Winter term course Automatic Planning:

- **Heuristic functions**: Partial delete relaxation, abstractions, landmarks, critical-path heuristics, cost partitionings.
- **Analyzing heuristic functions**: Compilability between heuristic functions, search space surface analysis.
- **Optimality-preserving state-space reduction methods**: Partial-order reduction, symmetry reduction, simulation-based dominance pruning.
- **International Planning Competition**: Languages, systems, results.
- **Practical experience**: You’ll implement your own planning system and participate in a planning competition at the end of the course.

Active research in my research group FAI:

- **Star-Topology Decoupling**: A new state-space decomposition technique that can yield vast savings on problems with a client-server nature. Currently: Model checking, liveness properties, weak memory models.
Active research in my research group FAI: (continued)

- **NoGood learning**: The first technique able to learn sound and generalizing knowledge from dead-end states during state space search. Currently: Probabilistic planning.

- **Planning and ML**: Using neural networks (NN) to learn heuristic functions and/or action policies. Model checking and visualizing NN action policies.

- **Explainable AI Planning (XAIP)**: Analyzing plan-property dependencies to explain the space of plans. User studies, NASA collaboration, deeper “Why?” questions, identifying relevant plan properties automatically, . . .

- **Minecraft instruction generation (collab CoLi department)**: Hierarchical planning methods combined with natural language generation to plan instruction texts for constructing complex objects in Minecraft.

- **Automated security testing (collab CISPA)**: Modeling attackers on networks, email infrastructure, etc. to analyze possible attacks; modeling defenses to assess cost-security trade-offs.