



NO FREE LUNCH THEOREM

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NO FREE LUNCH AND AI

- Finding the best solution among a set of possibilities within AI
- The 'no free lunch' theorem applies to all optimisers and algorithms, not just AI
- The “no free lunch” theorem for supervised machine learning essentially implies that no single machine learning algorithm is universally the best-performing algorithm for all problems.



KEY IMPLICATIONS OF NO FREE LUNCH FOR AI

- **There is no one-size-fits-all algorithm:**
No single AI algorithm works best for every problem. Different algorithms excel in different domains and tasks.
- **Focus on problem definition:**
Understanding the specific problem, its data, and constraints is crucial for choosing the most effective algorithm.
- **Inductive biases matter:**
Algorithms make assumptions about the world (biases) that influence their learning. Choosing algorithms with appropriate biases for the problem is essential.
- **Blindly trusting benchmark results:**
Benchmarks compare algorithms on specific datasets, but real-world performance on new tasks may differ.



THE FUTURE OF AI

- Encourage critical thinking and experimentation in algorithm selection.
- The importance of understanding algorithm strengths and weaknesses.
- Techniques like meta-learning that combine algorithms for improved performance.
- Promote research into problem-specific AI design and adaptation.

