Contest “Bebras” on Informatics in Russia and Belarus

Sergei Pozdniakov, Ilya Posov

St. Petersburg Electrotechnical University,
St. Petersburg University, Russia

Irina Kirinovich,
Belarusian State University of Informatics and Radioelectronics, Belarus

IOI-2016, Kazan, Russia 16.08.2016

KANGAROO AND BEBRAS
common features (and differences)

КЕНГУРУ И БОБЕР общее (и различное)

Common features (общие черты):

- **mathematics in Kangaroo FOR ALL**
(Математика для всех)
and informatics in Bebras FOR ALL
(Информатика для всех)
- **competitions duration is about 1 hour**
(продолжительность конкурса 1 час)
- **tasks have 3 levels of complexity**
(задачи имеют 3 уровня сложности)

KANGAROO AND BEBRAS (common features) and differences

КЕНГУРУ И БОБЕР (общее) и различное)

Pupils solve tasks and write answers on paper sheets

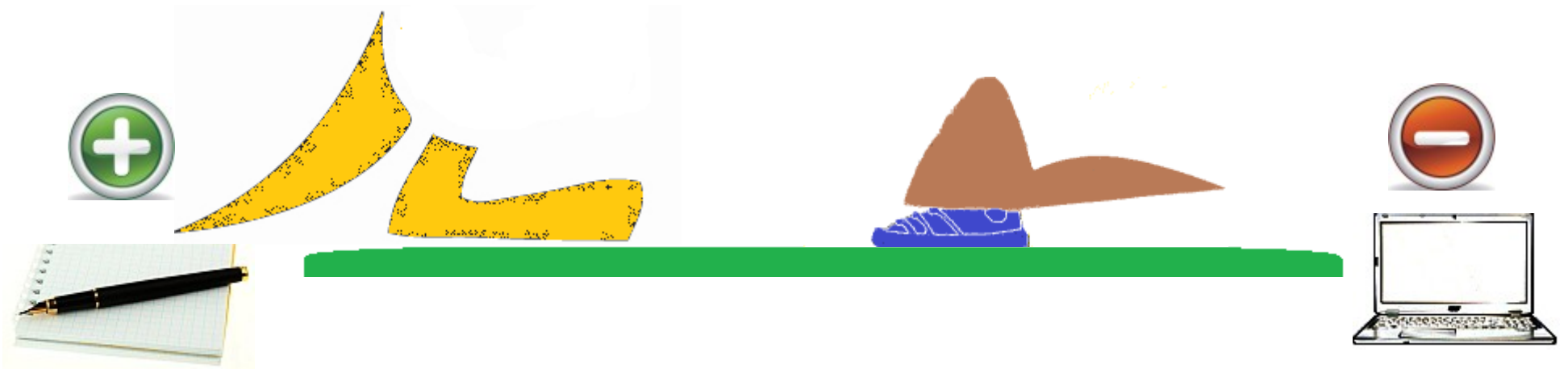
Ученики работают «на бумаге»

Pupils solve tasks and write answers on computers

Ученики работают за компьютерами

KANGAROO AND BEBRAS: differences

КЕНГУРУ И БОБЕР: различия



Points for tasks are summarized

Баллы за задачи суммируются

The penalty - 1/3 points for unresolved tasks is subtracted from a score

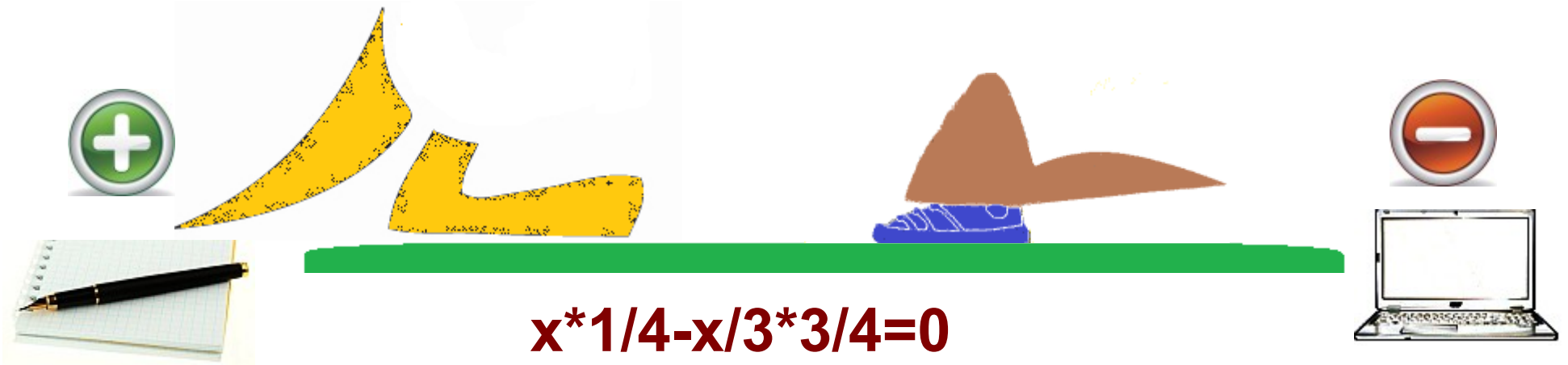
Из суммы баллов вычитается штраф: 1/3 баллов за нерешенные задачи

DIFFICULTY and COMPLEXITY

Pedagogical consequence of penalties introduction

ТРУДНОСТЬ и СЛОЖНОСТЬ

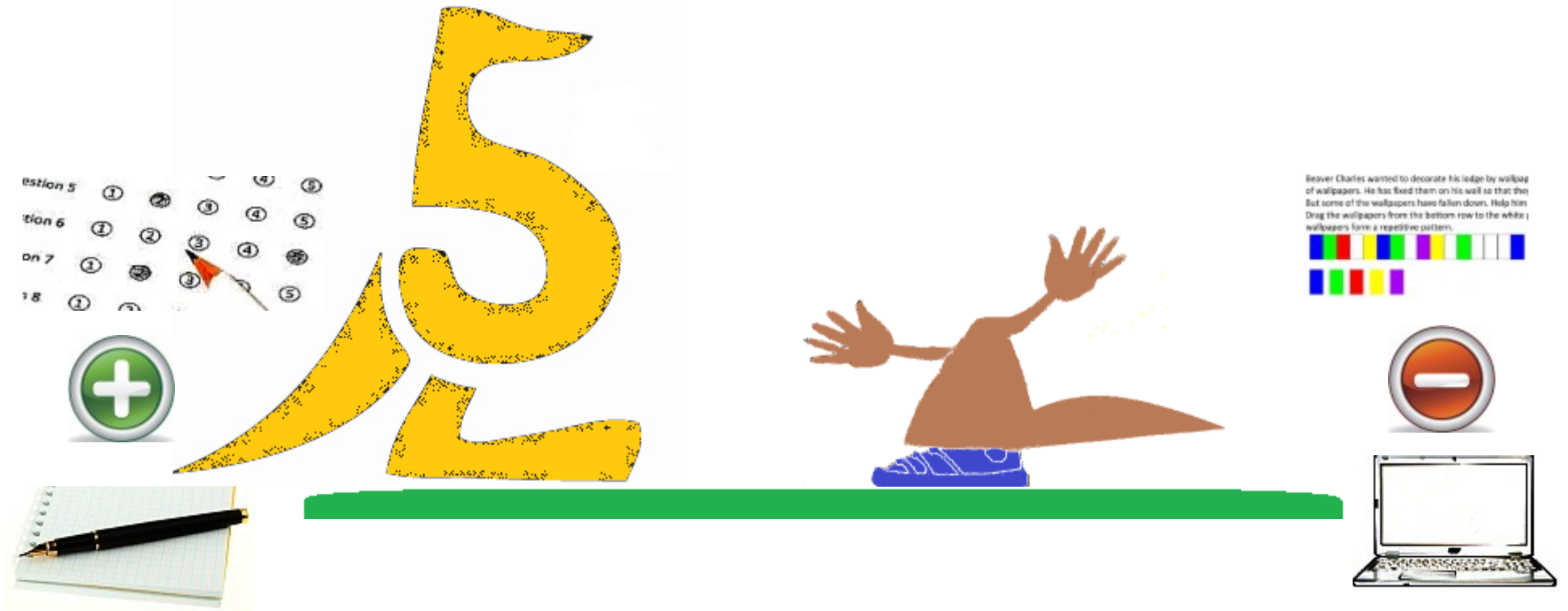
Педагогические последствия введения штрафов



x*1/4-x/3*3/4=0

so there is no difference to choose the answer incidentally or to refuse decision

с точки зрения теории вероятности несущественно, отказывается ли ученик от решения задачи или выбирает ответ случайно

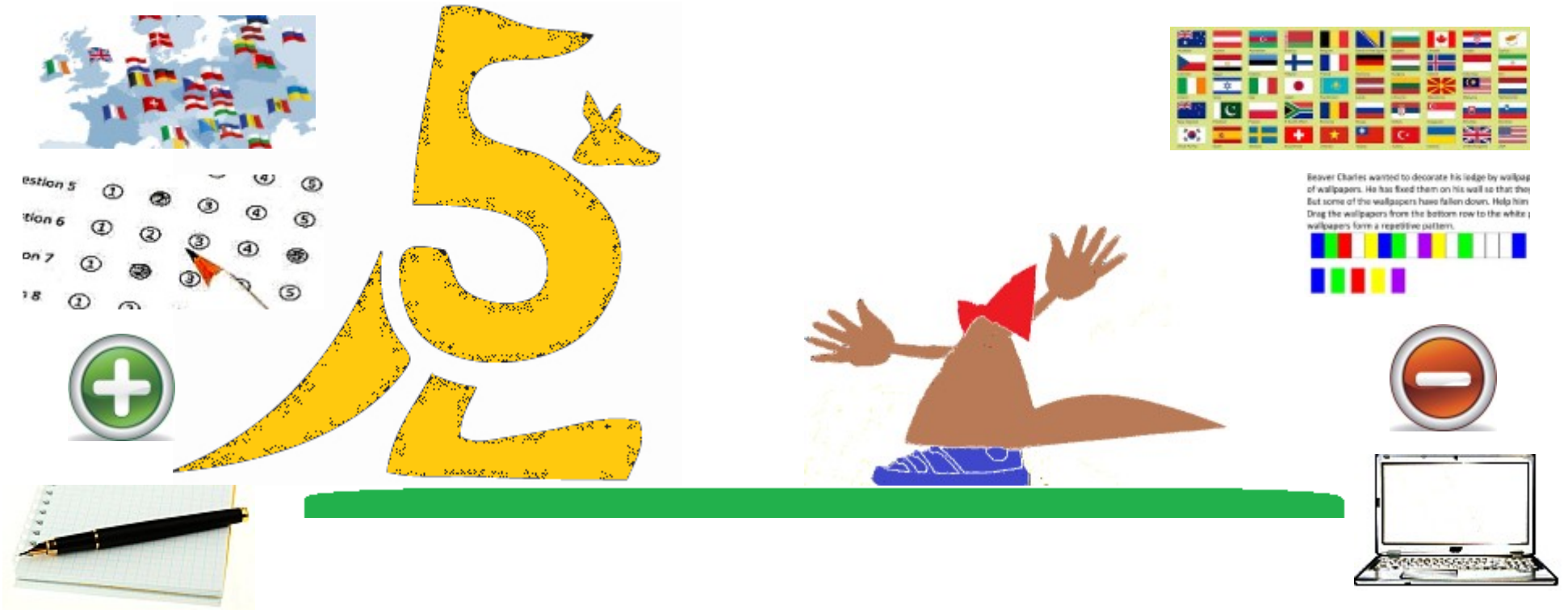


Tasks: multichoice question type

Задания имеют форму тестов с выбором ответа

Tasks: not only multichoice question type but interactive type too

Кроме заданий на выбор ответа есть интерактивные задания



Each country has own set of tasks

Каждая страна имеет свой набор задач

Countries create the common bank of tasks

Страны создают общий банк задач

Tasks in mathematics

Tasks in informatics: authors must explain to teachers why it's informatics (CS)

Задачи по математике

Задачи по информатике: авторы должны объяснить учителям, почему это информатика

Comments to some previous slides

Task Difficulty

The task difficulty reflects the relationships between a task and an individual who performs it..

Task Complexity

Complexity means a certain objective feature of a task while the difficulty is understood as a subjective feature, i.e. how a participant interprets a task.

Ball, 1990; Golikov & Kostin, 1996;

Navon & Gopher, 1979; Sammer, 1997

Important Bebras feature — minus 1/3 of task's value if answer is wrong

When the answer is arbitrarily chosen out of 4 proposed options, the probability (p) to choose a correct answer makes ¼. In this case a mathematical expectation of scores gained is

$$p*x+ (1-p)*(-x/3) =x (4p-1)/3=0 \text{ (x – task value) (!)}$$

that coincides with total scores received when choosing “no answer” option.

If one of the answers proposed is rejected as certainly wrong, the probability of arbitrary choice of a correct answer out of remained options is greater than ¼ and a mathematical expectation of score gained for solving a task becomes positive!

Therefore, a participant has no reasonable motive to choose “no answer” button. The use of this button may only be due to psychological reasons – for example, a fear of failure (and penalty for it) or an extreme lack of self-confidence, a fear of task statement.

As statistical expectation of score may be hardly calculated by schoolchildren, the choice of **“no answer” option reflects their feelings about the relation between winning and failing probabilities. In all cases the choice of “no answer” option is the result of an interaction between the schoolchild and the task, i.e. it features the difficulty of a task for a participant.**

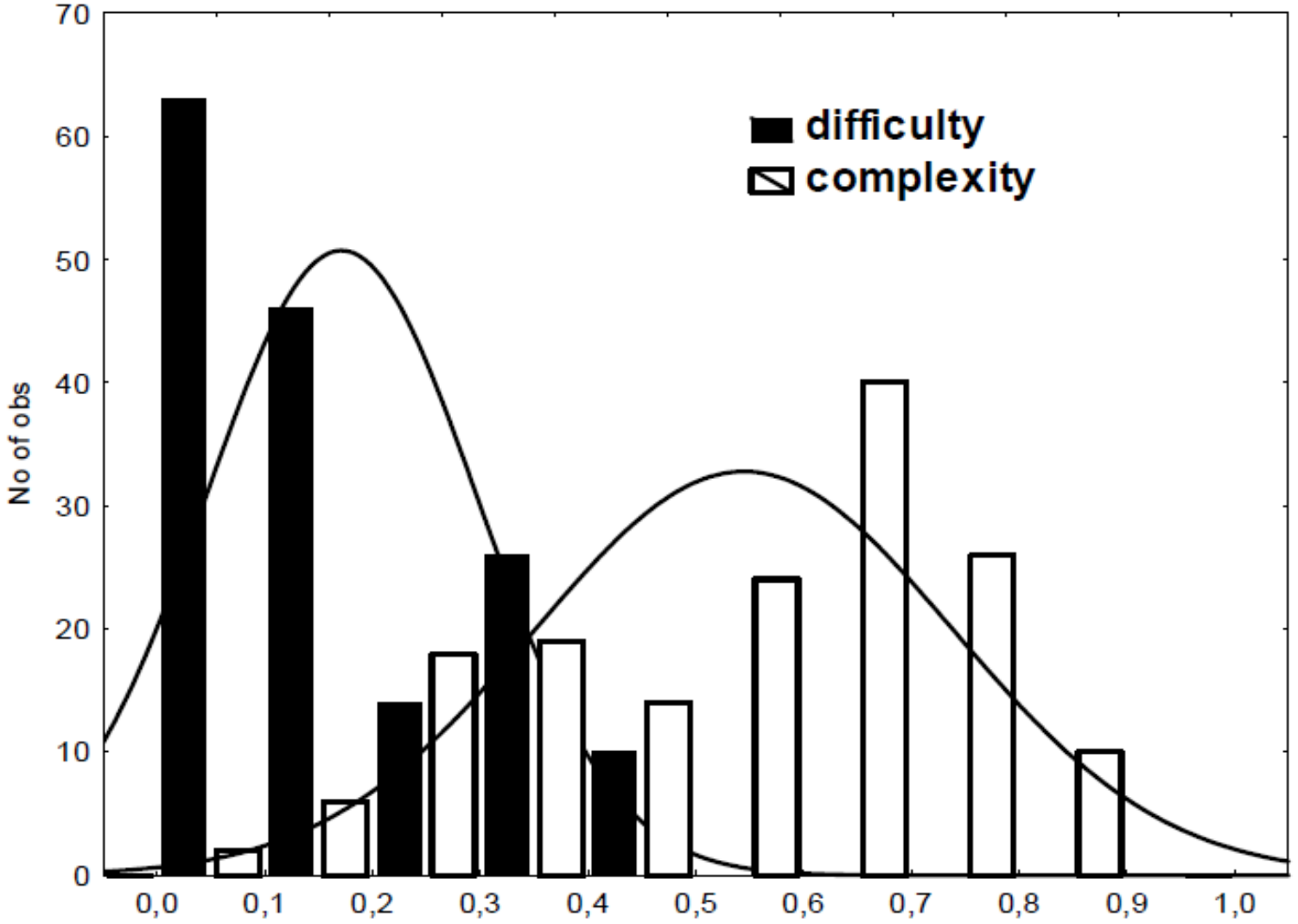
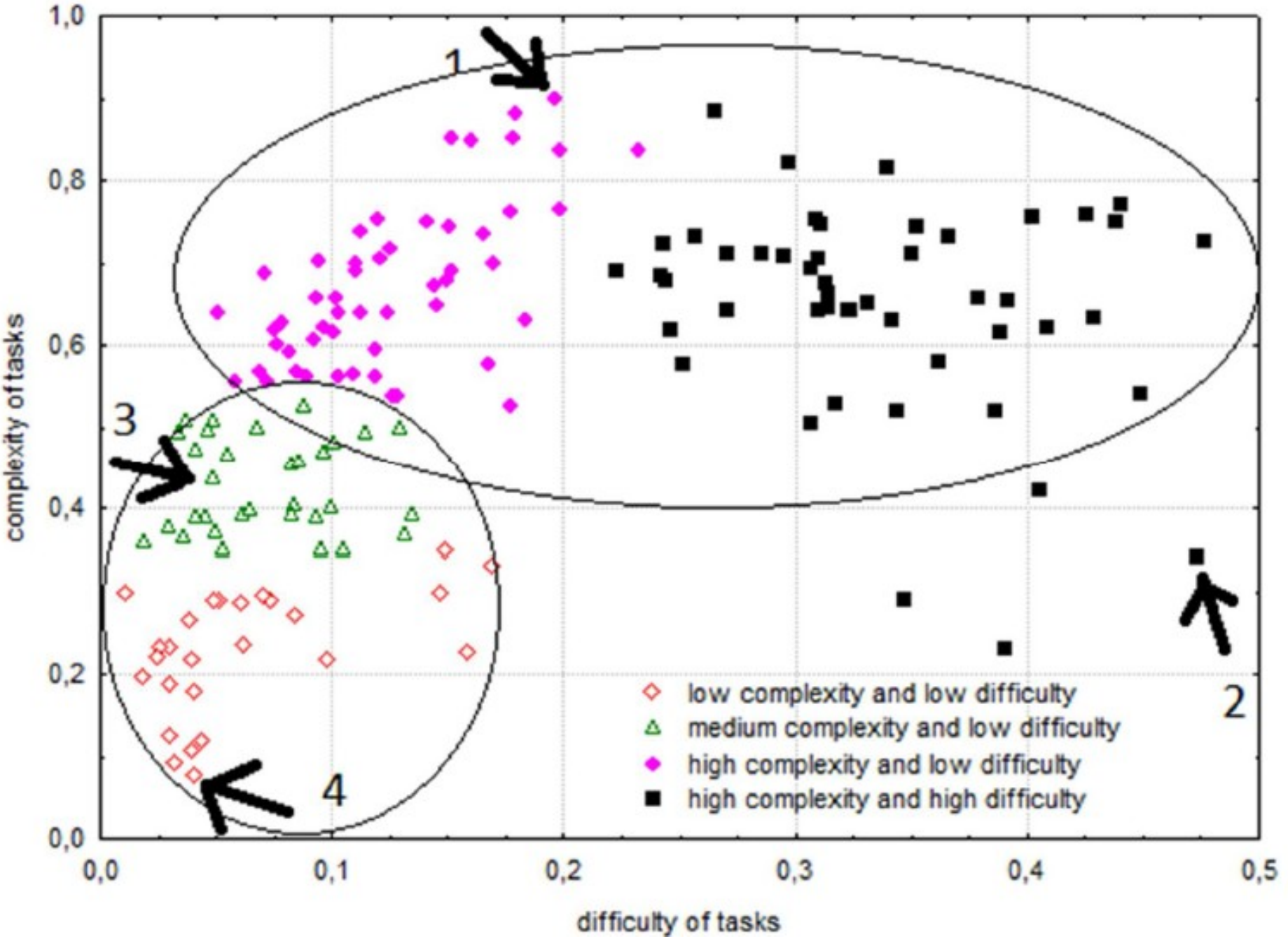


Fig. 2. Distribution of competition tasks upon their **difficulty** and **complexity**


1,0
0,8
0,6
0,4
0,2
0,0
complexity of tasks
0,0
0,1
0,2
0,3
0,4
0,5
difficulty of tasks
1
2
3
4
low complexity and low difficulty
medium complexity and low difficulty
high complexity and low difficulty
high complexity and high difficulty

Multichoice type of Bebras tasks

Before contest: to check all the tasks use “filter” - “It's Informatics”

After contest: to acquaint teachers and students with tasks background using Wikipedia and other accessible resources

Bebras interactive (dynamic) tasks

Gattaca

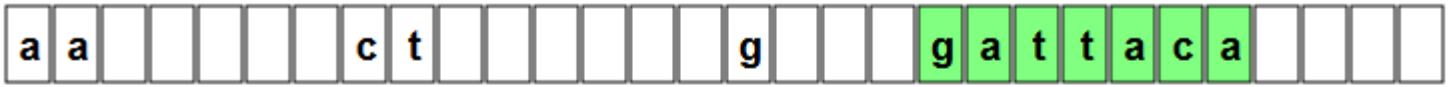
Each of the 30 face down cards below contains an "a", "c", "g" or "t". They represent part of a Beaver's DNA.

Somewhere in the DNA of the beaver the sequence **gattaca** is hidden. You have to try to find it by clicking on the cards to reveal which letter is on the other side.

While you click the computer will try to work against you so you can't get too lucky.

Try it! Click on the cards to flip them over. Try to find the sequence in as few clicks as possible.

You can try to improve your score as many times as you want.



12 cards flipped
You have found 'gattaca' in 12 flips.
Your best result so far is 12 flips.
Congratulations, this will give you 100% of the points.

Restart

Save your answer

Main page
Contents
Featured content
Current events
Random article
Donate to Wikipedia

Bahasa Indonesia
Italiano
Lietuvių
日本語
Polski
Русский
Српски / srpski
中文

Edit links

Boyer–Moore string search algorithm

From Wikipedia, the free encyclopedia

For the Boyer-Moore theorem prover, see Nqthm.

In computer science, the **Boyer–Moore string search algorithm** is an efficient string searching algorithm that is the standard benchmark for practical string search literature.[1] It was developed by Robert S. Boyer and J Strother Moore in 1977.[2] The algorithm preprocesses the string being searched for (the pattern), but not the string being searched in (the text). It is thus well-suited for applications in which the pattern is much shorter than the text or where it persists across

Definitions [edit]

- ***S[i]*** denotes the character at index *i* of string *S*, counting from 1.
- ***S[i..j]*** denotes the substring of string *S* starting at index *i* and ending at *j*, inclusive.
- A *prefix* of *S* is a substring *S*[1..*i*] for some *i* in range [1, *n*], where *n* is the length of *S*.
- A *suffix* of *S* is a substring *S*[*i*..*n*] for some *i* in range [1, *n*], where *n* is the length of *S*.
- The string to be searched for is called the *pattern* and is denoted by ***P***. Its length is ***n***.
- The string being searched in is called the *text* and is denoted by ***T***. Its length is ***m***.
- An *alignment* of *P* to *T* is an index *k* in *T* such that the last character of *P* is aligned with index *k* of *T*.
- A *match* or *occurrence* of *P* occurs at an alignment if *P* is equivalent to *T*[(*k*-*n*+1)..*k*].

A N P A N M A N -
P A N - - - - - -
- P A N - - - - -
- - P A N - - - -
- - - P A N - - -
- - - - P A N - -
- - - - - P A N -

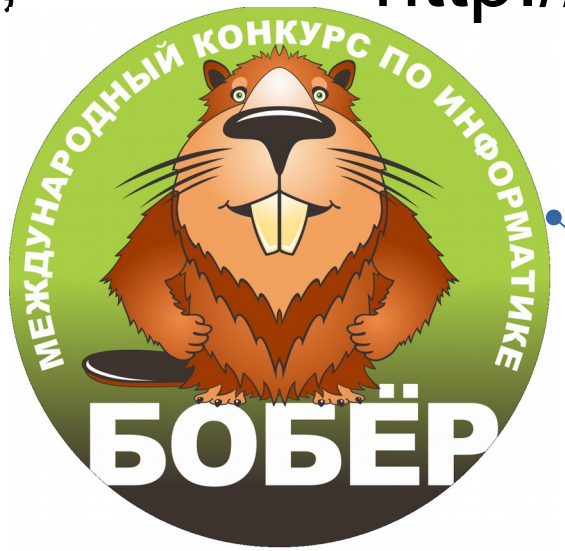
Alignments of pattern **PAN** to text **ANPANMAN**, from **k=3** to **k=8**. A match occurs at **k=5**.

Description [edit]

The Boyer-Moore algorithm searches for occurrences of ***P*** in ***T*** by performing explicit character comparisons at different alignments. Instead of a brute-force search of all alignments (of which there are ***m - n + 1***), Boyer-Moore uses information gained by preprocessing ***P*** to skip as many alignments as possible.

There are three stages, with the first being the Bebras contest

http://bebras.ru/



http://kio.spb.ru/kio

http://kioschool.eltech.ru/

http://dmti.ipo.spb.ru/

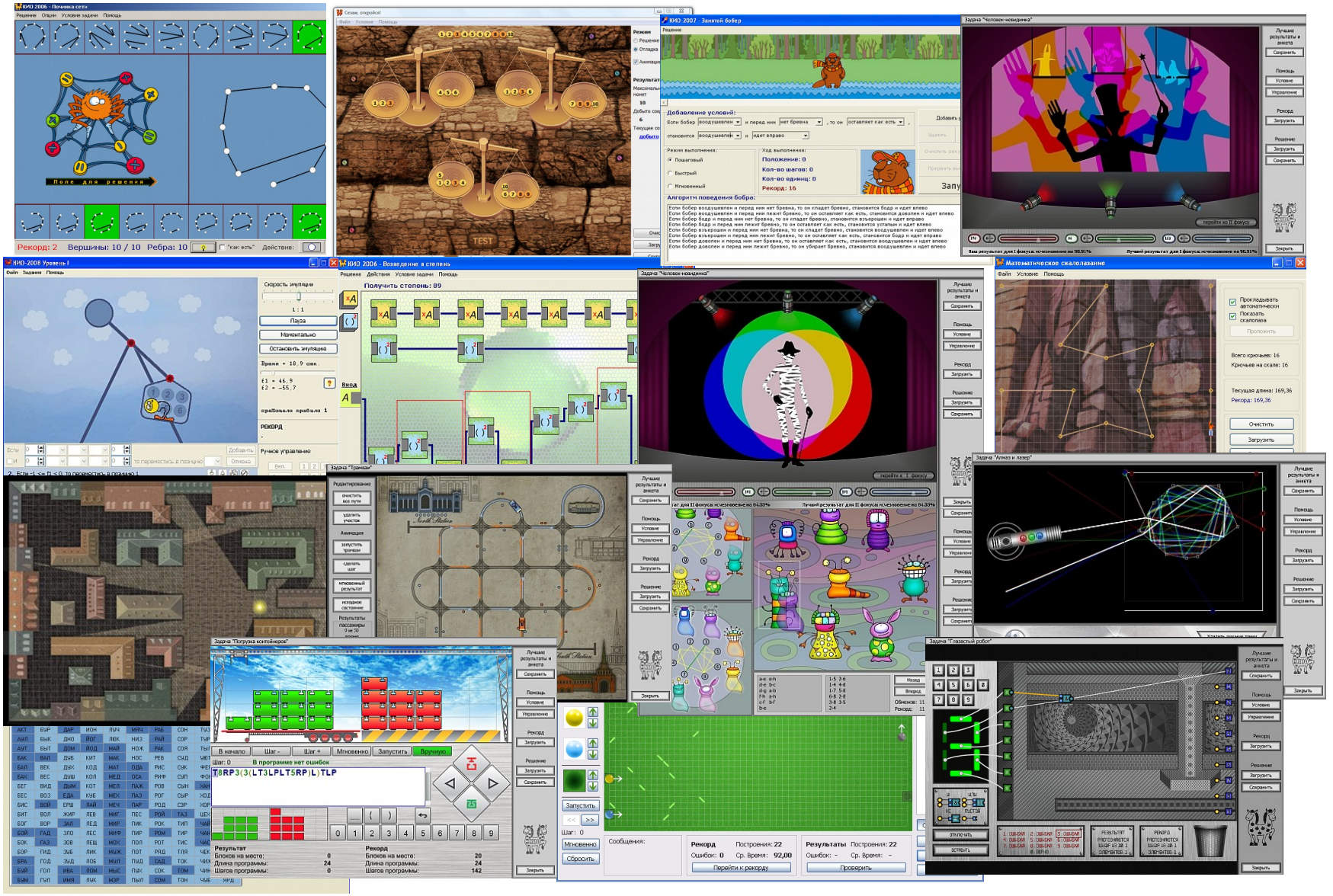
Three stages, with the first being the Bebras contest

1) Bebras: the mass contest on informatics;

2) “Construct, Test, Explore” (held about 15 years) (http://kio.spb.ru). The contest, presenting each year three nontrivial virtual laboratories, supporting research activity of schoolchildren. After the contest, which hold during a week these laboratories are used on teacher training courses and to support school sections on informatics;

3) The Olympiad in discrete mathematics and computer science for 9-11 grades (http://dmti.ipo.spb.ru/). The olympiad combines an idea of constructive work with computer models and tools with tasks, based on theoretical analysis of experiments results. The olympiad is held in December (the qualifying round) and March (the final round). In 2015-2016, 18 leading Russian universities participated as coorganizers.

Construct, Test, Explore contest in information technologies



Алгоритмы

Ход конем

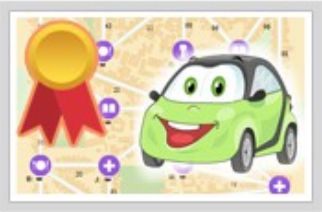
Алгоритм обхода доски шахматным конем Практически каждый хотя бы раз в жизни брался за задачу обойти конем все клетки шахматной доски так, чтобы в каждой клетке побывать ровно ...

Читать описание

Алгоритм Прима

Графы, с которыми мы уже познакомились, могут нести больше информации, чем только указывать отношение между объектами. Например, схема дорог, кроме указания какие пункты соедине...

Читать описание



Алгоритм Дейкстры

Прежде чем формулировать алгоритм Дейкстры строго, обсудим его неформально на примере "задачи спелеологов". Спелеологи, оснащенные портативными эхолотами и рациями для связи, ис...

Читать описание

Алгоритм Краскала

Сегодня мы познакомимся с тремя важными идеями информатики: 1) простые сортировки; 2) метод раскраски вершин для обнаружение циклов в графе; 3) ещё один жадный алгоритм постр...

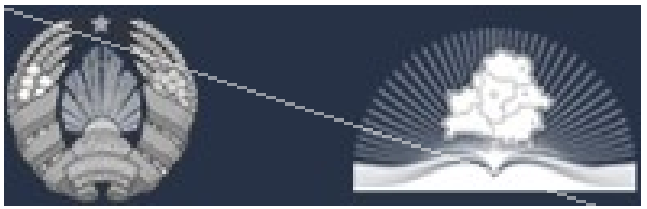
Читать описание

Conclusions

1. Bebras contest expands children society which are interested in informatics and participate in informatics contests.
2. Bebras gives possibility to enhance quality of tasks of national competitions due to procedure of tasks discussion and selection (and creation of common base of problems).
3. Due to using metaphores some of which reflect national features, Bebras contest plays a cultural role too.

Will be continued by
Irina Kirinovich

Belarusian State University of Informatics and Radio Electronics



The Ministry of Education of the Republic of Belarus

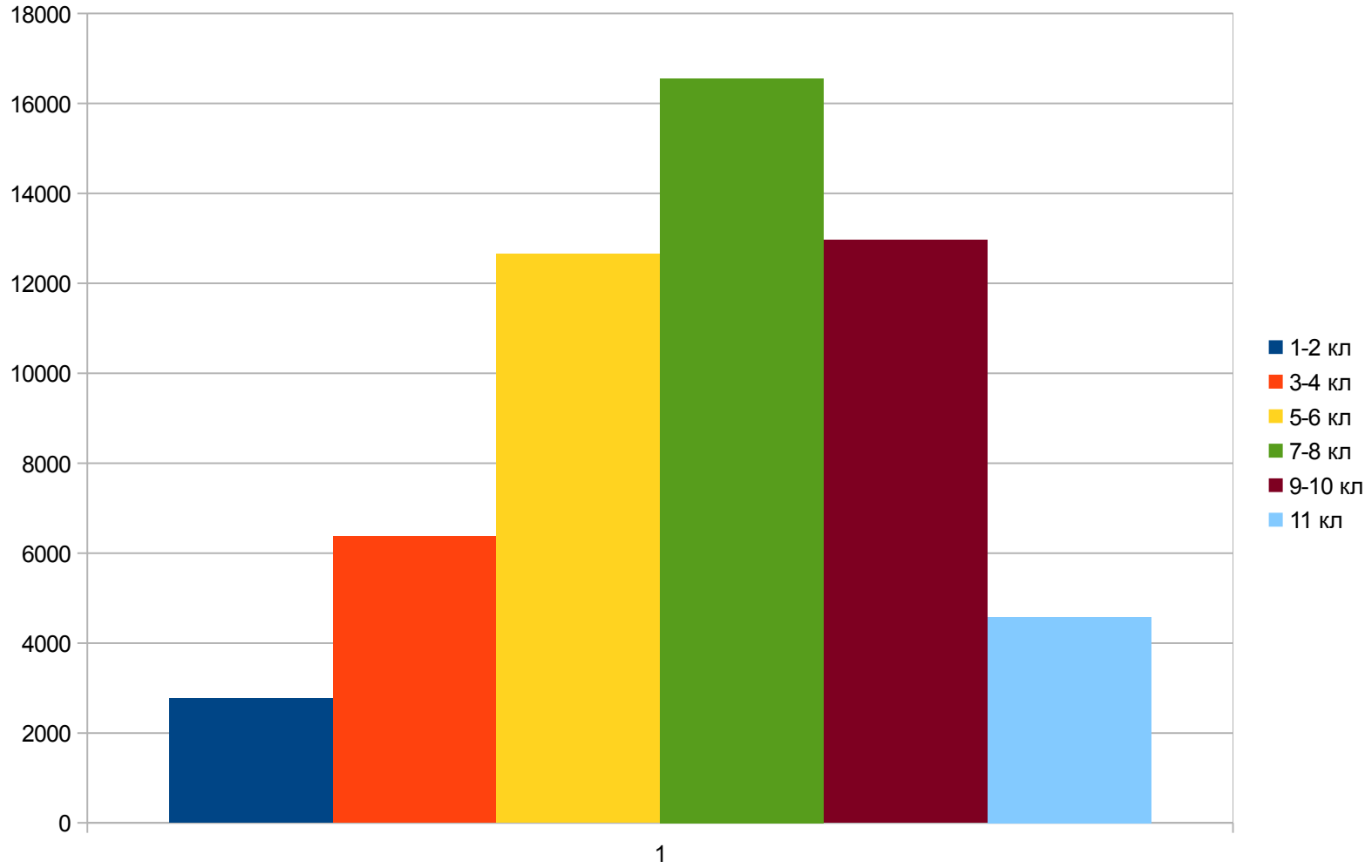
BSUIR TODAY - IT

- **20,000** studying in the daytime, evening, correspondence and distance learning
- **10** faculties, 38 departments
- **39** specialties first stage and 37 - second stage of of education
- **7** certification of internatiohal educational centers
- **7** tips on thesis
- INSTITUTE OF INFORMATION TECHNOLOGY
- RESEARCH PART
- COLLEGE
- **8** academic buildings and **4** comfortable hostels

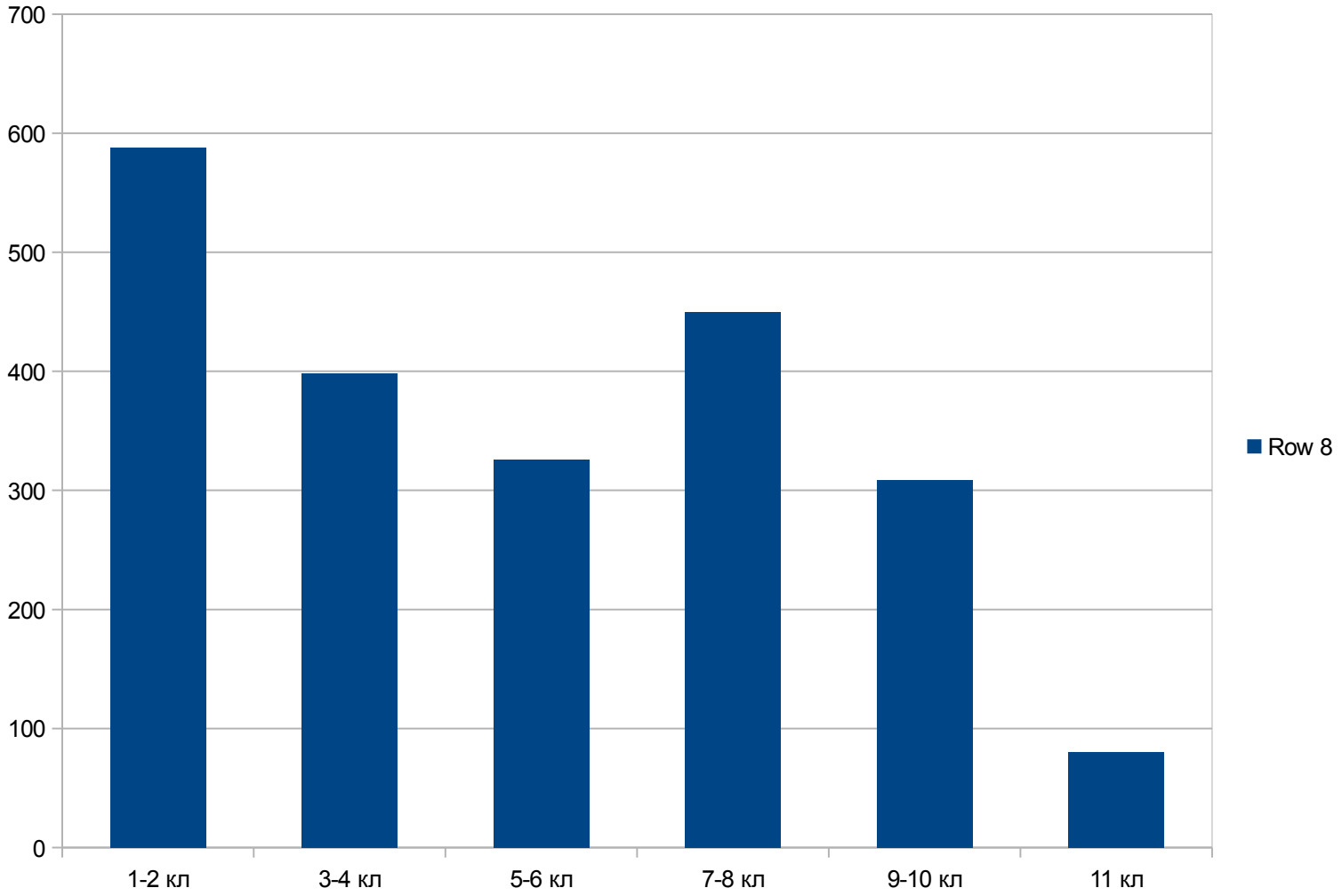
Symbol "Bebras" in Belarus

Participants were

55873 students from classes 1 to 11



Diplomas of I, II and III degree awarded to students in **2155(5%)**



Absolute winners were 67 people

1-2 cl	3-4 cl	5-6 cl	7-8 cl	9-10 cl	11 cl
0	54	3	5	5	0

Diplomas of I degree awarded to 518 people

1-2 cl	3-4 cl	5-6 cl	7-8 cl	9-10 cl	11 cl
156	73	70	143	69	7

ДИПЛОМ

абсолютный победитель

награждается

Калько Илья

учащийся 7 класса

ГУО «Клецкая средняя

школа №3»

победитель Международного конкурса

по информатике «БОБЁР»

Institute of Mathematics
and Informatics
Vilnius University

Prof. Hab.
Dr. Valentinas Dagienė

2014


ДИПЛОМ
Алексеевич Роман


ДВЕРИ