Why

We want to make a statement like "good performance on a correctly labeled training dataset of independent and identically distributed inputs leads to good generalization error."

ERM Learns Finite Realizable Classes

PAC Learnable Hypotheses

Hypothesis Classes — Probably Approximately Correct Induction

Supervised Probabilistic Data Models

Independent and Identically Distributed Random Variables

Prediction — Independent Random Variables

Independent Sigma Algebras — Random Variables

Dependent Events — Measurable Functions — Probability Measures — Topological Sigma Algebras — Approximation

Conditional Event Probabilities — Measures — Topologies — Similarity Functions

Sigma Algebras — Event Probabilities — Metrics

Real Series — Extended Real Numbers — Distance

Real Limits — Space Distance

Absolute Value — Plane Distance

Probability Distributions — Interval Length

Intervals — Real Space

Real Line — Real Plane

Real Sequences

Sequences — Subset Algebras — Real Optimizers — Real Summation — Real Order — Integral Line

Lists — Cardinality — Real Numbers — Rational Order — Geometry

Set Numbers — Optimizers — Rational Numbers

Direct Products — Finite Sets — Integer Arithmetic

Equivalent Sets — Natural Summation — Natural Additive Identity — Natural Multiplicative Identity — Integer Products

Family Unions and Intersection — Function Inverse — Family Operations — Comparisons — Identity Elements — Arithmetic — Integer Order — Integer Sums

Function Composites — Function Image — Families — Operations — Orders — Natural Power — Integer Numbers

Functions — Converse Relations — Equivalence Relations — Natural Order — Natural Products

Relations — Natural Sums

Subset Systems — Set Products — Recursion Theorem

Ordered Pairs — Set Powers — Peano Axioms

Uncertain Outcomes — Natural Induction

Generalized Set Dualities — Unordered Triple — Natural Numbers

Set Union and Intersection — Set Dualities — Successor Sets — Intersection of Empty Set — Partition — Set Symmetric Differences

Pair Union — Set Intersection — Set Complements

Pair Intersection — Set Union — Set Differences

Unordered Pair — Empty Set

Set Specification

Set Equality

Set Inclusion

Standardized Accounts

Accounts

Deduction

Quantified Statements

Logical Statements

Statements

Identities — Sets

Names

Letters — Objects