- The **Intelligent Data Analysis** Lab

IDA
Intelligent Data Analysis
RESEARCH GROUP

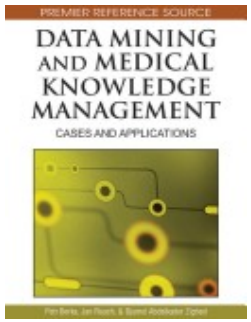
- Part of the **Computer Science** department

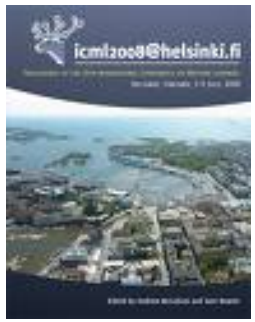
DEPARTMENT OF
COMPUTER
SCIENCE
CZECH TECHNICAL UNIVERSITY IN PRAGUE

- Develops **Data Mining** and **Machine Learning** solutions
- Using **Artificial Intelligence** and **Statistics**
- Applying in **Industry** and **Bioinformatics**
- Lab/Dept. head: **Filip Zelezny**

# Our recent sample contributions in basic research

- Šourek, G.; Aschenbrenner, V.; Železný, F.; Schockaert, S.; Kuželka, O.: **Lifted Relational Neural Networks**: Efficient Learning of Latent Relational Structures, **Journal of Artificial Intelligence Research**, 62 pp. 69-100, 2018.
- Kléma, J.; Malinka, F.; Železný, F.: **Semantic biclustering** for finding local, interpretable and predictive expression patterns, **BMC Genomics**, 18(4132), 2017.
- Kungurtsev, V.; Jäschke, J.: A Predictor-Corrector Path-Following Algorithm for Dual-Degenerate Parametric **Optimization Problems**. **SIAM JOURNAL ON OPTIMIZATION**, 27(1), 538-564, 2017.





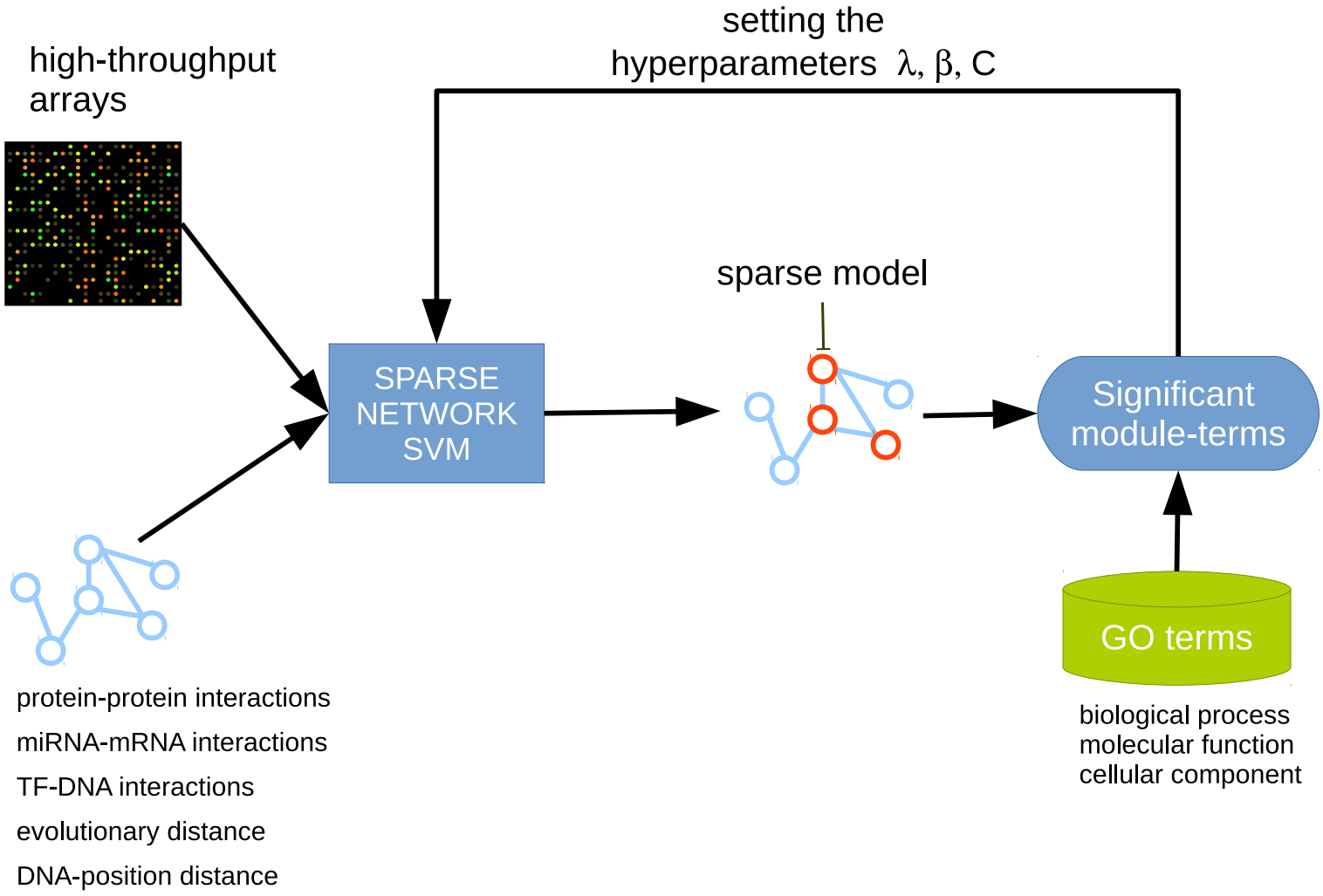
# Applied project examples: SUPREME

- **FP7** project (2012-2015)
- Embedded sensors in paper mill
- IDA developed predictors of paper breakage from sensor data

# Applied project examples: Combinatorial Design of Mechanical Keys

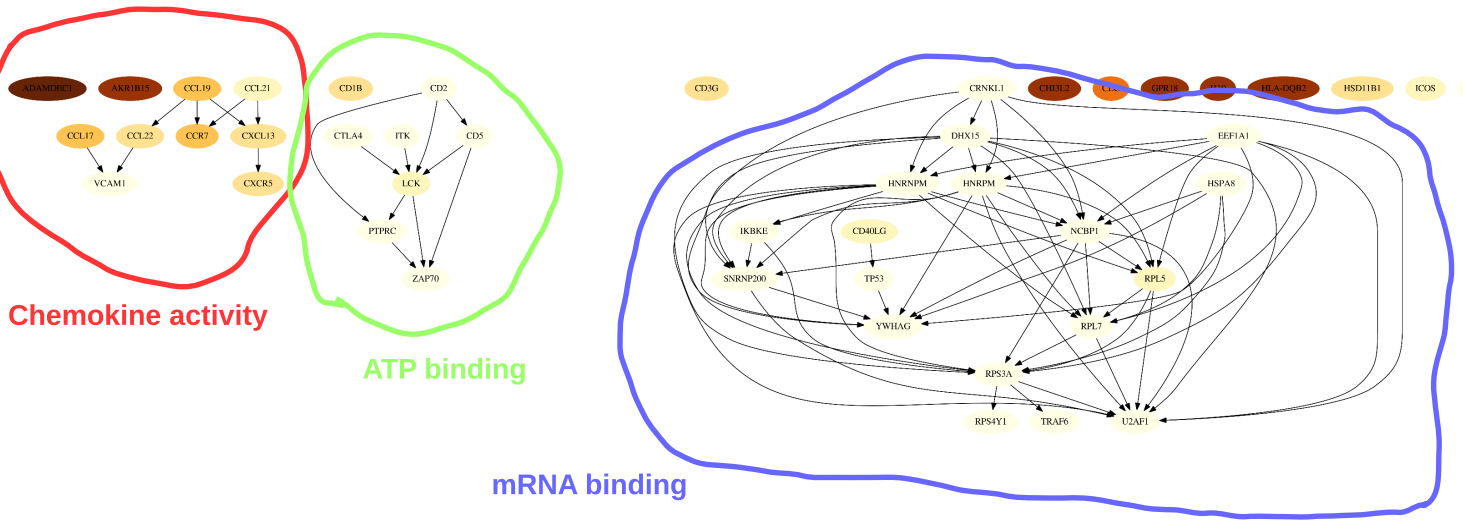
- Contractual research (2013-now) funded by **Assa Abloy**
- Compute shapes of keys and locks to satisfy key/lock relations
- First successful project (within AA group) with this aim in Europe
- Very large combinatorial problem, brute force won't do

# Biological research: sparse-network SVM



# Biological research: sparse-network SVM

- **Renal transplant rejection** study solved with ICEM Prague,
- GE microarray data: 16,000 features, 10 examples
  (two types of vascular rejection: 6 x 4)
- 79,288 protein-protein interactions (HPRD database)




Renal transplant rejection: Output of sparse-network SVM.