Interactive Automatic Algorithm Configuration for Bi-Objective Optimization

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Automatic Algorithm Configuration (e.g., irace)

\[ I: \text{training instances} \]
\[ A: \text{target algorithm} \]
\[ m: \text{performance metric} \]

Parameter space
- types
- domains

Best configuration found $\theta^*$

Evaluate configuration $\theta$

Aggregate performance values

\[ a_A(z) = \Pr\{A \leq z\} \]

Empirical Attainment Function (EAF)

Use EAF differences to elicit preferences about incomparable configurations of a multi-objective optimizer

Convert EAF differences into a weighted hypervolume

Use this weighted hypervolume to guide the automatic algorithm configuration of a multi-objective optimizer

\[ \text{irace + hypervolume} = \text{AAC of multi-objective algorithms} \]

HV assumes a preference that may be different from the DM's!

Empirical Attainment Function (EAF)

Weighted HV

irace + WHV

\[ \{0.9, 1.0\} \]
\[ \{0.7, 0.9\} \]
\[ \{0.6, 0.7\} \]
\[ \{0.4, 0.6\} \]
\[ \{0.3, 0.4\} \]
\[ \{0.1, 0.3\} \]
\[ \{0.0, 0.1\} \]