Motivational and Personalization Strategies for Human Activities in Everyday Life

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***Abstract*—Last years more and more physiologists say about importance of human physical activities. Wherein physical activities as well as mindfulness is a key factor for human successfulness and productiveness. Last years, different kinds of yoga practice and meditation techniques becomes more and more popular and migrating from east countries to Europe. However, people often have a lot of tasks that looks like more important than conscious exercises. In this paper we present a research related to investigation how motivational strategies can be used to motivate people spend a time in every day for conscious exercises and train their body and mind. Also, the paper present the competence-based model for trainers search based on the human preferences to advice her with conscious exercises.**

I. Introduction

Human physical activities and mindfulness are the key factors for human wellbeing and productivity. Recent scientific studies have proven the benefits of meditation [1], [2] that provides possibilities of relaxation for human mind and reduce the influence of stress in human life. Bob Roth said that stress is the bubonic plague of the 21st century [3]. Modern statistics show that a lot of people suffer a disease and die du the continues stress influence during the life.

Along with that conscious exercises becomes more and more popular in the world. People understand they it is important to spend time during the life for the body and mind. So, more and more people around the world are seek possibilities to learn yoga and meditation techniques. For example, the well-known in USA mobile application Headspace [4] has raised a total of $75 million. In June 2017, the company confirmed it was valued at $320 million. It currently generates more than $100 million in revenue per year.

However conscious exercises required continuous everyday involvement of human to the process. Often people buy annual gym membership pass and use it only first month. After that they find more important tasks and cancel the conscious exercises. So, it is important to find mechanisms related to people motivation for spend everyday time for conscious exercises. There are research and development in the topic of Artificial Intelligence, Ambient Intelligence, and Smart Spaces, where cognitive analysis and service personalization in human everyday life is one of the important areas for human activities support [5], [6], [7]. Wherein it is important to develop a model that provides possibilities to find right trainer for the right people in a right time that supports and advise her for physical activities and mindfulness. The paper presents a research aimed to solve both tasks. We present an approach to the system that will analyze human behavior and motivate her with the practice based on this analysis. Also, we present the reference model for competence management of conscious exercise trainers for selecting the right trainer for the right human based on her requirements and trainer expertise.

Last years, we are actively interacting with game elements in information systems. Games are primarily known for their ability to interact and excite humans. Also, players commonly experience different emotional and psychological states. Games try to evoke emotions like enjoyment, immersion, competence all of which are characteristic of intrinsically motivated human behavior. Incorporating the engagement and enjoyment of the game full process into activities outside games is at the core of what commonly titled gamification. In addition to gaining popular proponents, the gamification approach has gained traction from positive prospects, which predict that most companies and organizations will implement gamification in the near future [8]. Such companies as Google, Facebook, VK use gamification from short events to the integration of entire game mechanics. We focus in the paper on motivation of the human to practice conscious exercises. We chose meditation practice as an example. We build a conceptual motivational model which uses gamification elements for interaction with human.

Some people prefer to meditate with specially recorded audio guides for meditation. Meditation audio guides usually contain instructions from trainers that help users conduct meditation in the highest quality level. We develop and present mechanisms for evaluating meditation trainers and describe their competencies as well as evaluation meditation audio guides for possibility to recommend them to the human based on the human preferences.

II. Related Work

In the section we consider gamification approaches and examples of gamification's usage as well as approaches for finding a mentor for some activities. Then we consider the expert networks that is community of professionals in the some topic where the competencies of the participants are understandable.

A. Gamification

The term gamification is relatively new and usage of gamification in information systems is increasing. Systems are

increasingly gamified and implementation of games elements in real world are common in modern days. This trend continues due to gamification elements help people better immersed to the information system by influencing certain psychological needs.

The paper [9] consider gamification as a tool for motivating specific behaviors with certain game elements. The authors claim that it is expected that gamification can foster the initiation or continuation of goal-directed behavior, i.e. motivation. There are connections between gamification elements and specific psychological user experience. Three basic psychological and intrinsic needs are postulated: the need of competence, the need for autonomy, and the need for social relatedness. Each of these needs have connection with particularly game elements. To one degree or another, each element of gamification satisfies one of the needs.

For the considered in the paper meditation motivation approach these needs are closely related to the reasons why the human uses our system. Only with the answer to the question: "what led the user to us?" - will help to select the necessary elements for better interest and immersion in the system.

B. Mentoring Systems

There are no direct analogs for system where meditation experts profiles defined with competencies. There are systems like [10] where a person can find meditation expert but the competences of experts in such systems are not formalized.

Moving away from the topic of meditation itself, there are systems for selecting trainers [11] or systems for selecting tutors [12]. In such systems, some information about the competence of experts is often present, however, these competencies are defined externally, (at the expense of certificates). In some cases, the expert's competence is determined by the average of the ratings given to users, while there is no distribution of specific competencies.

The system [13] presents a library of meditation audio guides classified by the following categories.

- Meditations for relaxation & stress relief.
- Meditations for healing.
- Meditations for women.
- Meditations for children.
- Meditations for empaths.
- Chakra meditations.
- Compassion meditations.
- Love meditations.
- Meditations for self esteem.
- Meditations for spiritual awareness.

Another example is meditation application for smartphones. Meditation audio guides are divided by the aims of meditation. Examples of the applications are [4] and [14]. The aims that categorizes audio guides in both applications.

- Sleeping better.
- Less stressed.
- Finding calm.
- Managing anxiety.
- Being more focused (Headspace only).
- Learn awareness (Mediatopia only).

The term "expert network" usually refers to a community of professionals in a particular areas united by an information system in which the following main tasks are solved: selection of experts with specified competencies for the examination; expert rating, supporting professional and scientific activities of an expert with the help of additional services; search for colleagues and interest projects [1].

C. Expert Networks

For considered topic expert network brings together meditation experts and humans, who want to learn meditation practice. One of its main mechanisms is expert assessment.

One way of expert's competency level definition in the system is estimated on the basis of deviation from the average assessment by other experts. This approach is confirmed by the paper [15] where some students was surveyed on complex questions that did not have a clear answer. A survey of many students was more accurate than individual student responses.

An important task of the developing system is the selection of an expert competent to help a user with certain characteristics (gender, age) in a particular meditation. The task of finding an expert on a given topic is considered in [16]. The authors propose a method for assessing an expert based on a topic: assessment based on experts documents content. In the article, this method was determined the most accurate relative to others.

The authors of the papers [17] and [18] prove that expert judgments are subject to a number of cognitive and motivational biases, the concrete context of the expert and his personal experience. In the context of the presented in the paper approach this is expressed in danger of prejudice in the appearance of meditating students. For this work, this led to the use of comparison with the automatic assessment of meditation by a neural network. The purpose of this is to better evaluate and train experts.

The authors of the study [19] propose a model for changing the significance of expert estimates to improve probabilistic forecasts. Preliminary studies show that expert judgments are subject to a number of cognitive and motivational biases, the specific context of the expert and his personal experience. The authors show that the expert competence should be assessed based on how accurately do experts answer the questions, the answer to which can be predicted. To make a decision, the authors propose to perform mathematical aggregation of expert estimates.

III. Meditation Motivation Approach

Summarizing information from papers about the process of meditation [1], [20] and the applications for meditation accessible in Google Play market as well Apple Store three main reasons for using the information system for support this process have been identified.

- Stress level decreasing / help to control anxiety and other psychological related reasons.
- Improve productivity and concentration which focuses on meditation as a tool to achieve the goal.
- Learn how to meditate properly.

We develop motivational model of the meditation system that includes the gamification elements. The model takes into account user's actions. Every user has score in the system which she can't access. Points are calculated based on user's actions in the system. Initially points are calculated from optional initial survey (see Fig. 1). The user has possibility to skip the survey. In this case, the user is assigned a basic model of motivation (see Fig. 2), which in turn changes depending on her actions.

There are certain gamification's elements that need to be considered for motivational model.

- *Performance graphs* provide information about the users' performance compared to their preceding performance during usage of application. They evaluate the user's own performance over time. Visual graphs help to understand user's progress over time [21].
- *Achievement* is visual representation of progress. Can be earned and collected by particular activity within information system. Also, achievements can provide feedback about how the user have grown.
- *Badges with encouragements* indicates user's progress and motivational information.
- *Interactive meditation bot* provides all necessary information about meditation's process and application work.
- *Avatar* is visual representations of user within information system. Main formal goals identify users and set them apart from other users of the application.
- *Self-competition* provides information about the user's performance compared to their previous performances.
- *Chats with experts / user* allow users to ask some advice from experts or share their experience with other users. This element adds to our motivational model elements of social interaction which is vast part of the gamification.

We consider additional information for meditation process is a set of resources that the user can use to learn the meditation.

- *Health-oriented resources* contain articles and courses from verified sources which can help user to help to improve mental health.
- *Guides for meditation process* include guides for different levels of meditation (e.g. walking meditation, meditation in different poses).
- *Efficiency guide* provides information which can help user to stay focus and improve his/her productivity.

The motivational model includes gamification elements, additional information, and social chats. Basic motivational model consists of all basic gamification elements and aim to interact and guide user through application. Gamification elements of this sub-model helps system to understand to which sub-model include the user.

Lets consider the motivational sub-models in details. Reduce stress sub-model (see Fig. 4) aims to help user overcome psychological problems such as stress and anxiety. Additional information includes selected courses and articles from experts which can help to achieve these goals.

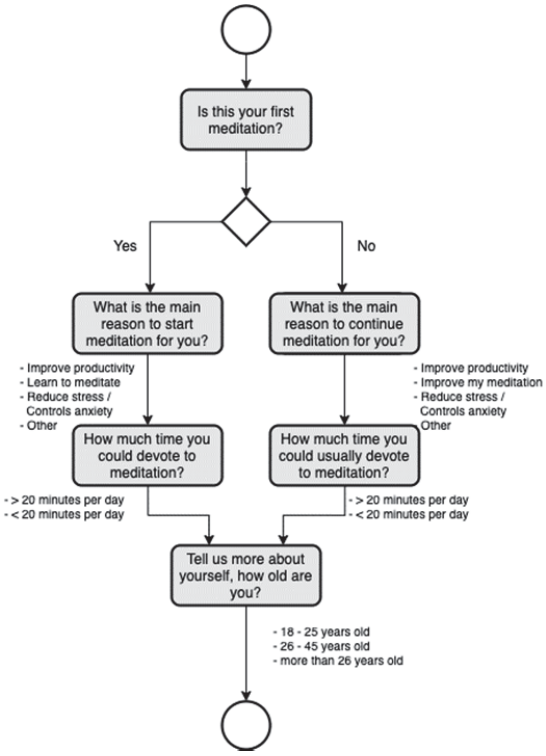

Fig. 1. Proposed User Survey

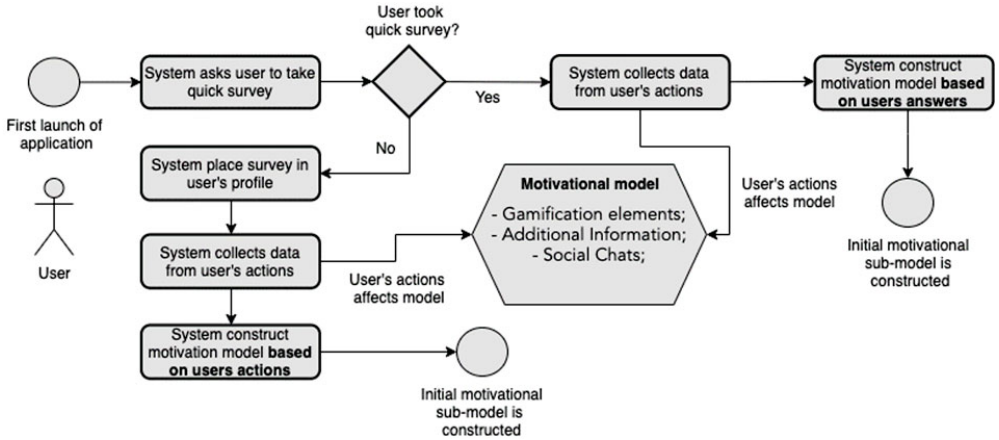

Fig. 2. Motivational Formation Based on Interaction with User

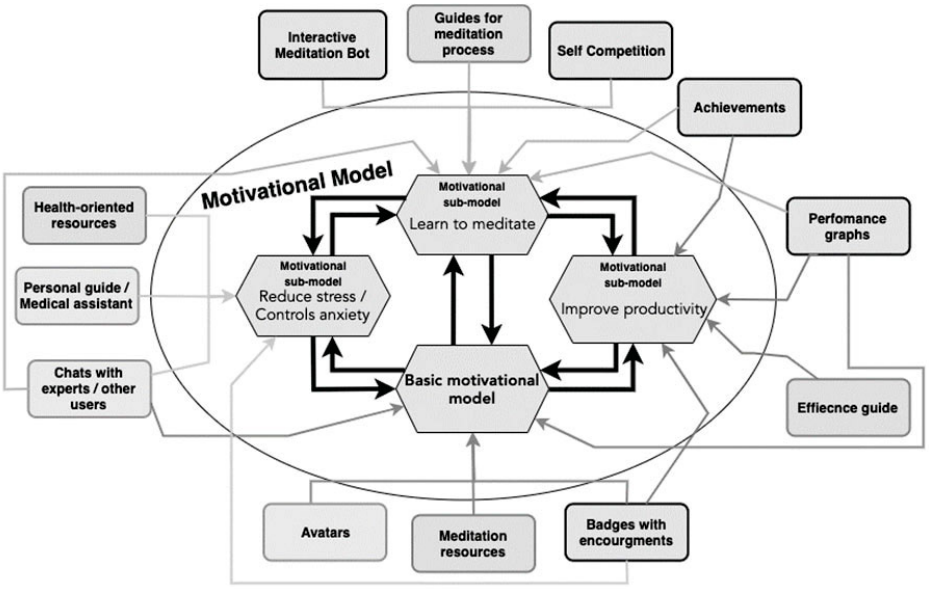

Fig. 3. Developed model for motivate human with meditation practice based on different gamification elements

Badges with encouragement show user his/her progress with meditation and motivates to continue meditation practice. If user is interested in special articles, courses or try to communicate with experts or other users on psychological-related themes, we assume that we can help to overcome these psychological issues.

Learn to meditate sub-model (see Fig. 5) is focused on the user's progress in meditation process. Performance graphs, achievements, "ghost rider" and interactive helper helps user to feel the progress and experience positive emotions from meditation. Social chats with users allow user to share these emotions with other users or ask some guidance from experts. Additional information for meditation helps user to learn more about meditation in general and to read guides about specific parts of meditation. User actions such as interest in guides and video courses helps to construct this sub-model for user.

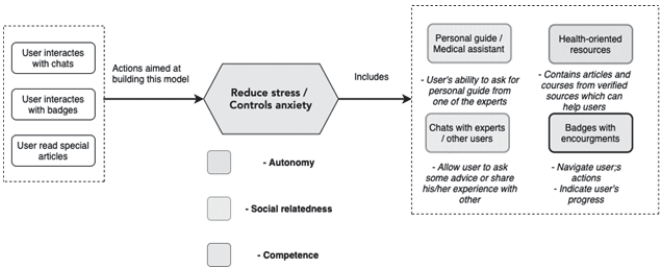

Fig. 4. Motivational sub-model which can help with user's psychological difficulties

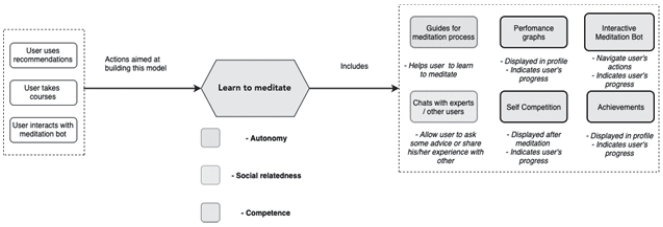

Fig. 5. Motivational sub-model oriented on help user to learn to meditate

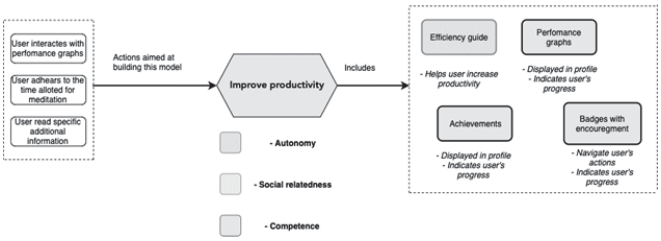

Fig. 6. Motivational sub-model oriented on help user to improve his/her productivity

At improve productivity sub-model (see Fig. 6) meditation practices aims to improve user's productivity. Badges, achievements and performance graphs are focused on meditation time and indicate user's progress over time. Special articles are focused on efficient time allocation for the user. User interests in configurable information such as performance graph and achievements inside application adds points to productivity / concentration oriented sub-model.

III. Reference Model of Trainers Competence Management

We develop a reference model for competence management of conscious exercise trainers for selecting the right trainer for the right human based on her requirements and trainer expertise. So, different trainers have different competencies, for example, some trainers are better at instructing children, while another ones are great at lowering the stress level. We rank trainers based on the following three things:

- Marks set by trainer students.
- Accuracy of trainer's assessment: how much trainer grades of meditation different from another trainers.
- Quality of audio guides: how strong audio guides by this trainer helped humans to meditate better.

The mechanisms for evaluating and ranking audio guides to select the appropriate meditation audio guide for the human. Audio guide could be well for specific group of humans.

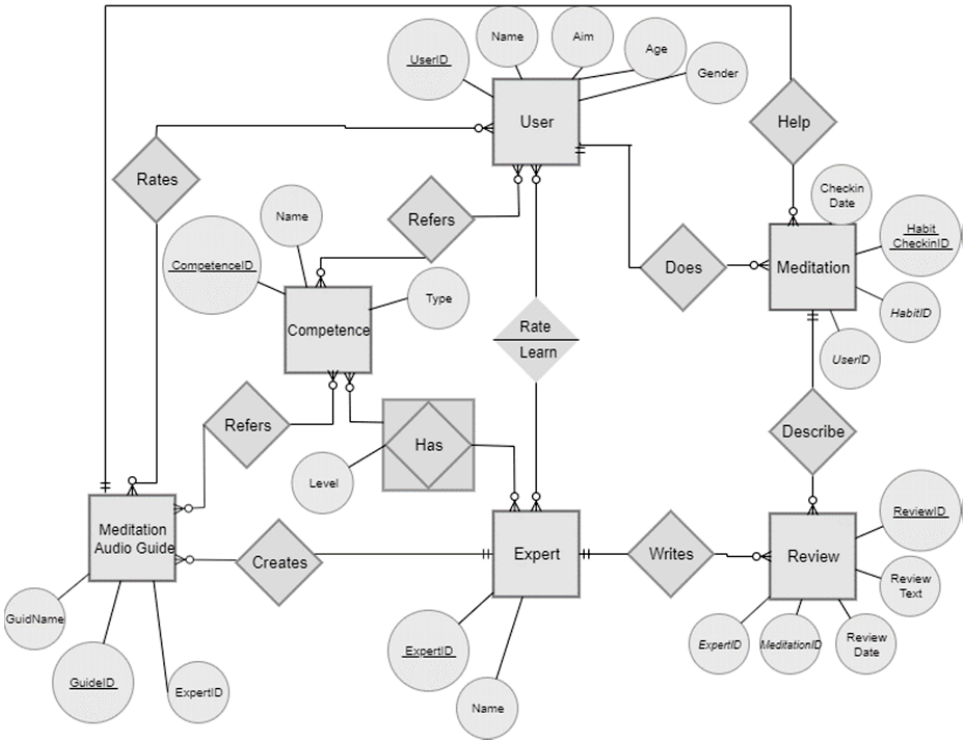

Fig. 7. Reference model for competence management of conscious exercise trainers

We check if meditation audio guide could help specific person to do meditation better or not. If it is, we recommend this meditation audio guide to users with similar characteristics (age group, meditation aim, etc.). We will rank audio guides based on three things:

- Marks set by humans who used this meditation.
- Influence on meditation quality: how strong audio guide improve the overall meditation rating of the human.

Fig. 7 presents the reference model of the main entities in developing mechanisms. It includes following modules: User, Meditation, Review, Expert, Competence and Meditation audio guide. User does meditations. He could use Audio guide by any Expert, and his meditation could be reviewed by any expert. Experts own competencies. Levels of competencies are calculating based on accuracy of expert evaluations in the review of meditation, expert mentor evaluations by users, as well as the specifics of the use of the audio guides they recorded.

IV. Experiments

We decided to test proposed models on publicly available datasets from similar spheres. For experiments we choose two datasets that consist of columns that could be used for testing developed mechanisms.

Each of dataset consist information with next structure:

- Evaluating subject
- Evaluation
- Evaluated object

Then we choose from this list two dataset, one of them consist time of evaluation, another consisting some characteristics of evaluated objects.

A. Amazon food dataset

Using the Amazon food dataset we checked the following hypothesis:

- With increasing number of rates, the standard deviation for expert, regarding the ratings of other experts, will decreasing, due to expert experience.
- With increasing number of rates, the middle rate for expert will be will get closer to average, due to increased expert criticality.

The dataset includes the following data.

- Reviews from Oct 1999 - Oct 2012.
- 568,454 reviews.
- 256,059 users.
- 74,258 products.
- 260 users with > 50 reviews.

A specific advantage of this dataset is the column containing the time at which the assessment was made. This allows you to test models for which the sequence of evaluations is important. Table I and Table II represents the way, how columns of this dataset were used applying to developing mechanisms. To test different hypotheses, data from these datasets are perceived in a different context. The second column describes the submodel that we are testing. Further column headings consist the name of the column in the source dataset. Intersection with the name of the submodel describe entities that column of the source dataset perceived in this case.

TABLE I. CORRESPONDENCE BETWEEN AMAZON FOOD DATASET AND CONSIDERED CASE

Amazon dataset column name		Product ID	Profile Name	Score	Time
Using for Meditation case	1.Expert accuracy	Meditation	Expert	Expert meditation rate	
	2.Audio guide influence on meditation quality	Meditation audio guide	User	Meditation summary rate	Time
	3.Audio guide user rating	Meditation audio guide	User	Meditation audio guide	

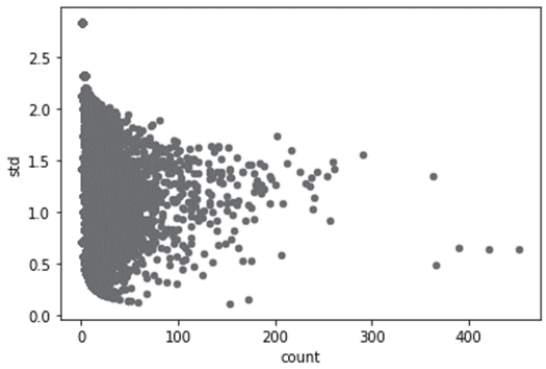

Fig. 8. Dependence of the standard deviation of the expert's assessment on the results of all experts

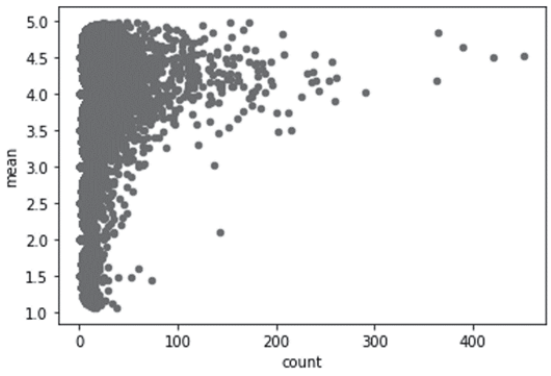

Fig. 9. Average rating given by an expert

Fig. 8 shows the dependence of the standard deviation of the expert's assessment on the results of all experts. Figure show how it is changing depending on the number of evaluations made by the expert. With an increase of the number of estimates, the deviation tends to middle deviation, and for experts who have made more than 350 estimates, the deviation tends to 0.5, which is much lower than the average deviation. Fig. 9 shows the average rating given by an expert. As the number of ratings increases, the rating strives to 4.5

B. Wine dataset

On second dataset we tried to check next hypothesis:

- With increasing number of rates the standard deviation for expert, regarding the ratings of other experts, will decreasing, due to expert experience.
- With increasing number of rates the middle rate for expert will be will get closer to average, due to increased expert criticality.
- It will be possible to build a model of changing specific competence based on where expert is more accurate.

Wine reviews dataset includes the following data.

- 119955 reviews
- 708 wine variety
- dozens of expert with more than 10 reviews.

The wine dataset is interesting to us in that it contains information about the varieties of wines, which we can perceive as some characteristic of the user that determines the competence of experts.

Fig. 10 and Fig. 11 shows the dependence of the average score and the deviation of the expert from the number of ratings. It is noteworthy that these graphs look like similar graphs for the Amazon food dataset, although datasets are not connected, and here the experts are real sommeliers, unlike the first dataset.

Fig. 12 shows an example of competencies changing based on the accuracy of the assessment. The expert, for whom the schedule was drawn up, was quite accurate in evaluating wines with the Bordeaux-style Red Blend characteristic, however, with respect to Cabernet Sauvignon, he was responsibly inaccurate. Accordingly, we are changing its competencies in the relevant fields.

This example was built for one expert, more than 5 ratings were analyzed for each competency. In total, the expert gave more than 50 ratings for these competencies.

TABLE II. CORRESPONDENCE BETWEEN WINE DATASET AND CONSIDERED CASE

Wine dataset column name		Points	Taster name	Title	Variety
Using for Medi-tation case	1.Expert Accuracy	Expert meditation rate	Expert	Meditation	Competency
	2.Audio guide user rating	Meditation audio guide rate	User	Meditation audio guide	User type
	3.Mentoring rating	Mentoring rate	User	Expert	User type

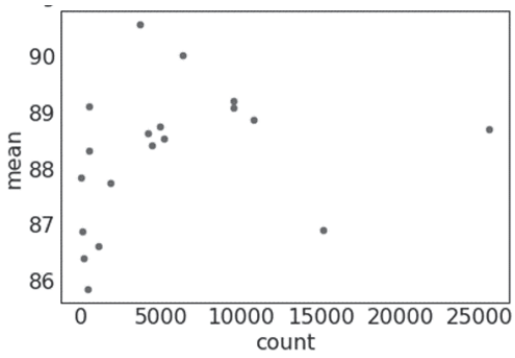

Fig. 10. Mean wine rating on numbers of review. Most of Wine rates in dataset is around 88, so this diapason picked to show dependence

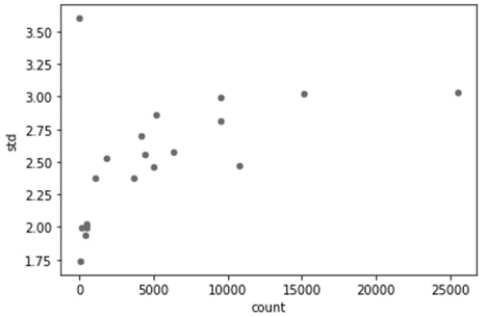

Fig. 11. Standard deviation for expert on number of expert's reviews

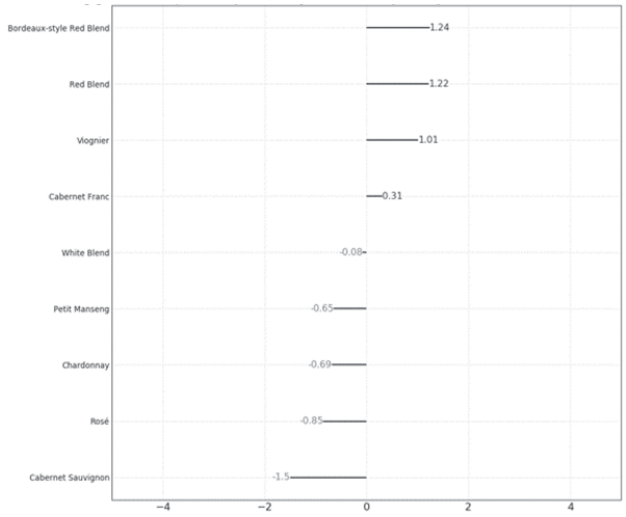

Fig. 12. Changing level of expert competence by each of competencies based on accuracy in exact cases

VII. Conclusion

We develop the approach to the system that will analyze human behavior and motivate her with the practice based on this analysis. Also, we present the reference model for competence management of conscious exercise trainers for selecting the right trainer for the right human based on her requirements and trainer expertise. We formulate the hypothesis and find the datasets for experiments. We examined evaluation mechanisms for experts and audio guides. Not all of hypothesis was confirmed, but it could relate to specific of exact dataset. The developed models are designed to ensure the high competence of experts in the system, and to ensure the quality of their selection. For further work authors identify the following tasks.

- Development of models for the training of experts. For the development of both the system and the community, the ability to include new experts in the system and increase their competencies is extremely important.
- Checking another hypothesis, work with time of rating and competencies. In shown models there was only static models. The system is directed to help users increasing meditation quality that is dynamic process.
- Find other datasets to check hypothesis. In testing hypothesis on these datasets some models could be wrongly accepted as right or wrong, due to different subject areas of datasets and meditation.
- Connect developing mechanisms together.

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