Programming Trainings and Informatics Teaching Through Online Contests

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Context

- Many existing programming contests (online or onsite)

- Contestants can improve their skills with those contests

- Those contests can help to learn programming

> ✔ **Using contests to support teaching programming and promoting informatics**

Classifying online contests

- Proposing a way to classify contests with a set of criteria

- Makes it easier to choose contests for trainings or teaching

- Two categories of criteria: information and tasks criteria

Information criteria

- Global information about the contest

I1	Team	Single contestants or teams
I2	Age and gender	Ages range required to participate and accepted genders
I3	Language	Accepted programming languages
I4	Duration	Timespan during which contestant can submit solutions
I5	Frequency	Frequency with which the contest is organised or open
I6	Scoring	How the score of the contestant is computed

Task criteria

- Information about the tasks of the contest

T1	Submission	Code source, executable program, output data
T2	Type	Writing a function given a specification, solving a problem, writing an artificial intelligence
T3	Limitation	The number of trials that are allowed, time and memory
T4	Feedback	The feedback produced for a submission
T5	Level	Any difficulty level or partition of the tasks

IOI team selection process

- IOI pool contestants asked to participate to online contests

- Their performance are taken into account through:
    - the number of contests they participate to;
    - and the scores they achieved.

- The selection process also includes an additional small contest

Using online contests for trainings I

Advantages:

- Reduced human ressources to coordinate the training

- No need to create programming exercises and tasks

- Pupils improve their coding efficiency by practicing

- Pupils can compare with other worldwide contestants

Using online contests for trainings II

Disadvantages:

- Difficult to motivate pupils to participate and to be involved

- Honour-based training difficult to use for a selection process

Using online contests for teaching

- Additional activities supervised by trainers must be proposed

- Feedback is very important to support learning

The MCP platform

An online platform to share contestant profiles which:

- Maintains a list of online programming contests

- Allows contestants to put scores they achieved to contests

- Allows trainers to manage groups of contestants

- Permits discussions about tasks and problems via forums

MCP

Organisations

Name	Acronym	Contests
ACM International Collegiate Programming Contest	ACM-ICPC	0
CodeChef		0
Google Code Jam		0
ICFP Programming Contest		0
IEEEXtreme 24-Hour Programming Competition		0
International Olympiad in Informatics	IOI	0
Internet Problem Solving Contest	IPSC	0
ProjectEuler		0
TopCoder		0
情報オリンピック	JOI	0

International Olympiad in Informatics

The *International Olympiad in Informatics* (IOI) is an international programming competition targeted to secondary school students. The competition is run once a year and the first edition was held in 1989 in Pravetz, Bulgaria. The idea of creating such a contest dates back to October 1987 when the Bulgarian delegate Professor Blagovest Sendov proposed that idea to the 24th General Conference of the *United Nations Educational, Scientific and Cultural Organisation* (UNESCO).

The IOI is one of the 13 *International Science Olympiads*, with mathematics, physics, chemistry and biology to cite some of them. Each participating country send a delegation of one to four contestants, that are typically selected after a national contest, and accompanied by two adults.

Contestants have to solve problems that are algorithmic by nature, during two days. They compte on an individual basis and their goal is to successfully solve all the problems in order to get the higher score. In addition to problem solving skills, the contest also involves skills about algorithms design, data structures, programming and testing. Accepted programming languages are C, C++ and Pascal (Java is planned to be added in 2015).

The upcoming IOIs will take place in the following countries:

- IOI 2014, Taipei, Taiwan
- IOI 2015, Astana, Kazakhstan
- IOI 2016, Kazan, Russia
- IOI 2017, Iran

Some contestants are multiple IOI winners since some countries allows a given contestant to go multiple times to the IOI. The best top performer is *Gennady Korotkevich* (Bulgaria) who won seven times in a row starting in 2006 with a silver medal to 2012 with 6 gold medals.

The current *IOI President* is Dr Richard Foster who was elected for a term of three years at IOI 2011. Associated to the IOI is the *Olympiads in Informatics* refereed scholarly journal which provides a medium to present research and developments in the scope of teaching and learning computer science through the olympiad and other competitions.

Website	http://www.ioinformatics.org

Running contests

No contest.

Upcoming contests

Name	Start	End
IOI 2014	13 Jul 2014 00:00	20 Jul 2014 00:00

Past contests

Name	Start	End
IOI 2013	6 Jul 2013 00:00	13 Jul 2013 00:00
IOI 2012	23 Sep 2012 00:00	30 Sep 2012 00:00
IOI 2011	22 Jul 2011 00:00	29 Jul 2011 00:00
IOI 2010	14 Aug 2010 00:00	21 Aug 2010 00:00

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Conclusion

- Online contests can help building programming trainings

- They can also be used for teaching programming

- The MCP online platform can help those two activities

Perspectives

- Deploying and populating the MCP platform

- Finding a way to measure the impact on the motivation of training contestants and of pupils from schools