How to choose personal educational targets according to your own abilities

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Abstract. We propose new approach to problem "person chooses education to get a good job". The paper introduces new concept where old terms get new meanings i.e. terms like "skills", "abilities", "demands for skills", "demands for abilities", "person", "task". We use term "person card" for formal description of a person and "task card" for formal description of a task. The paper describes some basic principles about cards, how they could be organized and how rating of pair <person, task> could be calculated. Algorithm of building and working with this model is described. Implementation of the model and algorithm would be new online service.

Keywords: MathematicalModel, Industry, Pattern, Competence, LaborMarket, Qualification, Requirement;

Key terms: Skills, abilities, demands for skills, demands for abilities, person, task;

1 Introduction: Problem, Actuality and Research Objectives

Below we lay out basic ideas of project "AbiTask.com"
Consider world economics as a system. It consists of subsystems. Some of these subsystems are markets. Some markets are old and well-studied like "raw materials market". Some markets are new and less studied. We will speak of the three most innovative markets of today: "Education", "People for job" and "Job for people"

At the end of XX century these three markets came to some kind of balance. But recently two events happened that made the old balance impossible.
1993: Internet was born
2012: MOOCs appeared to the world [3]

Before these events ("before MOOC") these three markets cooperated like in the fig.1

Fig 1. Three markets "before MOOC"

In this schema you first go to university (college, courses ...) and after successful graduating start looking for a job. Here universities controlled your way to job market except two cases

1. Your job has low-status and is unqualified
2. You are innovator and your position is too undefined and risky

Now (after 2012) we have different picture (fig.2) or at least would have in near future

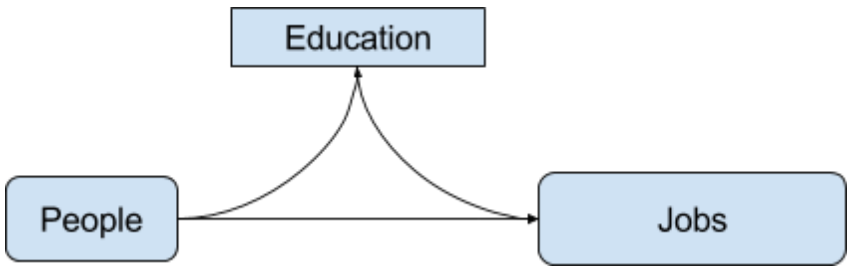


Fig. 2. Three markets now

Instead question "what education I need to get a good job?" young people ask "what job I need to be happy and what education I need to get the job?"
"Job to be happy" is the main subject of this paper

2 Existing approach and our approach

First, let us separate things you can get by learning and training (**skills**) from things you cannot (**abilities**).

Some models of personality suggest that "there are no abilities, only skills". Other models (we will call them **A-models**) suggest that **set of abilities is not empty**. We will work with A-models only

Take one A-model. We will call it **AX-model** if and only if in this model

- Every person has its own "formal description of abilities presented" (**person's card** or **P-card**)

- Every task has its own “formal description of abilities needed” (**task’s card** or **T-card**)
- Every pair <P-card,T-card> has a rating - a number - for pairs to be compared. The higher rating the better the pair is.

Now for every AX-model, for every person, and every list of tasks we can order the list of tasks putting better task (for this person) first. Tasks at the beginning of the list are best for this specific person according to this specific AX-model

3 Problem definition, target of the paper

Problem definition: we need a computer service to help a person to choose education according his/her abilities and according demands of real economy of near future, and, after choosing, to support educational process up to getting a good job.

Target of the paper: we show how it could be done with math model and algorithms.

4 Main content

About terms.

Task - is a situation that needs a person to step in (or to solve it). After the person acts (or solves the task) the task shows “**Yes, success**” or “**No, failure**” result.

Every AX-model for every task can show **T-card**, i.e. description of abilities needed. Person with these abilities would get “success” whenever he/she step in.

We have access to proposition “the person has these abilities” through **P-card** and **Rating** for this model.
Some task are “**atoms**” i.e. indivisible.
Other task are “**complex**” - they can be divided into other smaller tasks. T-card for a complex task could be calculated from T-card of its parts, considering their importance and relative duration.

Abilities. Everyone who wants to study abilities steps into one trap. We will show the trap on simple example of “left-handed person”.

Suppose you have to operate with left hand on the same level as you operatie with right hand or better. With some training and high motivation you can achieve that. Does it mean you are left-handed person? No, it does not.

With this approach “operating with left hand” is **a skill, not ability**.

You can observe such “skills“ at examination for high-paid job. The job would be taken (while play is fair) with most motivated and trained person, not with most able.
But such exam has its drawback. In olympic sports, in professional arts like music or ballet, even in IT-professions some people after few years feel sick, give up and decide to start life from scratch

Let us take another approach. Imagine a child in a playing room waiting a psychologist while psychologist observes him/her being invisible.

Suppose the psychologist wants to know is the child left-handed or not. The solution is simple. Whenever the child takes something in a hand let us count for “left hand” and “right hand” operation separately.

If the child uses left hand in 80% of operations and right hand in 20% he/she is left-handed. If he/she uses left hand in 20% of operations and right hand in 80% he/she is right handed

Define a “**line of similar but different tasks**”. For example you can take a cup with left hand or with right hand. These are **two different tasks of the same line**.

Define “psycho-physiological subsystems” for these tasks. “Left-handed operations subsystem” includes the left hand and part of your brain and nerves to solve the task.

Imagine child L. He took a cup with left hand 4 times of 5 and with right hand 1 time of 5.

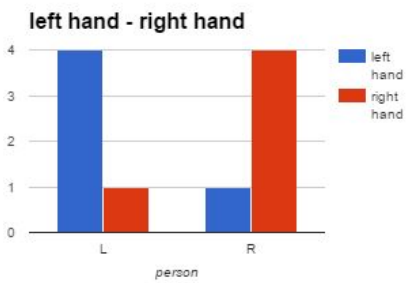
Imagine child R. He took a cup with right hand 4 times of 5 and with left hand with 1 time of 5.

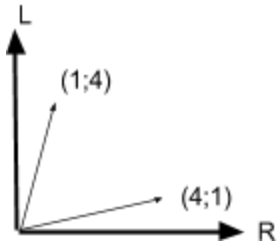
We will say that “**subsystems of these people have defined proportions**”

These proportions could be presented with table as follows

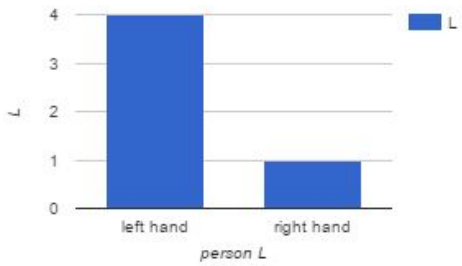
Person	**With left hand, times**	**With right hand, times**
L	4	1
R	1	4

Or with bar chart. Or with vectors at the coordinates’ plain.





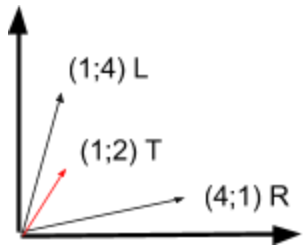
Consider the chart for person **L** only.



Imagine that two subsystems called “left hand” and “right hand” accordingly “**get energy**” according to height of the bar. Imagine that tasks person solves “**consume this energy**” with specific proportions

Suppose that for “left energy” the income flow is high and outcome flow is low. It means that after some time of accumulating this subsystem would blow up from overflow. The person would feel sick, would say “I cannot implement myself” and escape the workplace for “better” job

Suppose two persons, L and R, both apply for the same job T. Imagine that at this job for every one operation with right hand two operation with left hand are needed (fig.3, red arrow)



In the best case possible vectors L and T would be collinear. Anyway the “I feel sick” state would come for L person later than for R person. Therefore L person must be hired here and R person must not.
The same approach is appliable for one person and many tasks.
The simplest measure for vectors “to be close” is “angle between vecorts” calculated with “scalar product” as follows

$$cos\,(a,b) = (a*b)/(|a|*|b|)$$

We could calculate **Rating of pairs** with this formula

Now consider our model (called **Abstract Intelligence Levels**’ theory, or **TUAI** in Russian), its lines and subsystems. We are implementing the model now.

Other AX-models would be admitted to the contest on our online service platform as soon as their experts would be ready to describe P-cards, T-cards and Rating for every possible case

TUAI-model

This model has 3 lines and 21 subsystem
Every line corresponds to one group of demands of every possible task

- M - modality. These demands are about information of some specific kind.
- T - timeline. These demands are about time
- C - complexity. These demands are about complexity of task

M-line consist of three lines

- M1 - about input of information
- M2 - about processing of information
- M3 - about ouput of information

Lines and Subsystems

Modality lines and subsystems:

M1	Sound/Audio/Ear	View/Video/Eye	Touch/Move/Hand
M2	High generalized form / Schema	High detailed form / Picture	Selective generalization - selective detalization/ Text / Symbols
M3	Holistic Emotional Presentation / Image	Key points and values / Meaning	To do list / Scenario

Timeline subsystems

1	Fast and energetic	“choleric”
2	Well-balanced	“sanguinic”
3	Enduring	“phlegmatic”
4	Sensitive	“melancholic”

Complexity subsystems

Level	**Attention field structure**	**Keywords**
1	One objects	Name, thing
2	Many objects	Space, boundary
3	One process	Time, target
4	Many processes	Role, way
5	One map	Free, random
6	Many maps	Proof, doubt
7	One system	Paradox, innovation

8	Many systems	Complexity and variety

Afterwords

How can we learn abilities of specific person?

Methods from most cheap (and least precise) to most expensive (and most precise) are as follows

1. Questionnairy
2. Computer game
3. Free behavior observing
4. Brain tomography

Probably you can add more methods.

How T-card could be built?

We see two methods to build it

1. Thought experiment
2. Keywords analysis of description

Every AX-model (including TUAI) has its own patterns for two these procedure

P-cards and T-cards as vectors

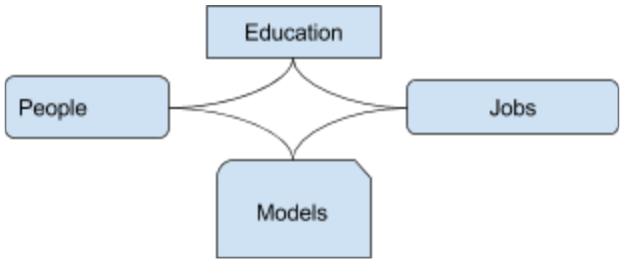
Inside every line there are three options to present data.

1. To put subsystems in order (from most energetic to least energetic)
2. To divide subsystems into classes (and order such classes)
3. To distribute weights (of 100% total or of 1 total as in probability theory)

Every option has its own procedure to calculate rating. “Cosine formula” (see above) works well for 3rd option.

About markets

We started from three markets: “People”, “Education”, “Jobs”
Now we see new market: “Models of person”



5 Summary

New trends in development of world education system shift attention from question "How can I get good education?" to question "What education I need to get a good job?". Therefore old problem of choosing right education comes afront. In this paper we described our solution to this problem.

6 Conclusions and Future Work

Now we work on alpha-version of the system. It must be ready in a few months.

Some theoretical aspects need more detailed investigation such as (1) susystems list (2) procedure of getting card for the person (3) rating calculation formula and more.

7 References

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