Why

A simple example of an embedding.[1]

Definition

Fix $d \in \mathbf{N}$. A *polynomial feature map* of degree d is a function $\phi : \mathbf{R} \to \mathbf{R}^d$ with

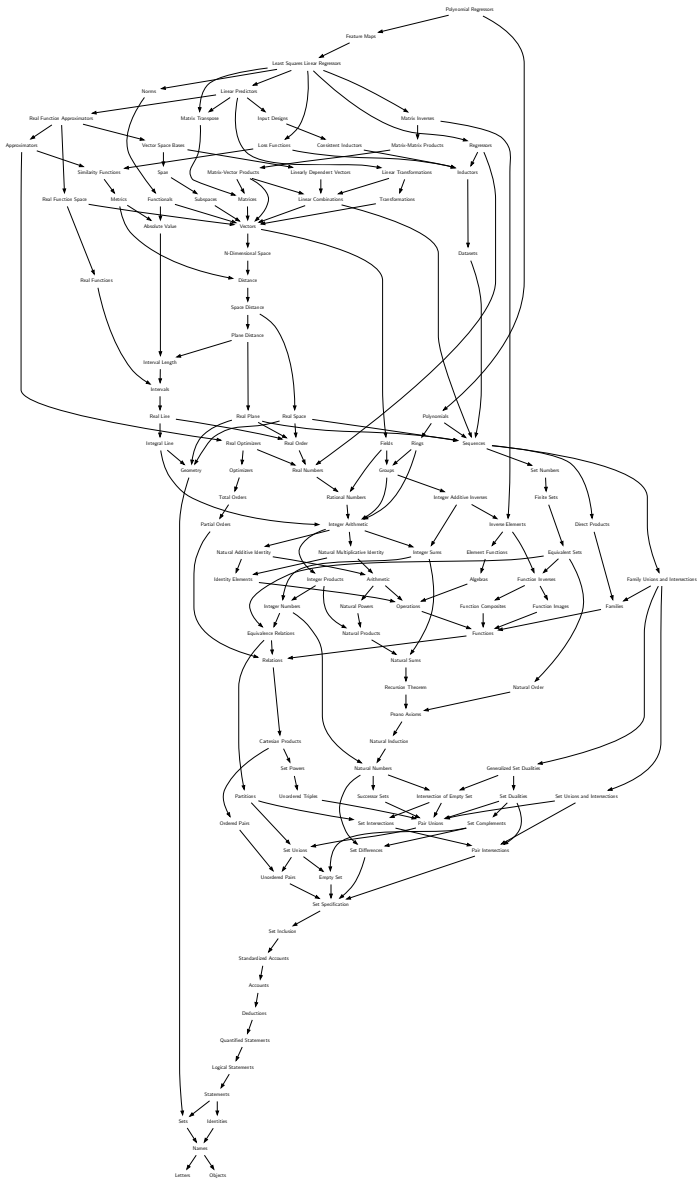
$$\phi(x) = \begin{pmatrix} 1 & x^2 & \cdots & x^d \end{pmatrix}^\top .$$

For $x \in \mathbf{R}$, we call $\phi(x)$ the *polynomial embedding* of x.

A *polynomial regressor* is a least squares linear predictor using a polynomial feature embedding (of any degree, but to be precise one must specify the degree). The task of consructing a linear predictor is often referred to as *polynomial regression*.

Given a dataset of paired records $(x^1, y^1), \ldots, (x^2, y^2) \in \mathbf{R}^2$, one can construct a predictor $g : \mathbf{R} \to \mathbf{R}$ for y by embedding the dataset $(\phi(x^1), \ldots, \phi(x^n))$ and finding the least squares linear regressor $f : \mathbf{R}^d \to \mathbf{R}$ for y. One defines the predictor $g : \mathbf{R} \to \mathbf{R}$ by $g(\phi(x))$.

[1] Future editions will expand, or perhaps collapse this sheet.


Polynomial Regression
Feature Maps
Least Squares Linear Regression
Norms
Linear Predictors
Real Function Approximation
Matrix Transpose
Input Designs
Matrix Inverses
Approximation
Vector Space Bases
Loss Functions
Consistent Inductors
Matrix-Matrix Products
Regressors
Similarity Functions
Span
Matrix-Vector Products
Linearly Dependent Vectors
Linear Transformations
Inductors
Real Function Space
Metrics
Functionals
Subspaces
Matrices
Linear Combinations
Transformations
Absolute Value
Vectors
N-Dimensional Space
Datasets
Real Functions
Distance
Space Distance
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Interval Length
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Real Line
Real Plane
Real Space
Polynomials
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Real Order
Fields
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Optimizers
Real Numbers
Groups
Set Numbers
Total Orders
Rational Numbers
Integer Additive Inverses
Finite Sets
Partial Orders
Integer Arithmetic
Inverse Elements
Direct Products
Natural Additive Identity
Natural Multiplication Identity
Integer Sums
Element Functions
Equivalent Sets
Identity Elements
Integer Products
Arithmetic
Algebras
Function Inverses
Family Unions and Intersections
Integer Numbers
Natural Powers
Operations
Function Composites
Function Images
Families
Equivalence Relations
Natural Products
Functions
Relations
Natural Sums
Recursion Theorem
Natural Order
Peano Axioms
Cartesian Products
Natural Induction
Set Powers
Natural Numbers
Generalized Set Duality
Partitions
Unordered Triples
Successor Sets
Intersection of Empty Set
Set Duality
Set Union and Intersection
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
Sets
Identities
Name
Lemas
Objects