

PROPOSAL on visualization of IOI tasks

Following the idea of President of the IOI Zide Du, to popularize the IOI, "to bring the discipline of informatics to the attention of young people" (Statute S1.7 of the IOI Regulations), to diversify its tasks, to make its tasks closer to future work of participants, to make it more attractive for eventual sponsors, on the base of experience of conducting Republican Olympiads on Informatics in Kyrgyzstan since 1987, I propose the following:

- 1) One of three tasks each day as well as one of three tasks for practice session must provide visualization (graphical presentation of results).
- 2) If it is possible, such visualization would be related to any reality: reminiscences of the host country of the IOI, or sponsors.
- 3) Knowledge and skills necessary to fulfill the task must be obvious for computerists of IOI level.

Remark. The main obstacle to introduce graphics into IOI tasks is the subjectivity and non-automation in scoring. The following items are to diminish it.

- i) The score for a graphical presentation is fixed: 30 points of 100; other 70 points are distributed in a common way.
- ii) These 30 points are given alternatively: 30 or 0.
- iii) The quantity and content of graphical images is fixed: the first image presents the initial data and the second one presents the result.
- iv) The only test (G-test below) in the task for graphical presentation is to be as simple as possible.
- v) The initial data for the G-test are to be announced as full as possible.
- vi) The size and other parameters of a graphical image in the G-test are to be described in details, for instance "600×400 pixels etc."
- vii) If the goal of task is an optimization then the contestant's program for the G-test must give a result not less than 50% of the best result if it is known or of the best result of all contestants (i.e. the score for the test itself may be zero, but the score for the graphical presentation may be 30 points).
- viii) The following scoring procedure is proposed:
 - while submitting the task the contestant announces whether a graphical presentation is provided; then the program must have the option to generate graphical images (only within the range announced in v));
 - if the G-test is passed (may be, not with the full score) then the scoring program shows the graphical images to three members of ISC. If they (independently) confirm that these graphical images are proper / not proper then the scoring program adds / does not add 30 points (while this procedure each of them does not know opinions of others); if their opinions are different then after this procedure they gather together and discuss all (only few) ambiguous programs (still they do not know contestants-authors of these programs).

If they look at each work about 30 seconds then about 200 works would be scored during two hours.

Example 1: the task "Joining points" at IOI'06.

Constraints for the G-test:

$$g=20$$

$$x_1=50; x_2=450$$

$$y_1=50; y_2=50$$

$$r=25$$

$$x_1=50; x_2=450$$

$$y_1=450; y_2=450$$

$$50 \leq x_i \leq 450$$

$$50 \leq y_j \leq 450$$

Description for the G-test:

The origin of coordinates is in the left upper corner; one unit in coordinates = one pixel.

The first image must contain given points of corresponding colors, on the black background. The second image must contain given points joined by straight lines of corresponding colors, on the black background.

Example 2: the task "The valley of Mexico" at IOI'06.

Constraints for the G-test:

$$c=15$$

Number of commercial agreements = 40

Description for the G-test:

The background is green. The lake of blue color is the circle of the 200 pixels radius with the center in the center of the screen. The first city is in the upper point of the circle; cities are arranged uniformly.

The first image must contain the given commercial agreements presented as straight lines of white color between cities. The second image must contain the route presented as brown piecewise linear line of white color between cities.

We hope that an implementation of such visualization would be not difficult for organizers and interesting for participants; also, while treating graphical images participants will understand the sense of a task better and avoid rough mistakes.

Pavel S. Pankov, leader of Kyrgyzstani team since IOI'02.

September 24, 2006