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

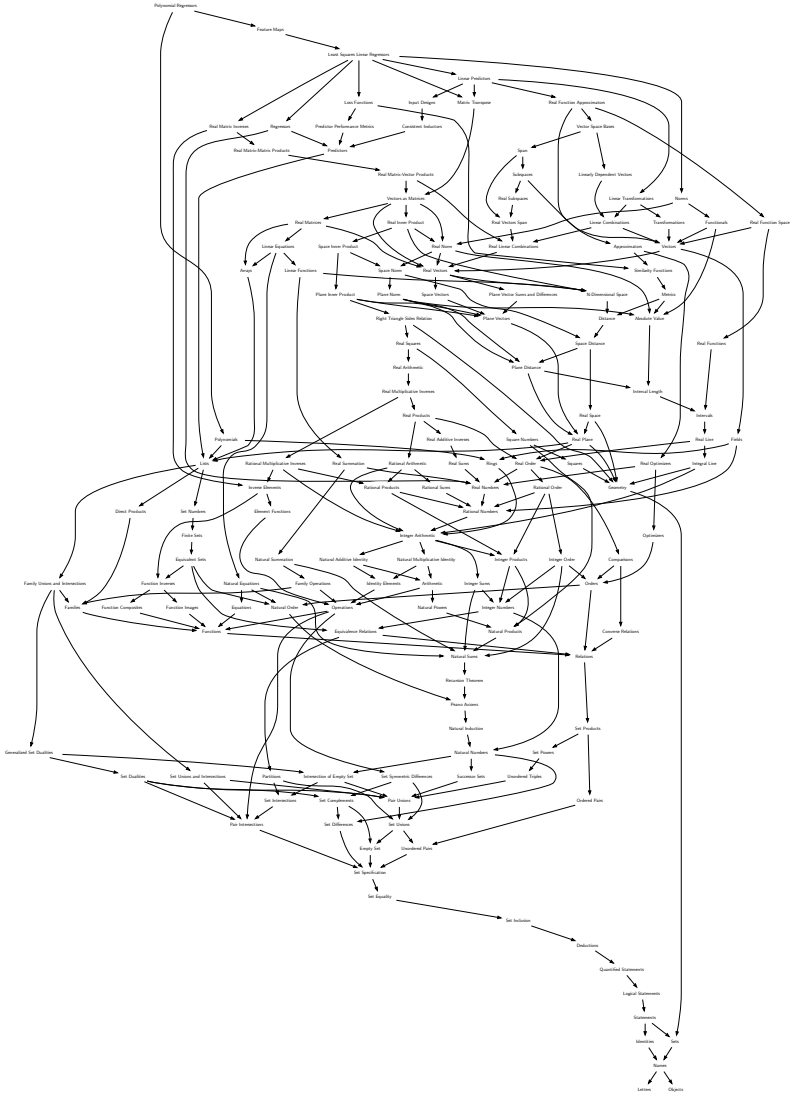
$$\phi(x) = \begin{pmatrix} 1 & x^2 & \cdots & x^d \end{pmatrix}^\top.$$

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 $(x^1, y^1), \ldots, (x^n, y^n) \in \mathbf{R}^2$, 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
Linear Prediction
Loss Functions
Input Designs
Matrix Transpose
Real Function Approximation
Real Matrix Inverse
Regression
Prediction Performance Metrics
Constraint Inductors
Vector Space Bases
Prediction
Span
Real Matrix-Matrix Products
Real Matrix-Vector Products
Subspaces
Linearly Dependent Vectors
Vectors as Matrices
Real Subspaces
Linear Transformations
Norms
Real Matrices
Real Inner Product
Real Vector Spaces
Linear Combinations
Transformations
Functionals
Real Function Space
Linear Equations
Space Inner Product
Real Norm
Real Linear Combination
Approximation
Vectors
Arrays
Linear Functions
Space Norms
Real Vectors
Similarity Functions
Plane Inner Product
Plane Norm
Space Vectors
Plane Vector Sums and Differences
N-Dimensional Space
Metrics
Right Triangle Side Relations
Plane Vectors
Elements
Absolute Value
Real Numbers
Space Distance
Real Functions
Real Arithmetic
Plane Distance
Interval Length
Real Multiplicative Inverses
Real Products
Real Space
Intervals
Polynomials
Real Additive Inverses
Square Numbers
Real Plane
Real Line
Fields
Integers
Rational Multiplicative Inverses
Real Exponentiation
Rational Arithmetic
Real Sums
Rings
Real Order
Squares
Real Optimizers
Integral Line
Access Elements
Rational Products
Natural Sums
Real Numbers
Rational Order
Direct Products
Set Numbers
Element Functions
Rational Numbers
Integer Arithmetic
Optimizers
Finite Sets
Equivalent Sets
Natural Successors
Natural Additive Identity
Natural Multiplicative Identity
Integer Products
Integer Order
Comparisons
Family Unions and Intersections
Function Inverses
Natural Exponents
Family Operations
Identity Elements
Arithmetic
Integer Sums
Orders
Function
Function Composition
Function Images
Equations
Rational Order
Operations
Natural Powers
Integer Negatives
Functions
Equivalence Relations
Natural Products
Converse Relations
Natural Sums
Relations
Recursive Theorems
Peano Axioms
Natural Induction
Set Products
Generalized Set Dualities
Natural Numbers
Set Powers
Set Dualities
Set Unions and Intersections
Partitions
Intersection of Empty Set
Set Symmetric Differences
Successor Sets
Unordered Triples
Set Intersections
Set Complements
Pair Unions
Ordered Pairs
Pair Intersection
Set Differences
Set Unions
Empty Set
Unordered Pairs
Set Specification
Set Equality
Set Inclusion
Deductions
Quantified Statements
Logical Statements
Statements
Identities
Sets
Atoms
Lattices
Objects