User Manual for Bayesian Optimization Tool

1 Installation

1. Clone the repository:

```
git clone https://github.com/aqilmarwan/cpt-bayesian.git
cd cpt-bayesian
```

2. Install dependencies:

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

2 Basic Usage

2.1 Running Bayesian Optimization

To run the Bayesian Optimization on all datasets:

```
python bayesian_optimization.py
```

2.2 Comparing with Random Search

To compare Bayesian Optimization with Random Search:

```
python comparison_methods.py --budget 100 --repetitions 5
```

2.3 Generating Visualizations

To generate visualization plots:

```
python comparison_convergence.py    # Convergence plot for Apache
python comparison_improvement.py     # Performance improvement across systems
python comparison_efficiency.py      # Search efficiency analysis
```

3 Command-line Arguments

- `--budget`: Number of configurations to evaluate (default: 100)

- `--repetitions`: Number of repetitions for statistical analysis (default: 5)

- `--output_dir`: Directory to save results (default: 'comparison_results')

4 Input Data Format

The tool expects CSV files in the `datasets` folder with the following format:

- Columns 1 to n-1: Configuration parameters (discrete integer values)

- Column n: Performance metric to optimize

5   Output Files

- `bo_search_results/`: Contains CSV files with search results from Bayesian Optimization

- `bo_visualization_results/`: Contains PNG files with visualization of results

- `comparison/`: Contains comparison analysis between methods