

# Transversal Hypergraph Generation: Algorithmic state of the art

(A guided tour of known algorithms including a practicability  
stopover)

Matthias Hagen

Friedrich-Schiller-Universität Jena, Institut für Informatik, D-07737 Jena,  
hagen@cs.uni-jena.de

In this talk we give an overview of state-of-the-art algorithmic research on TRANSVERSAL HYPERGRAPH GENERATION—given a simple hypergraph, compute all its minimal hitting sets (transversals). Note that this can also be seen as the enumeration of all minimal solutions of some system. Hence, equivalent problems are ubiquitous in various fields such as artificial intelligence, combinatorial optimization, computational biology, databases, data mining, distributed systems, logic, and machine learning. Thus, on the one hand, research on algorithms solving TRANSVERSAL HYPERGRAPH GENERATION and even any technique improving known procedures is very important from a practical application's point of view. On the other hand, TRANSVERSAL HYPERGRAPH GENERATION research is also faced with some very exciting theoretical issues as the decision version—given two simple hypergraphs, decide if one is the transversal hypergraph of the other—is one of the very few problems that currently cannot be classified as polynomial or NP-/coNP-hard.

In this talk, we focus on known algorithms for the general TRANSVERSAL HYPERGRAPH GENERATION problem without any restrictions. We give lower bounds for several algorithms and try to shed some light on practical performance.