

Training Application for Mountain Climbing

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ABSTRACT

Sport Climbing has become increasingly popular internationally during the last two decades [9]. Some do it professionally whereas others do it as a pastime. Either way, proper training has to be undergone for mountaineers because it involves more of physical strain. Though there are many websites on assisting people in this, a personalized training would be considered more effective for anyone who is keen on mountain climbing. The ultimate aim of this paper is to develop a personalized web application that provides appropriate training for a person who wants to do mountain climbing. Customization apparently means getting the personal information about the user and suggesting training routines accordingly. Since mountain climbing is not any usual task, a customized training would prove to be more effective than randomly suggesting exercises.

Keywords: Body Mass Index (BMI), Integrated Physical Fitness (iFit)

INTRODUCTION

Now a days many people climb mountains for recreation. They undergo rigorous training for it exclusively. Professional climbers/ Sports Climbers take up regular training for mountain climbing whereas people who do it as a pastime would undergo training only few days before they actually climb the mountain. Training for Sport climbers would be personalized where one actual person trains them in climbing and other exercises involved. An amateur climber who wouldn't be able to afford a personal trainer makes use of mobile and web applications, which almost does the same job as a personal physical trainer.

Training for climbing involves cardiovascular fitness, physical fitness, regular exercising routines for a period of time and taking safety precautions. For a successful mountain climbing, these are very important.

The physical fitness training involves three main types of training. They are: walking/running, weights and hiking. Walking/running is primarily for endurance or longevity. The weights are aimed at giving strength. Training on hiking would give cardiorespiratory fitness, muscle strength and weight control.

Motivating and encouraging physical activity can be a challenging task since keeping up a commitment to pursue the exercise goal people initially set is difficult [5]. In that case, the User Interface plays an important role in

influencing people to exercise and train themselves for their particular needs. When the design seems appealing then the user naturally would have some affinity towards the application or website.

There are many web as well as mobile applications on fitness training. Some are personalized whereas some are not. Not many applications are available for mountain climbing. The existing ones do not facilitate all the above mentioned trainings. Therefore a personalized web application is developed considering all the important aspects in mind.

ASPECTS TO BE CONSIDERED FOR THE TRAINING APPLICATION

Health

Computers play a major role in our day-to-day activities. E-health is an emerging field that tends to utilize the evolving technologies in health and medical applications and provides effective solution for healthcare [1]. The major consideration before undergoing the training is to have a full health checkup. They include the cardiovascular fitness, the respiratory fitness, as one has to climb high mountains where the air pressure gets lower and causes breathing problems. There are many applications for monitoring health. However it is always best to check our health before stepping into a big venture such as mountain climbing.

Physical fitness

Physical fitness is a must for anyone who aspires to climb any mountain. Proper training has to be given to the person so that he/she would be fit to do the destined task. Fitness for climbing could be ensured in three different manners.

Walking/Running is the first type of training. The distance walked/jogged could be fed into the system to get the actual calories burnt and how much to burn in the future. This is a must because climbing a mountain requires more endurance than usual. That could be achieved only by undergoing appropriate training. There are many applications in the market for physical fitness. Jogging and walking could be monitored via many applications but the act of giving distance as input and getting the number of calories burnt as output is also an effective method that could be used in our application. Thus endurance could be maintained.

Lifting weights is the second type of training, which is done for ensuring arm strength. This type of training could be undergone anywhere.

Hiking is an important part of mountain climbing. Anyone who wishes to climb mountains has to undergo some training in hiking that apparently involves even taking the necessary materials.

Since a person's hand arm strength and endurance are prime factors that determine the climbing performance, a study was done with 205 sport climbers [2] where basic information of all climbers such as height, weight and experience in climbing were all given as inputs and that eventually calculated the hand-arm strength and endurance by mapping all the values. Another essential attribute any mountain climber must possess is having low fat. That could be ensured by walking/jogging. There is no direct link between body fat and the climbing performance. Hence, the hand-arm endurance and strength could be used as a medium to find the climbing performance as per the study. The same method could be adapted for our application as well.

Personalization

Customizing the application is as important as maintaining physical fitness. Not all body types would suit mountain climbing. They have to undergo some fitness training to adapt their bodies for mountain climbing. Training would be more effective if they undergo a personalized one that would suit their body type. Personalizing is nothing more than getting basic information about the user and suggesting workout routines accordingly.

The basic details of the person like height, weight, age etc. could be got as input. The output would apparently display the BMI (Body Mass Index) and the training routine that would suit their BMI and age. This is important because a person should not overdo a workout as that might lead to major health problems. Also there shouldn't be fewer workouts because that wouldn't produce any effect at all.

A list of workout packages has to be allocated for each combination of BMI and age. Once the user enters the necessary details, it calculates the BMI and with the entered age, the particular workout routine is shown to the user.

With regards to privacy and personalization, only one user could be made to use the application by registering with a username and password. Making the user login each time with the right password would be appropriate for authentication. All the log information could be viewed by this user about the daily workout routine, the trainings undergone today, the trainings to be undergone tomorrow, the amount of calories that needs to be burned etc.

User Interface

The more the application looks appealing, the more is the chance for the user to utilize it. External appearances or User Interfaces play a major role in determining the usage of a particular application. Some of the aspects [5] that would attract the users include:

Goal setting: Any path to success needs a start, which ultimately is the goal. A proper goal has to be set before proceeding with the further steps. In this case, the goal could be preset, as we already know what our goal is. There could also be an option of manually setting the goal, as that would be more motivating for the user. Apparently the workout routines are going to be based on the BMI and the age and not on this.

Personal awareness: The user must be fully aware of what he/she is undergoing, what the progress is like, what all measures could be taken for a better results tomorrow etc. Daily progress reports are one of the effective ways of self-analyzing. Real time feedbacks such as giving information about calories burnt, workout duration, steps taken, heart rate etc. would be more useful for the user as they'll know their steps in training.

Social influence: Studies show that results are more productive when people work together than doing things alone. Although our application is more personalized, viewing other people's progress and results would be an added advantage and could be an encouragement for the user.

Rewards: Giving a positive feedback encourages people to workout more with a positive attitude compared to people who receive negative feedback. The conditions of people who receive no feedback at all tend to have the same effect as those who receive negative feedback. This was proven in a study.

Reminders: Reminders are like a constant alarm for users to exercise. Reminders could be set in particular intervals according to the workout routine. Users could even set their own text in the reminder label as a notion of self-motivation. Reminders could be for workouts or feedbacks. These reminders could be optional if they might disturb the daily routine of the user.

Entertainment: For a user to workout for a longer time, there has to some sort of entertainment that would sustain him/her from boredom. Most of the users prefer anything that involves entertainment. Bearing that fact in mind, entertainment factors such as music, movie etc. could be introduced alongside the workout routines.

A paper suggests that gamification (use of game design elements in non-game contexts) improves the average performance of any user in terms of exercises [3]. Therefore introducing games would provide a more stress-free and easier environment to workout. There is also a chance of socializing while playing games. The net results are usually not feedbacks but scores. Anything visually attractive tends to captivate the users without even giving the slight feel of boredom. However, this feature would be an extravagant feature for a basic training application as there is just going to be one week of rigorous training in order to climb the Kilimanjaro after that.

EXISTING APPLICATIONS/METHODOLOGIES FOR EXERCISING AND MOUNTAIN CLIMBING

There are many online guides for mountain climbing. There are many web and mobile applications as well. Some of them from which ideas are extracted include:

ClimBSN: This ultimately aims at monitoring the climbing performance of mountaineers during training. Sensors are used for sensing their climbing patterns and performance. Their performances are quantified. This system could further be improved by suggesting appropriate training routines based on their performances.

iFit: It is an integrated physical fitness system that evaluates the level of fitness of elderly people [11]. It is a system for evaluating the PF (Physical Fitness) of a person, self-assessing the workout routine and to self-train with personalized PF assistants. It also involves a ZigBee module, RFID (Radio Frequency Identifier), ADC (Analog to Digital converter) etc.

GymSkill: It's a training system where an android application named VMI is fitted onto a fitness equipment [6]. The application provides constant feedback about the exercises done, calories burnt, improvement strategies etc. The feedback is either in textual or audio format. The feedbacks are a boost for anyone who exercises.

Exercise logging system: A data logging system [10] is fitted into a gym equipment to track the calories burned, the velocity in which the exercises are done, the number of times weight is lifted etc. This might not prove to be efficient always because it runs mainly on signal strength.

Mountain climbing tips: This android application focuses on guiding an amateur about the mountain climbing venture. It contains all textual information about climbing such as setting up base camp for mountain climbing, essentials to avoid accidents while climbing mountains etc.

Mountain climbing do's and don'ts: This is another useful android application which clearly tells the do's and the don'ts of mountain climbing including navigating in the wilderness, the climatic conditions in the mountains, equipment for rock climbing, climbing ropes, climbing on snow etc.

Naturapps: It is an award winning hiking application that is integrated with an interactive GPS. It provides a more lively view of the location to which we are actually climbing. The path/ trail could be easily found using this application. Signal strength isn't a problem because it works in offline mode as well.

Hiking log: This iOS application is custom-made for hiking. It contains a system where we can save the trials of the previous hike, see the total distance travelled, a Calendar view for a more aesthetic hiking experience, a graphical representation of the progress made etc. The

features that stand out are setting as many goals we like and deciding the pace in which we want to go hiking.

AllTrails: It is a website co-branded by National Geographic which mainly focuses on outdoor camping, hiking, mountain climbing etc. It contains the National Geographic maps in it, list of existing trails of previous mountaineers, advanced map editor enabling the editing of paths etc.

Mountainmadness: It is a website for mountain climbing, skiing and trekking. It guides the user in all these aspects. They also have mountaineering school for all levels.

ClimbMountKilimanjaro: This website is custom made for people who aspire to climb Mount Kilimanjaro. All the essentials for climbing Kilimanjaro is found in the website. Various routes for climbing, the health condition that must exist for climbing, climatic conditions at various points, budgeting, reasons for altitude sickness and its remedies etc. Even various fitness routines to be followed are given. A personal guide could also accompany under separate cost.

ClimbKilimanjaroGuide: This website is similar to the ClimbMountKilimanjoro website but this has added advantage of training people for various altitudes and handling the low air pressure at that altitude. This would be beneficial for people who cannot handle the low pressure and heights. Most of the guidelines here are free whereas there are some payable subscriptions that has more advantages. There is also a blog where many people write about their experiences and we could also get inspired and learn from them.

TeamKilimanjaro: This website focuses on training a person to climb Kilimanjaro in their own norms. A team of well-trained people would guide us through the climbing experience. All the essentials must be bought before hand so that people don't suffer during the climb. Trainers would accompany the people throughout the climb. People with improper health conditions could go if they have the supporting medications. Various packages are available for people with various conditions or for people of various age groups. This website also contains rating and reviews where people who have already gone mountain climbing have given reviews about their experience with the team and rated the team Kilimanjaro out of 10. The average rating was 9 out of 10 so it seems to be a good website for the results it has given.

UltimateKilimanjaro: It is a website that focuses on climbing Kilimanjaro where a group of people would guide throughout the climb. It is more or less similar to TeamKilimanjaro. It has been rated the best among other websites because of their quality of service. The website contains details about the various routes, various camping locations, various packages involved, various climatic conditions, when it is best to go, Medical checkup, vaccination, gear list, physical training, altitude training,

daily schedule etc. Here again there are many testimonials of people about their experience with UltimateKilimanjaro and a blog about this. The following is the comparison of all the mountain climbing applications:

ASPECT (Y/N)	Health?	Fitness?	Custom Made?	Good UI?
AllTrails	N – It doesn't give much importance to health.	Y – Fitness is focused to some extent.	N – It is just another website with information for all.	N – User has to navigate too much to get information.
MountainMadness	N– Less focus on health.	Y– Various fitness programs are available for various age groups.	N	N – Too much of texts make it uninteresting to read.
ClimbMountKilimanjaro	Y – Provides various health related information.	Y – Fitness is a major focus as it is a commercial website.	N – Group of people will have a common guide.	Y – The UI is good to an extent.
ClimbKilimanjaroGuide	Y – Health is focused mainly.	Y	Y - We can request for individual guides	Y – Focus on the UI makes it more attractive
UltimateKilimanjaro	Y – Many health related information is available for the user's perusal	Y	Y – Personalizing the climbing expedition is also possible.	Y – Many pictures and small facts about Kilimanjaro makes it look professional & appealing.
Hiking log	N – Only hiking is given focus.	Y – Not much information or training is provided on fitness.	N – It is custom-made for hiking, not for the user.	Y – It contains graphs and calendars for progress views.
Naturapps	N	N	N	Y – Interactive GPS is the best feature involved.
Mountain Climbing Tips	Y	Y	N	N
Mountain Climbing do's and don'ts	Y	Y	N	Y
ClimBSN	N	Y	N	Y

Table 1: Comparison of training application

SUMMARY

The web application for mountain climbing focus mainly on providing information about the mountain itself, the various routes available for climbing, various categories of people involved and specific training for them, special attention to people with abnormal health conditions, training people in various altitudes, training people under fluctuating air pressure, focusing on day-to-day fitness routines to be followed, trails of people who have climbed previously, progressive track of the fitness routines followed, blogs about people with climbing experiences and reviews and ratings of people who have undergone training through that particular application. All their advantages are collectively summarized and used for the development of a personalized training application. The existing ones are not customized for the user. Hence a custom-made web application would prove to be an added advantage for an amateur mountain climber.

Thus a web application could be personalized by providing a login id and password. The basic information about the user such as name, height, weight and age could be fed into the application. The BMI will be calculated and a pre-fed exercising routine for the particular age group and BMI is shown. The application keeps track of the exercising routines and the day-to-day activities of the user. There could be a progressive graph to indicate the progress made in the days of exercising. Therefore such a web application would be easy to use for amateur mountain climbers covering all the basic goals of being user friendly, personalized, custom-made for Kilimanjaro and providing a personal schedule for endurance, strength and hiking.

FUTURE WORK

The web application is going to be tailor made for one person and only for climbing Mount Kilimanjaro. Having a database that can store a list of multiple users and many mountains could broaden this application. The routes could be selected by entering the necessary information initially. When the user logs in, he/she can select the mountain, which he/she wants to climb. There could be an interactive GPS integrated to the application that tells the user about his/her whereabouts, improvements in exercising routines, deviation in the daily schedule and progress of the current schedule. Providing feedback could be a positive notion for the user. The feedback again could be textual or audio-visual.

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