rates, and band-by-band totals for up to three logs.
- **Annotated CSV Output:** Generates detailed, "annotated" CSV files from the processed logs, perfect for loading into Excel or other tools for custom analysis and prototyping.
- **Contest-Specific Scoring:** A modular system calculates QSO points based on the official rules for supported contests (ARRL-DX, ARRL-SS, CQ-WPX, CQ-WW).
- **Dynamic Reporting Engine:** A flexible, "plug-and-play" system for generating a wide variety of text, plot, and chart-based reports.

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## Usage

The analyzer is run from the command line using `main_cli.py`.

### Basic Syntax

```
python main_cli.py --report <ReportID|all|chart|text|plot|animation|html> <LogFile1> [<LogFile2>]
```

### Examples

- **Generate all available reports for two logs:**

**CODE\_BLOCK** `python main_cli.py --report all Logs/2024/cq-ww-cw/k3lr.log Logs/2024/cq-ww-cw/kc1xx.log`  
**CODE\_BLOCK**

Generate a specific report (Score Summary) for a single log:

**CODE\_BLOCK** python main\_cli.py --report score\_report Logs/2024/cq-ww-cw/k3lr.log **CODE\_BLOCK**

- **Generate a Missed Multipliers report for CQ WW Zones:**

**CODE\_BLOCK** python main\_cli.py --report missed\_multipliers --mult-name Zones Logs/2024/cq-ww-cw/k3lr.log Logs/2024/cq-ww-cw/kc1xx.log **CODE\_BLOCK**

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## Supported Contests

The analyzer uses the `CONTEST:` field in the Cabrillo header to apply contest-specific rules. The following contests are currently supported:

- ARRL 10 Meter
- ARRL DX (CW & SSB)
- ARRL Field Day
- ARRL Sweepstakes
- CQ 160-Meter
- CQ WPX (CW & SSB)
- CQ World Wide DX (CW & SSB)
- North American QSO Party (NAQP)

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## Available Reports

All generated files are saved to a structured directory under `reports/YYYY/CONTEST_NAME/`.

### Animation Reports (`animations/`)

- `hourly_animation`: Hourly Rate Animation

### HTML Reports (`html/`)

- `html_qso_comparison`: HTML QSO Comparison Report

### Chart Reports (`charts/`)

- `chart_point_contribution`: Point Contribution Breakdown
- `chart_point_contribution_single`: Point Contribution Breakdown (Single Log)
- `qso_breakdown_chart`: QSO Breakdown Chart

### Plot Reports (`plots/`)

- `band_activity_heatmap`: Band Activity Heatmap
- `comparative_band_activity`: Comparative Band Activity
- `comparative_band_activity_heatmap`: Comparative Band Activity Heatmap
- `comparative_run_sp_timeline`: Comparative Activity Timeline (Run/S&P)
- `cumulative_difference_plots`: Cumulative Difference Plots
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- `point_rate_plots`: Point Rate Comparison Plots
- `qso_rate_plots`: QSO Rate Comparison Plots

## Text Reports (`text/`)

- `comparative_continent_summary`: Comparative Continent QSO Summary
  - `comparative_score_report`: Comparative Score Report
  - `continent_breakdown`: Continent QSO Breakdown
  - `continent_summary`: Continent QSO Summary
  - `missed_multipliers`: Missed Multipliers Report
  - `multiplier_summary`: Multiplier Summary
  - `multipliers_by_hour`: Multipliers by Hour
  - `qso_comparison`: QSO Comparison Summary
  - `rate_sheet`: Hourly Rate Sheet
  - `rate_sheet_comparison`: Comparative Rate Sheet
  - `score_report`: Score Summary
  - `summary`: QSO Summary
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