

The Seventh International Automated Negotiating Agents Competition (ANAC2016)

Organizers:

Dr. Reyhan Aydogan, Ozyegin University

Dr. Katsuhide Fujita, Tokyo University of Agriculture and Technology

Dr. Tim Baarslag, the University of Southampton

Dr. Koen Hindriks, Delft University of Technology

Prof. Dr. Takayuki Ito, Nagoya Institute of Technology

Prof. Dr. Catholijn Jonker, Delft University of Technology

The slide features a white background with four large, overlapping, rounded shapes in the corners: a green shape in the top-left, a blue shape in the top-right, a red shape in the bottom-left, and an orange shape in the bottom-right. The text is centered in the white space.

ANAC2016 COMPETITION SET-UP

Motivations

- to encourage the design of **practical negotiation agents** that can proficiently negotiate against unknown opponents and in a variety of circumstances
- to provide a **benchmark for objectively evaluating** different negotiation strategies
- to explore **different learning and adaptation strategies** and opponent models
- to **collect state-of-the-art negotiating agents and negotiation scenarios**, and making them available to the wider research community.

ANAC2010 - 2015

	2010	2011	2012	2013	2014	2015
Agents	7	18	17	19	21	24
Domains	3	8	24	24	12	10
New Feature		Discount Factor	Reservation Value	Bid History	Nonlinear Domain	Multilateral Negotiation

Organizers

- Tim Baarslag, the University of Southampton
- Kobi Gal, Ben-Gurion University
- Enrico Gerding, University of Southampton
- Koen Hindriks, Delft University of Technology
- Reyhan Aydogan, Ozyegin University
- Takayuki Ito, Nagoya Institute of Technology
- Katsuhide Fujita, Tokyo University of Agriculture and Technology
- Nicholas R. Jennings, University of Southampton
- Catholijn Jonker, Delft University of Technology
- Sarit Kraus, University of Maryland and Bar-Ilan University
- Raz Lin, Bar-Ilan University
- Valentin Robu, University of Southampton
- Colin R. Williams, University of Southampton

Competition Setup

- **Multi-party Closed Negotiation**
 - Stacked Alternating Offers Protocol (SAOP)
 - Negotiation among three agents
 - Negotiation without any knowledge of the preferences and strategies of the opponents.
- Real time with a deadline after 3 minutes
- Discounting Factor (from 2011)
- Reservation value (from 2012)
- Utility functions are linear
 - Agents negotiate about the large set of previously unknown domains
- Best overall average of the individual utility = Winner !

Stacked Alternating Offers Protocol (SAOP)

- All participants around the table get a turn per round
 - Turns are taken clock-wise around the table
- The first party starts the negotiation with an offer that is observed by all others immediately.
- Whenever an offer is made the next party in line can take the following actions:
 - Make a counter offer (rejecting and overriding the previous offer)
 - Accept the offer
 - Walk away (e.g. ending the negotiation without any agreement)
- This process is repeated in a turn taking clock-wise fashion until reaching an agreement or reaching the deadline.
 - To reach an agreement, all parties should accept the offer.
 - If at the deadline no agreement has been reached, the negotiation fails.

Participants

- **16 Teams Entered**
- **7 Institutions from 6 countries**
 - The Chinese University of Hong Kong, Hong Kong
 - Nanyang Technological University, Singapore
 - University of Isfahan, Iran
 - Nagoya Institute of Technology, Japan
 - Tokyo University of Agriculture and Technology, Japan
 - Delft University of Technology, Netherlands
 - Ozyegin University, Turkey

16 domains for “smart energy grids”

Name	# of Issue	Domain Size	Discounted	RV
YXAgent	4	4250	1	0
Ngent	3	6	0.3	0.5
MaxOops	7	7200	1	0
AgentHP2	8	42	1	0
Atlas3	2	9	0.1	0.3
ParsCat	8	390625	1	0
AgentLight	4	20	1	0
Granma	3	24	1	0
ParsAgent2	3	612	1	0
Terra	7	35840	0.5	0.4
MyAgent	5	1280	0.7	0.2
SYAgent	4	240	0.9	0.9
Farma	2	25	0.2	0.05
AgentSmith	4	320	0.2	0.3
Clockwork	3	120	0.6	0.4
Caduceus	3	80	1	0



QUALIFYING ROUND RESULTS

Qualifying Round

- **Each three-party negotiation will negotiate against the winners of ANAC 2015**
 - The Submitted Agent v.s. Atlas, Pars and RandomDance
- **The top 10 performing agents considering the individual utility can proceed to the final**
- **16 domains for “smart energy grids”**
 - Their domains are submitted by all participants
- **Deadline: 3 min.**
- **The results are the average of 2 trials**

Qualifying Round Setup

- GENIUS 5.3.5
- Allocating the entire matches to 10 computers in Japan
 - For finishing the qualifying round in some weeks



Qualifying Round Results

Rank	Agent	Score
1	Caduceus	0.705800651
2	ParsCat	0.704232241
3	Ngent	0.702532854
4	Farma	0.690446449
5	AgentYX	0.680644434
6	Terra	0.659653913
7	Atlas3	0.649037124
8	MyAgent	0.648977431
9	Granma	0.647753786
10	AgentHP2	0.64096591
11	AgentLight	0.629769047
12	MaxOops	0.625251819
13	ClockWork	0.57435841
14	ParsAgent2	0.571121181
15	SYAgent	0.552332739
16	AgentSmith	0.535744566

Finalists

- Caduceus (Ozyegin University)
- ParsCat (University of Isfahan)
- Ngent (The Chinese University of Hong Kong)
- Farma (Nagoya Institute of Technology)
- AgentYX (Nanyang Technological University)
- Terra (Nanyang Technological University)
- Atlas3 (Nagoya Institute of Technology)
- MyAgent (Nanyang Technological University)
- Granma (Delft University of Technology)
- AgentHP2 (Tokyo University of Agriculture and Technology)



FINAL ROUND RESULTS

Final Round

- The tournament among 10 finalists
- 6 domains for “**smart energy grids**”
 - They are submitted by the non-finalists
- **Deadline: 3 min.**
 - 720 negotiation sessions per a trial
 - The results are the average of 5 trials
- **GENIUS 5.3.5**

Prizes

1 st Place	\$500
2 nd Place * 2	\$250

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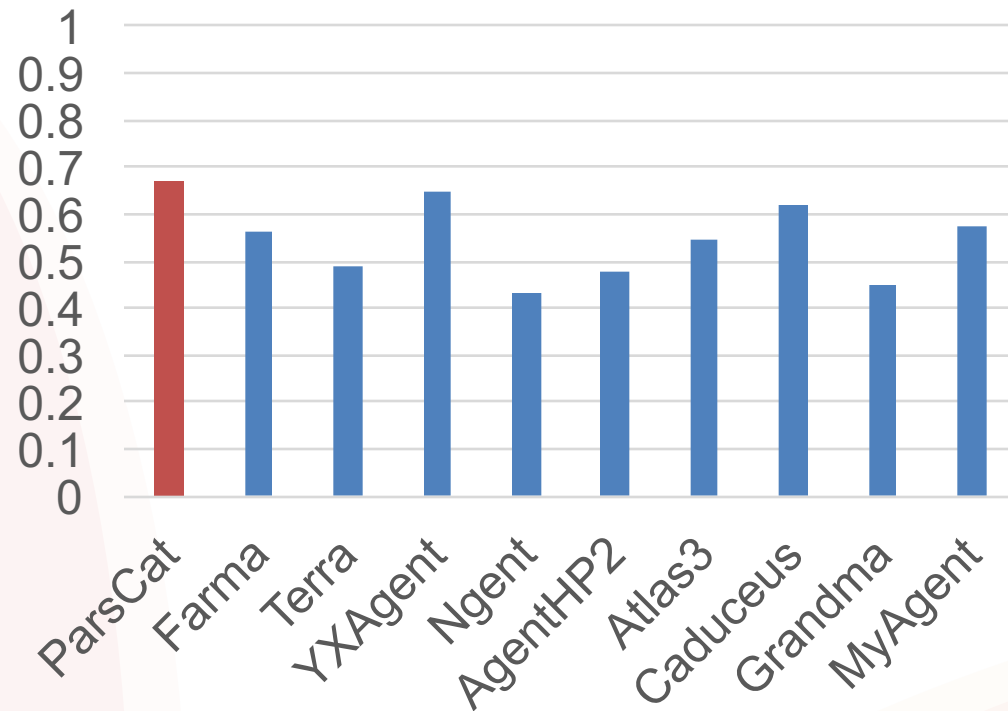
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Prof. Dr. Takayuki Ito / Makoto Lab., Inc.

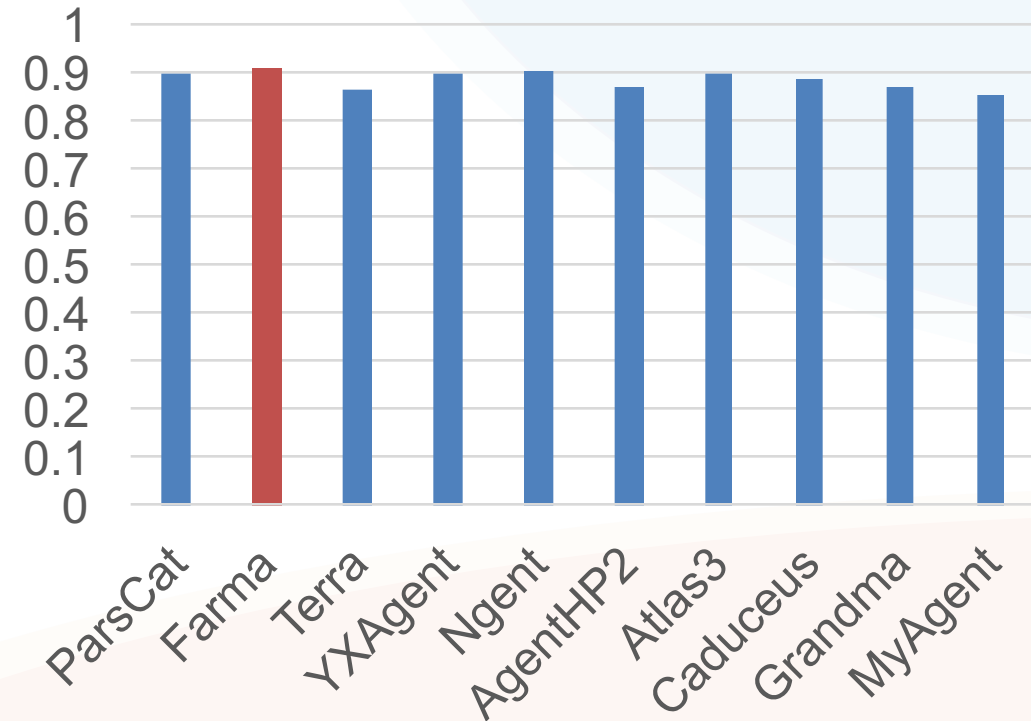
Results in Each Domain

AgentSmith



of issues: 4, Size: 320, Discount: 0.2, RV: 0.3

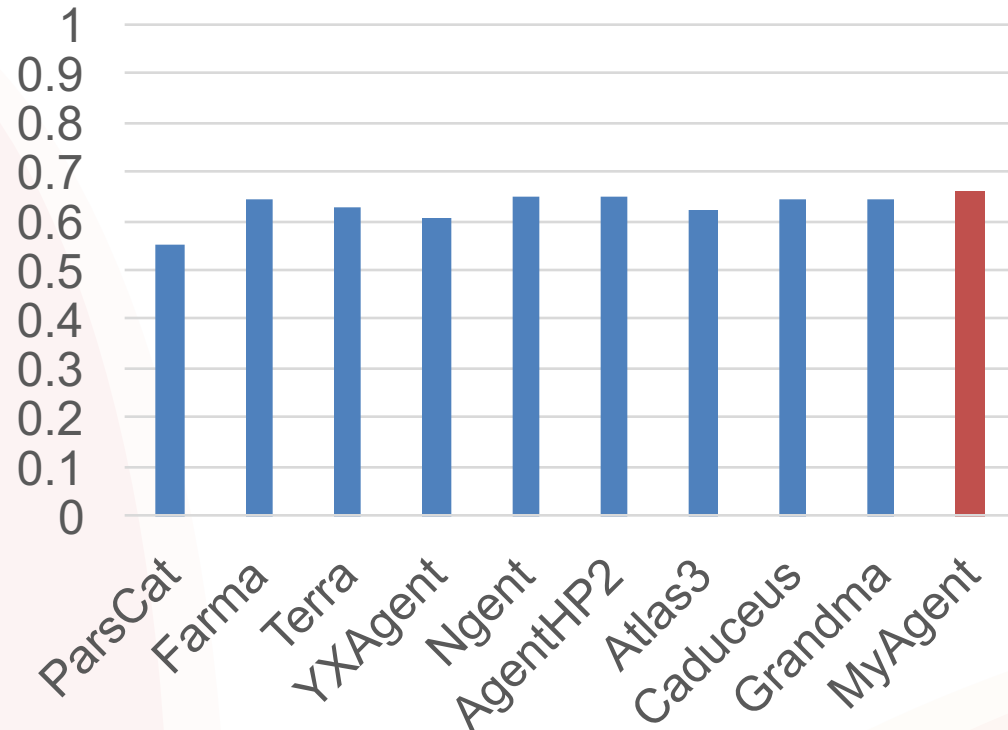
SYAgent



of issues: 4, Size: 240, Discount: 0.9, RV: 0.9

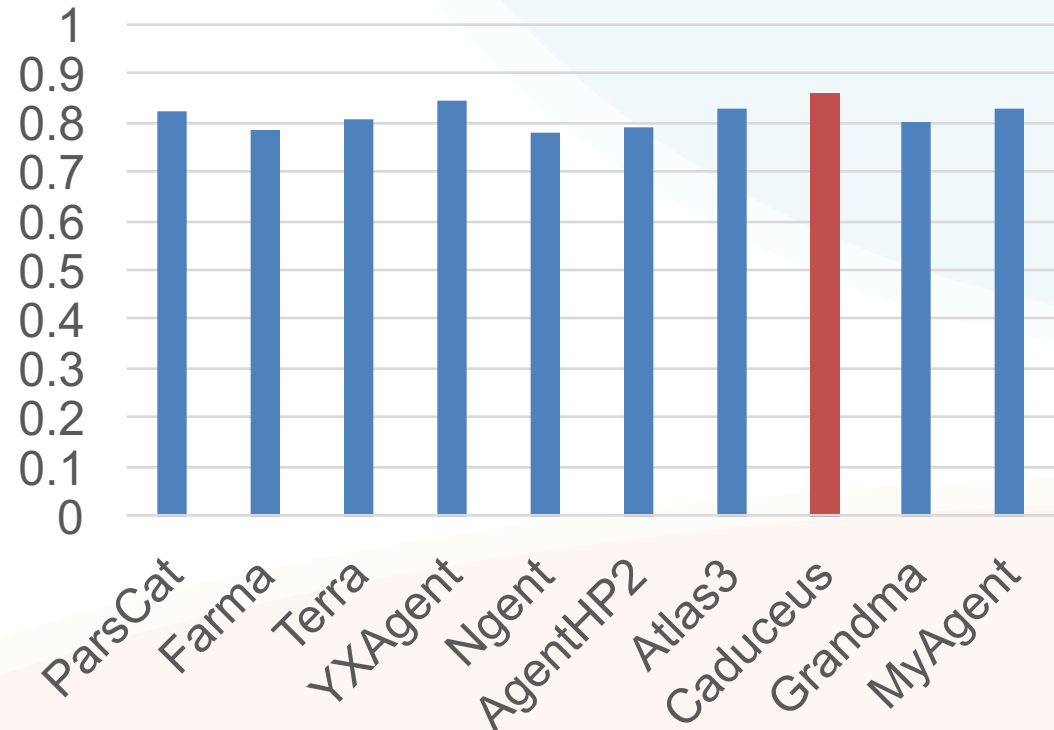
Results in Each Domain

ParsAgent2



of issues: 3, Size: 612, Discount: 1, RV: 0

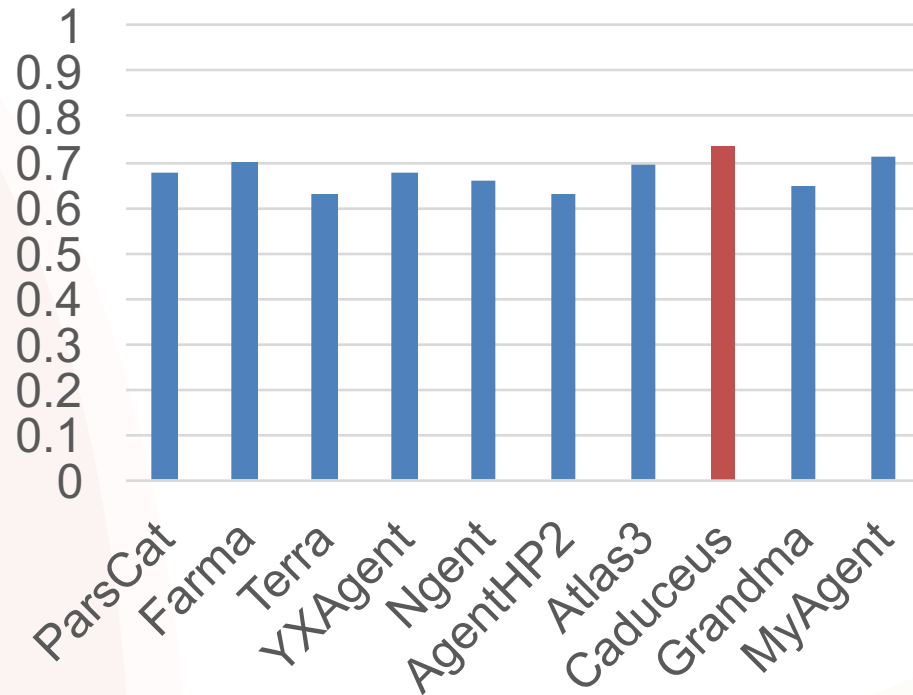
MaxOops



of issues: 7, Size: 7200, Discount: 1, RV: 0

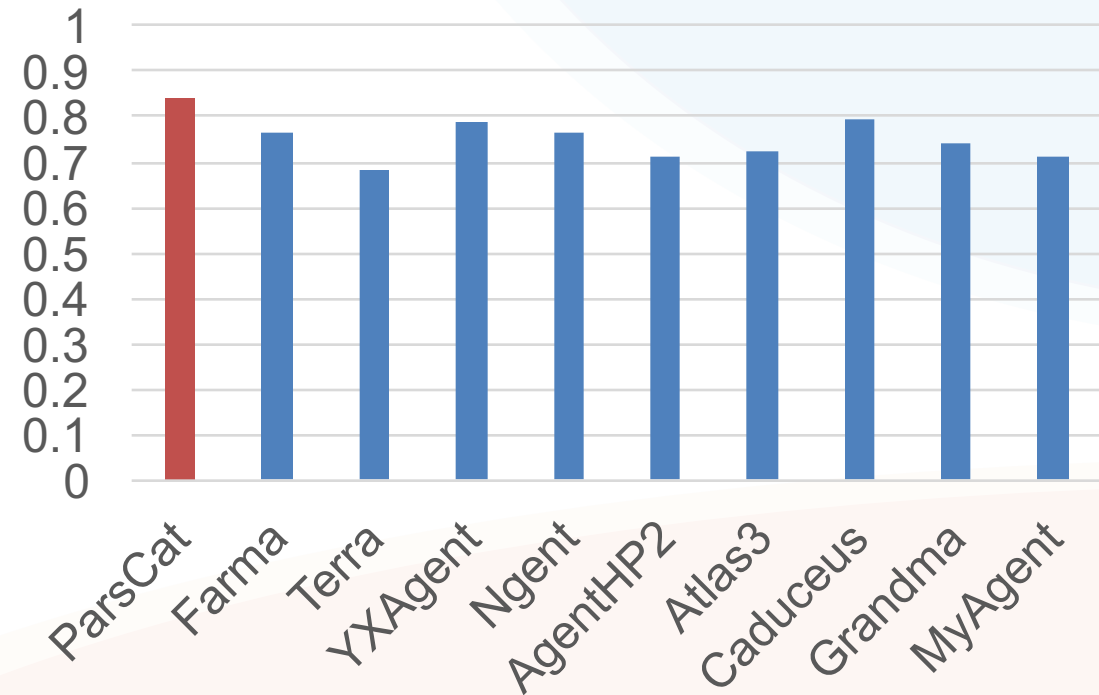
Results in Each Domain

AgentLight



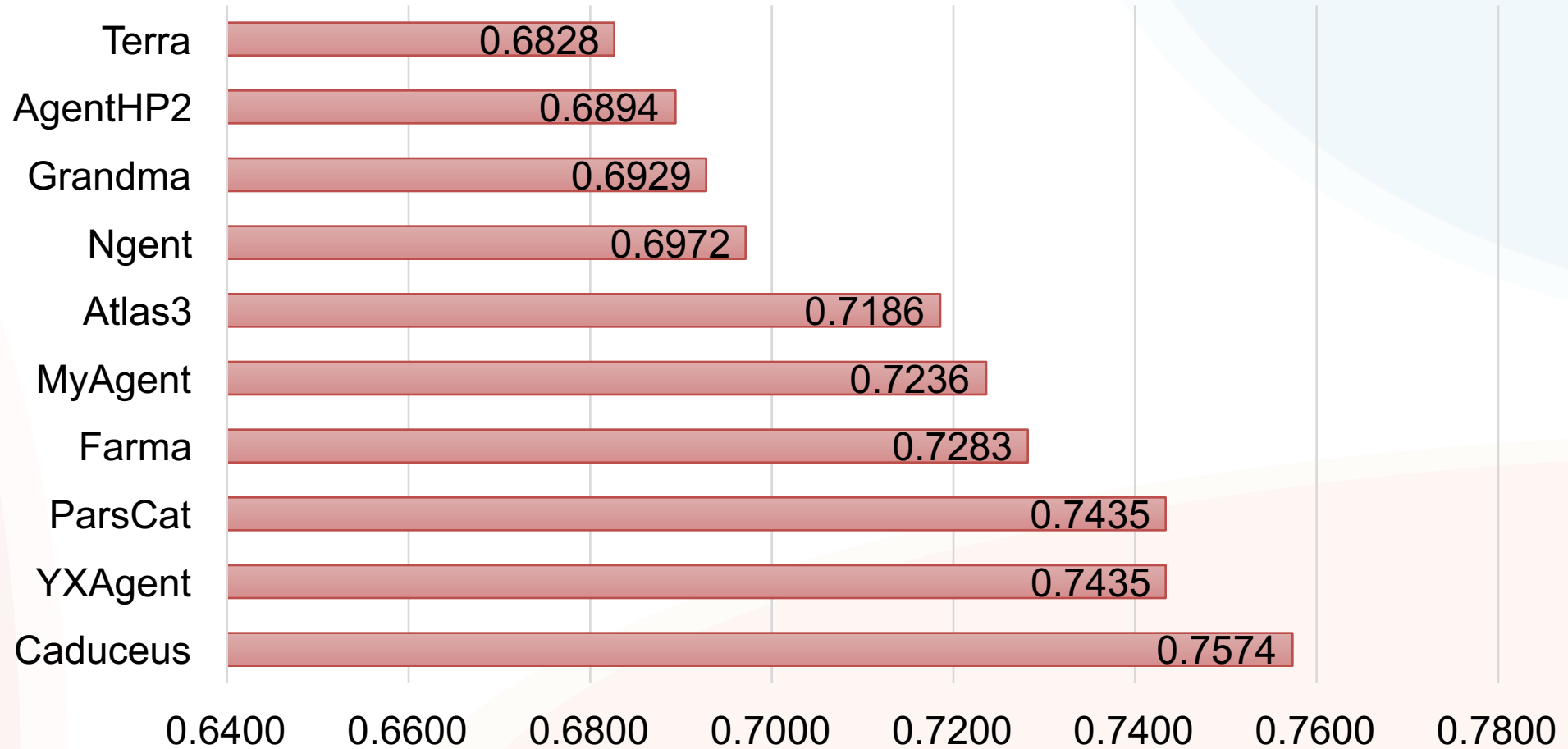
of issues: 4, Size: 20, Discount: 1, RV: 0

ClockWork



of issues: 3, Size: 120, Discount: 0.6, RV: 0.4

Overall Ranking



Winners in ANAC-2016

- 1. Caduceus by Burak Atalay, Taha Doğan Güneş, Bahadır Kırdan: \$500**
- 2. AgentYX by Tan Yi Xin: \$250**
- 2. ParsCat by Delaram Javdani, Maedeh Najari: \$250**