Documentation for `solution.py` - Signal Analysis Tool

Overview

`solution.py` is a Python command-line tool designed for signal analysis. It offers functionalities to analyze signal data from CSV files and generate optimal MIN-MAX water peak thresholds. The tool is equipped with two primary commands: `analyze` and `water`.

Prerequisites

- Python (Version 3.x)
- Required Python libraries: ***pandas, numpy, matplotlib, scipy, click.***

To install the required libraries, run the following command in your terminal:

```
pip install -r requirements.txt
```

This will install all the dependencies listed in the `requirements.txt` file.

Commands

1. **`analyze`**

- Description: Analyzes signal data from a provided CSV file and optionally saves the analysis results to another CSV file.
- Usage:

```
python solution.py analyze INPUT_FILE [--save OUTPUT_FILE]
```

  - `INPUT_FILE`: Path to the CSV file containing signal data.
  - `--save OUTPUT_FILE` (optional): Path to save the analysis results. If not provided, results will not be saved.

2. **`water`**

- Description: Generates optimal MIN-MAX water peak thresholds based on the provided signal data.
- Usage:

```
python solution.py water INPUT_FILE [--non-baseline-fixed]
```

  - `INPUT_FILE`: Path to the CSV file containing signal data.
  - `--non-baseline-fixed` (optional flag): If provided, processes the signal without baseline correction.

Usage Examples

1. Analyze Signal Data:
- Command:

```
python solution.py analyze "path/to/signal.csv"
```

- This command analyzes the signal data in `signal.csv` and generates a ***peak_detection.png*** image file to show the plot.

2. Analyze and Save Results in csv file:
- Command:

```
python solution.py analyze "path/to/signal.csv" --save "results.csv"
```

- This command analyzes the signal data, generates a ***peak_detection.png*** image file to show the plot. and saves the results to `results.csv`.

3. Generate Water Peak Thresholds:
- Command:

```
python solution.py water "path/to/signal.csv"
```

- Generates threshold and shows in console and saves the water peaks in ***water_peak.png*** image file based on the provided signal data.

4. Generate Water Peak Thresholds without Baseline Correction:
- Command:

```
python solution.py water "path/to/signal.csv" --non-baseline-fixed
```

- Generates threshold without fixing baseline and shows in console and saves the water peaks in ***water_peak.png*** image file based on the provided signal data.

5. Generate Water Peak Thresholds without Baseline Correction:
- Command:

```
python solution.py --help
python solution.py water --help
python solution.py analyze --help
```

- Each command will show help window for related their section

Notes

- Ensure that the CSV file paths are correctly specified. If a file path contains spaces, enclose it in quotes.
- The `--save` option in the `analyze` command is optional. If not used, the analysis results will only be displayed and not saved.