hypergraphs

A GAP package to work with hypergraphs

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Hypergraph Objects

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2.1 Hypergraphs

2.1.1 HHypergraph (for list of vertices and edges)

▷ `HHypergraph(V, Ed)` (method)
▷ `HHypergraph(Ed)` (method)

Returns the hypergraph object, with vertices `V` and hyperedges `Ed`. In the second form, the hyperedges determine the set of vertices, as the union of the hyperedges.

2.1.2 HCompleteHypergraph

▷ `HCompleteHypergraph(n, r)` (function)

Returns the hypergraph that has $\{1 \dots n\}$ as set of vertices, and all r-subsets of $\{1 \dots n\}$ as hyperedges.

2.1.3 HRandomUniformHypergraph

▷ `HRandomUniformHypergraph(n, r, p)` (function)

Returns a hypergraph with set of vertices given by $\{1 \dots n\}$, and where each r-subset of $\{1 \dots n\}$ appears as a hyperedge with probability p.

2.1.4 HRemovedEdge

▷ `HRemovedEdge(H, e)` (function)

Returns the graph obtained from the hypergraph `H` removing its edge `e`.

2.1.5 HRemovedVertex

▷ `HRemovedVertex(H, x)` (function)

Returns the hypergraph obtained from the hypergraph H by removing the vertex x from its list of vertices and from each of its edges. It also removes edges that become empty as a result.

2.2 Properties

2.2.1 IsUniform

▷ `IsUniform(H)` (method)

Determines if the hypergraph H is uniform, that is, if all edges of H have the same cardinality k. If H is uniform, then the function returns k, otherwise, it returns false.

2.2.2 IsSimple

▷ `IsSimple(H)` (method)

Determines whether the hypergraph H is simple. (A hypergraph is simple if no edge is contained in another edge.)

2.2.3 IsConnected

▷ `IsConnected(H)` (method)

Determines whether the hypergraph H is connected.

2.3 Parameters

2.3.1 HDistance

▷ `HDistance(H, x, y)` (function)

Given a hypergraph H and two of its vertices x, y, this function returns the distance in H from x to y.

2.3.2 HDiameter

▷ `HDiameter(H)` (method)

Returns the diameter of the hypergraph H.

2.3.3 HGirth

▷ `HGirth(H)` (method)

Returns the girth of the hypergraph H.

2.4 Lists

2.4.1 Vertices

▷ `Vertices(H)` (method)

Returns the list of vertices of the hypergraph `H`.

2.4.2 Edges

▷ `Edges(H)` (method)

Returns the list of edges of the hypergraph `H`.

2.4.3 HNeighborhood

▷ `HNeighborhood(H, x)` (function)

Given a hypergraph `H` and one of its vertices `x`, returns the set of vertices that share an edge with `x`.

2.4.4 HDistancesFrom

▷ `HDistancesFrom(H, x)` (function)

Given a hypergraph `H` and one of its vertices `x`, it returns a record `L`, where `L.u` is equal to the distance in `H` from the vertex `x` to the vertex `u`.

2.4.5 IndexOfEdges

▷ `IndexOfEdges(H)` (method)

Given a hypergraph `H`, the function returns a record `I`, where `I.u` is a list of the indices of the edges where the vertex `u` appears.

Chapter 3

Library of Hypergraphs

3.1 Hypergraphs

3.1.1 HFano

▷ `HFano` (global variable)

The Fano hypergraph.

3.1.2 HQuad

▷ `HQuad` (global variable)

The hypergraph of the smallest generalized quadrangle.

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