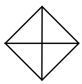


Why

Linear predictors are simple and we know how to select the parameters. The main downside is that there may not be a linear relationship between inputs and outputs.

Definition

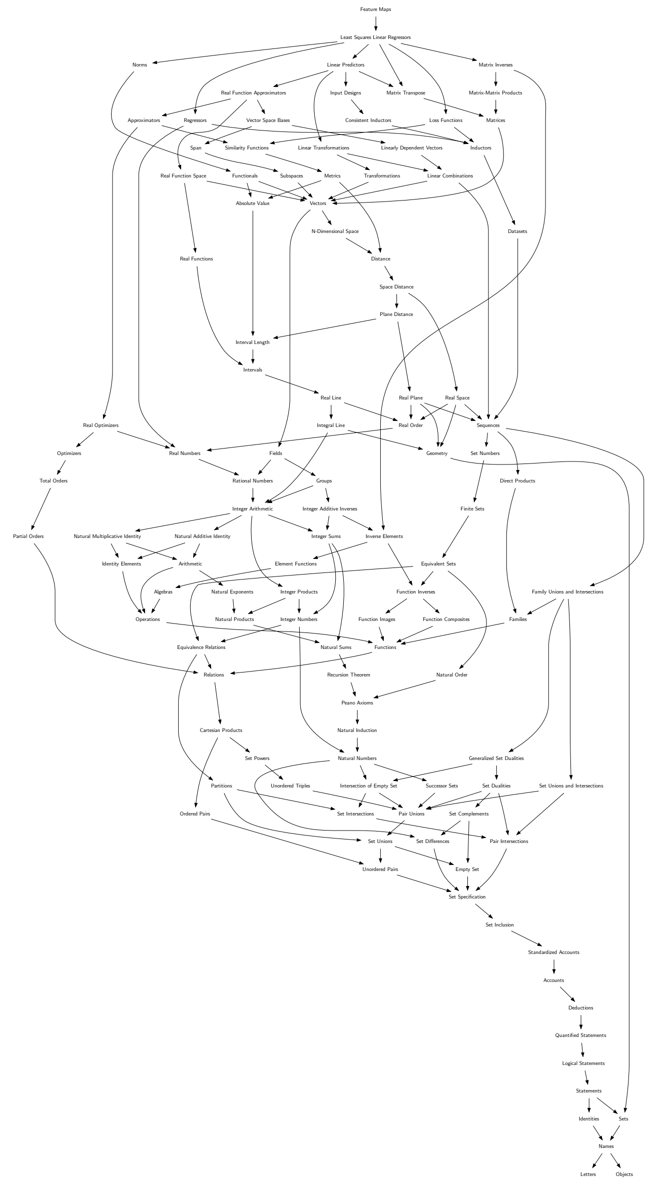
A *feature map* for outputs A is a mapping $\phi : A \to \mathsf{R}^d$. In this setting, we call $a \in A$ the *raw input record* and we call $\phi(a)$ an *embedding*, *feature embedding* or *feature vector*. We call the components of a feature vector the *features*.

A feature map is *faithful* if, whenever records a_i and a_j are in some sense "similar" in the set A, the embeddings $\phi(a_i)$ and $\phi(a_j)$ are close in the vector space R^d.

Since it is common for raw input records $a \in A$ to consist of many fields, it is regular to have several feature maps ϕ_i which operate component-wise on the fields of a. These are sometimes called *basis functions*.[1] We concatenate these field feature maps and commonly add a constant feature 1. Since R^d is a vector space, it is common to refer to it in this case as the *feature space*.

Given a dataset $a = (a^1, \dots, a^n)$ in A and a feature map $\phi : A \to \mathsf{R}^d$, the *embedded dataset* of a with respect to ϕ is the dataset $(\phi(a^1), \dots, \phi(a^n))$ in R^d.

[1] Future editions will clarify, and perhaps remove.


Feature Maps
Least Squares Linear Regressors
Norms
Linear Predictors
Matrix Inverses
Real Function Approximators
Input Designs
Matrix Transpose
Matrix-Matrix Products
Approximators
Regressors
Vector Space Bases
Consistent Inductors
Loss Functions
Matrices
Span
Similarity Functions
Linear Transformations
Linearly Dependent Vectors
Inductors
Real Function Space
Functionals
Subspaces
Metrics
Transformations
Linear Combinations
Absolute Value
Vectors
N-Dimensional Space
Datasets
Real Functions
Distance
Space Distance
Plane Distance
Interval Length
Intervals
Real Line
Real Plane
Real Space
Real Optimizers
Integral Line
Real Order
Sequences
Optimizers
Real Numbers
Fields
Geometry
Set Numbers
Total Orders
Rational Numbers
Groups
Direct Products
Integer Arithmetic
Integer Additive Inverses
Finite Sets
Partial Orders
Natural Multiplicative Identity
Natural Additive Identity
Integer Sums
Inverse Elements
Identity Elements
Arithmetic
Element Functions
Equivalent Sets
Algebras
Natural Exponents
Integer Products
Function Inverses
Family Unions and Intersections
Operations
Natural Products
Integer Numbers
Function Images
Function Composites
Families
Equivalence Relations
Natural Sums
Functions
Relations
Recursion Theorem
Natural Order
Peano Axioms
Cartesian Products
Natural Induction
Set Powers
Natural Numbers
Generalized Set Dualities
Partitions
Unordered Triples
Intersection of Empty Set
Successor Sets
Set Dualities
Set Unions and Intersections
Ordered Pairs
Set Intersections
Pair Unions
Set Complements
Set Unions
Set Differences
Pair Intersections
Unordered Pairs
Empty Set
Set Specification
Set Inclusion
Standardized Accounts
Accounts
Deductions
Quantified Statements
Logical Statements
Statements
Identities
Sets
Names
Letters
Objects