НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ УНИВЕРСИТЕТ

Факультет компьютерных наук,
ОП Программная инженерия

ПРЕДИКАТИВНЫЙ ВВОД

Выполнили: Чертанов Денис БПИ185
Сафонов Николай БПИ185
Калантаев Максим БПИ185

Москва, 2021

OBJECTIVE FUNCTION

Main metric – **KSPC** metric

Keystrokes per character (KSPC) is the number of keystrokes, on average, to generate each character of text in a given language using a given text entry technique

$$KSPC = \frac{\sum\left(K_w \times F_w\right)}{\sum\left(C_w \times F_w\right)}$$

where K_w is the number of keystrokes required to enter a word,
C_w is the number of characters in the word, and
F_w is the frequency of the word in the corpus

OBJECTIVE FUNCTION

Secondary metric – **Learning Performance** (LP)

Learning Performance (LP) is the numerical indicator of the learning rate (based on calculating the similarity of the proposed keyboard with the default)

$$\text{Similarity} = \sum_{i \in \alpha} \left(|k_{i_x} - q_{i_x}| + |k_{i_y} - q_{i_y}| \right)$$

where i is a letter in alphabet α,
the set of lowercase letters
from ‘а’ to ‘я,’ and kix
and qix
are the x-indices of the i key
on the given keyboard layout and default

ALGORITHM

Simulated annealing

Before starting simulated annealing we need to define 3 functions:

- **Energy function:** it's just our objective function
- **Decrease temperature function:** ti = t0 / i * 1.1
- **Function that generates a new state:** select new random button for one random letter

Probability of going into a bad state: $P(\Delta E) = e^{-\Delta E / t_i}$

CONCLUSION

The best layout which was generated by algorithm (30000 steps)

```
{
  "s" : ["б", "и", "р"],
  "d" : ["д", "й", "о"],
  "f" : ["з", "т", "у"],
  "g" : ["г", "н", "ъ", "э", "я"],
  "h" : ["в", "е", "ф", "ш"],
  "j" : ["ж", "л", "с", "х", "ь"],
  "k" : ["к", "п", "ц", "щ", "ы", "ю"],
  "l" : ["а", "м", "ч"]
}
```

	kspc	lp
baseline-layout	1.015218	37
best-algorithm-layout	1.003498	136

НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ
УНИВЕРСИТЕТ