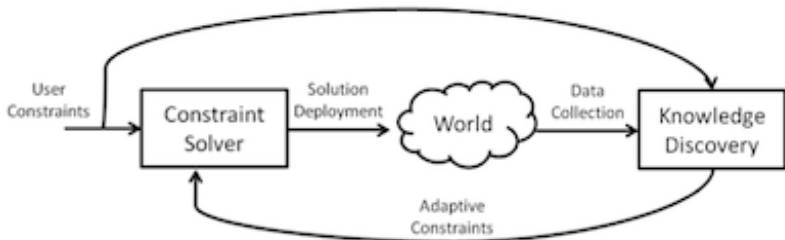


# ICON: an update

14 September 2015

## EU-FP7 FET project Inductive Constraint Programming



- ▷ summary of ICON project
- ▷ will be published by Springer (soon)
- ▷ chapters on ICON work and context from outside authors

- ▷ Learning Modulo Theories
- ▷ New Approaches to Constraint Acquisition
- ▷ Learning Constraint Satisfaction Problems: An ILP Perspective
- ▷ ModelSeeker: Building Constraint Models with Global Constraints from Positive Examples
- ▷ Algorithm Selection for Combinatorial Search Problems: A Survey
- ▷ Automated Parameter Tuning and Algorithm Configuration: A Review
- ▷ Advanced Portfolio Techniques
- ▷ Adapting Consistency in Constraint Solving
- ▷ Data Mining and Constraints: An Overview
- ▷ A Novel Hybrid Approach to Prototype-based Clustering
- ▷ Modeling Data Mining Problems in MiningZinc
- ▷ Partition-Based Clustering using Constraint Optimization
- ▷ ICON Show Cases and Challenges

ICON challenge on algorithm selection

*ICON challenge  
on Algorithm Selection*

<http://challenge.icon-fet.eu/>

ICON challenge on algorithm selection

*ICON challenge  
on Algorithm Selection*

`http://challenge.icon-fet.eu/`  
(Sorry, closed and done now.)

# ICON challenge on algorithm selection

- ▷ submit algorithm selection system to be trained and tested on the Aslib data
- ▷ all data public, split into train/test secret
- ▷ can specify subset of features, presolver
- ▷ time limit of 12 hours
- ▷ evaluate in terms of PAR10, misclassification penalty, number solved
- ▷ normalise by single best and virtual best performance

# ICON challenge on algorithm selection

8 submissions:

- ▷ ASAP\_kNN
- ▷ ASAP\_RF
- ▷ autofolio
- ▷ flexfolio-schedules
- ▷ sunny
- ▷ sunny-presolv
- ▷ zilla
- ▷ zillafolio



# ICON challenge on algorithm selection – results

1. zilla
2. autofolio
3. zillafolio
4. ASAP\_RF
5. ASAP\_kNN
6. flexfolio-schedules
7. sunny-presolv
8. sunny

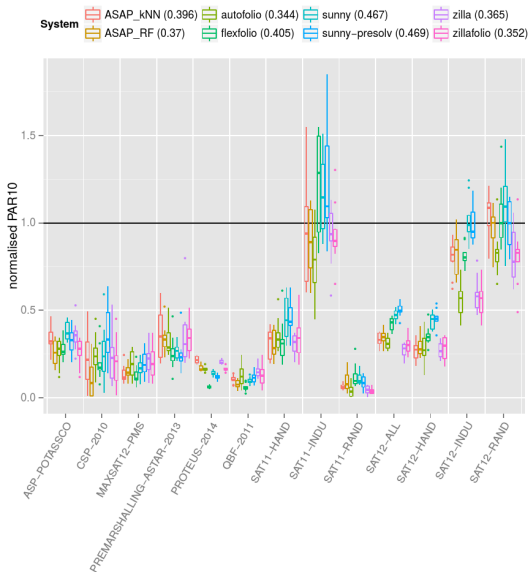
# ICON challenge on algorithm selection – results

- ▷ top-ranked systems very close
- ▷ combination of zilla and autofolio worse than either of them?
- ▷ ASAP\_\* not previously described in literature and very good results

# ICON challenge on algorithm selection – results

scenario	ASAP_kNN	ASAP_RF	autofolio	flexfolio	sunny	sunny-presolv	zilla	zillafolio
ASP-POTASSCO	6	<b>1</b>	2	4	7	5	<b>8</b>	3
CSP-2010	4	<b>1</b>	7	3	6	<b>8</b>	2	5
MAXSAT12-PMS	2	4	7	<b>1</b>	3	6	5	<b>8</b>
PREMARSHALLING-ASTAR-2013	6	4	5	2	3	<b>1</b>	<b>8</b>	7
PROTEUS-2014	5	4	6	<b>1</b>	3	2	<b>8</b>	7
QBF-2011	3	<b>1</b>	6	2	4	5	<b>8</b>	7
SAT11-HAND	3	2	6	4	<b>8</b>	7	<b>1</b>	5
SAT11-INDU	5	4	<b>1</b>	7	6	<b>8</b>	2	3
SAT11-RAND	4	6	2	<b>8</b>	7	5	3	<b>1</b>
SAT12-ALL	4	5	3	6	7	<b>8</b>	<b>1</b>	2
SAT12-HAND	4	5	3	6	7	<b>8</b>	<b>1</b>	2
SAT12-INDU	5	6	2	4	<b>8</b>	7	<b>1</b>	3
SAT12-RAND	<b>8</b>	5	3	6	7	4	<b>1</b>	2

# ICON challenge on algorithm selection – results



# No excuse not to participate!

```
trainAS = parseASScenario(opts$strain)
ldf = convertToLlama(trainAS)
testAS = parseASScenario(opts$prediction)
ldft = convertToLlama(testAS)

feats = intersect(ldf$features, ldft$features)
ldf$features = feats
ldft$features = feats

tt = trainTest(ldf)
model = regressionPairs(makeLearner("regr.randomForest"), tt)
preds = model$predictor(ldft$data[,feats])

sched = ddply(preds, c("id"), function(ss) {
  data.frame(instanceID = testAS$feature.values[ss$id[1], "instance_id"],
             runID = 1,
             solver = ss$algorithm[1],
             timeLimit = testAS$desc$algorithm_cutoff_time)
})

write.csv(sched[,c("instanceID", "runID", "solver", "timeLimit")],
          file = stdout(), quote = FALSE, row.names = FALSE)
```

This would have ranked you 4th.

- ▷ first evaluation did not remove presolved instances from generated training sets
- ▷ rerun with this fixed
- ▷ no major result changes

1. zilla
2. zillafolio
3. *autofolio with 48 hours training time*
4. autofolio
5. *llama-regrPairs*
6. ASAP\_RF
7. ASAP\_kNN
8. *llama-regr*
9. flexfolio-schedules
10. sunny
11. sunny-presolv

<http://www.cs.ubc.ca/~larsko/aschallenge-results-rerun.pdf>

# ICON challenge on algorithm selection – takeaway

- ▷ independent comparison of different approaches
- ▷ some data sets are still “hard” for algorithm selection
- ▷ motivated increased support for Aslib format and some changes
- ▷ data and setup will be made available



## Challenge reloaded?

- ▷ Second challenge next year?
- ▷ Would you be interested in participating?
- ▷ Your feedback welcome!