

Social Interaction around Diet Applications: An Initial Study

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Abstract—As being threatened by overweight and obesity, more and more people start thinking how to change the way they eat. However, less evidence shows current diet-related applications really work and current design mainly focuses on nutrition value and are not tailored to specific person. In this paper, we try to learn from social science to investigate two popular diet products' forums to see what social interaction happens and what elements related to those social interaction. Then we find out contextual information and emotion are related to social conversation on forum which help people find similar buddies to solve problem and validate opinions and understandings. We argue we should take into account those information and social interaction in our future design to better support diet.

I. INTRODUCTION

Obesity, as a recent OECD's report [1] shows, will threaten almost 71% of American people in next decade, and the American government already spent 344 billion dollars for it in 2009 alone [2]. One method to prevent obesity is diet [3], and its success is highly dependent on support tools and mechanisms [4]. One type of such support tools are diet-related software applications and services, a popular segment of health-related applications in the mobile market [5]. Most of these applications and services can be ascribed to two main categories: those tracking food intake and those providing food information.

In contrast to such quantitative and information-oriented approach, social science suggests that human-food interaction cannot be described just in terms of nutrition and food: emotional and contextual elements also play an important role in both human-food interaction and human-human interaction around food [6], [7]. Therefore, our interest is in understanding how social and contextual aspects of human-food interaction can be taken into account in the design of technology to support diet.

In this paper, we present an initial study of online discussion forums related to two diet services: TweetWhatYouEat (TWYE) and Precision Nutrition (PN). The study was conducted to learn about social interactions around two example diet services that take advantage of modern internet technology. In particular, through the study we address the following two questions: (1) is there social interaction around diet-related services, even though they do not explicitly embed social features? (2) What topics does such social interaction cover?

Analysing threads in the two discussion forums, we found out that users of TWYE and PN look for other users with similar profiles or goals to form support groups, share similar experience to answer each other doubts, review or confirm public information and discuss related practical issues. We therefore suggest that future design should be explicitly take into account context and emotion, beyond quantitative nutrition values, to better support diet.

II. RELATED WORK

Before diving into details of the study, we review the current understanding of human-food interaction in related work in human-computer interaction and social science.

Persuasive technology is one emerging area focusing on designing interactive applications and services to persuade people to change behaviour [8]. One group of persuasive technology applications aims at leveraging self-monitoring technology to change behaviour. In the domain of encouraging physical activity, projects like Ubifit [9] and fish 'n' step [10] log the number of steps that users walk every day to motivate them to do more activity. Similarly, in the diet domain, applications like MAHI [11] and TWYE, focus on tracking what people eat and what nutrition the food contains to encourage people to change the way they eat.

On the other hand, in social science, human-food interaction is understood more broadly. In Roberts' book [12], she describes five human's instinct to food: hungry, dense of calorie, familiarity, availability and variety. In other words, humans choose food not just based on nutrition values, but also based on factors like location which will determine food availability and familiarity. Moreover, Beck [13] concluded in her book that in her long-year coach life, she found out one efficient way to control what people eat is to control emotion and analyze contextual information first to identify possible barriers. Grimes and Harper [7] propose food-related technology to be 'celebratory technology' – technology designers should focus on positive aspect of human-food interaction. Even though the goal of celebratory technology is not to change they way people eat, we believe that combining ideas from celebratory technology with ideas from current persuasive technology it is possible to design systems that help people eat better and feel happy.

III. THE STUDY

In this exploratory study, we chose to study online discussion forums because we are interested in social interaction. Forums are inherently social, so by studying them it is possible for us to observe social interaction that takes place around diet-related technology.

Since we are interested in how technology could help people to change how they eat, we first choose TWYE¹, a free of cost service based on twitter, a popular social networking platform with 175 million users [14]. TWYE allows users to log what they eat through twitter via web or SMS, or through a web form directly on the TWYE website. The log is formed of “food entries”. Each food entry comprises an optional food picture, a textual food description, the number of calories associated with the food, and the time and date when the food was eaten. To contrast our findings on TWYE, we also analysed the discussion forum of Precision Nutrition². PN is a commercial product which provides diet coach service; all users on this forum are paying clients. PN provides users with web tools to track own progress via answering heuristic questions, logging body measurement and taking picture of body and PN also provides users with a forum board to record detail diet journal. On PN, only clients are permitted to write on the forum, but the forum is public for reading.

A. Data Collection Method and Dataset Overview

We downloaded messages from the TWYE forum in the period from June 1st 2010 to September 26th 2010. In this dataset, there are in total 553 posts including 180 original posts (thread starters), and 373 replies. Six of the posts are not written in English, and were therefore excluded from this analysis. The messages were authored by 163 users, 114 of them initiated discussion threads. The average messages per user is 8.22, the average threads initiated by each user is 2.13, and the average reply per user is 6.1.

A number of different forums are associated with PN, we choose to analyse the “Nutrition Question” forum because it is the most similar to the TWYE forum. We analysed messages from the same period as the TWYE selection. The data contains in total 248 threads, including 1620 posts and 236 posts have replies. The messages in dataset were authored by 291 users, 155 of them initiated discussion threads. The average posts per user is 5.57, the average threads initiated by each user is 0.85 and the average reply per user is 4.71.

B. Data Analysis Method

To analyze posts on two forums, we used content analysis method inspired by grounded theory [15]. The analysis started by categorising the TWYE’s posts at the sentence level through open codes. Initially 41 open codes were used, later grouped into 13 categories: *how-to question*, *knowledge question*, *contextual information*, *personal condition*, *emotion to diet*, *emotion to food*, *sharing opinion on information*, *similarity-buddy*, *similarity-solution*, *goal*, *knowledge*, *alternative* and

method. Among those categories, we found *how-to question*, *knowledge question*, *goal*, *knowledge*, *alternative* and *method* uninteresting. Therefore, we only used the other 7 categories to code the PN posts.

IV. THE FINDINGS

In this section, we report our findings, which are also summarized in Table I.

A. Barriers to Diet

On both forums, we observed that people ask for advice on how to change the way they eat. When users ask questions, they describe contextual information like location to frame their own eating patterns. For example, on PN, one person reports he spends “*A LOT of time in airports*” and asks whether it is possible to “eat better” at airports. Other contextual information frequently mentioned is food-related events or activities. On the TWYE forum one user asserted that she really wanted to start diet, but she “*got to go to dinner for daughter’s birthday and she wants to do fondue. no lo-cal choices there at least I don’t think there is anyway*”.

In addition to contextual information, people also mentioned their *lifestyle* as a barrier to a specific eating style, generally because of being short of time or on an unusual schedule. For instance, one person on PN wrote: “*...I work in the evenings (3-12) and am often stuck in a car during my shift. My schedule at work is unpredictable.....Anyone have any really portable food options for dinner?...*”. We found similar examples on TWYE: one man who thought that he was not overweight but want to change the way he eats said he follows a very “*busy lifestyle*”, which makes him feel that he has no time to eat better.

Food preference is another topic people discussed on the forums. In one thread on PN it is asked: “*....Has anyone tried to take the Gourmet Nutrition recipes and make them soy, dairy, wheat and peanut free? I can eat walnuts and almonds but no dairy, soy, fish, other nuts, peanuts, and most wheat products at all... sometimes even eggs are out...*”.

B. You and Me: We Are Similar

When people consider who will be their buddies (i.e. friends on forums who could support each other), they intend to find other users who are in a similar condition. On PN we noticed that when people find similarity with someone, they express the desire to connect with them. A post mentioned: “*I’m 44 yrs. old, and it’s my goal to lose about 45-50 lbs.*” and someone replied: “*I am 45 and have about 40-50 lbs to lose, as well. Let’s help each other along! I am sure we can do this.*”. This also happened on TWYE. A user called for buddies writing: “*Female, age 56, weight 174..goal weight 144. Need a support group*”; another user replied: “*Female, age 59,weight 185. I, too, am good about sticking to a commitment, however, I’ve tried to do this alone too many times before. I’m putting myself out there for the first time*”.

¹<http://www.tweetwhatyoueat.com>

²<http://www.precisionnutrition.com>

TABLE I
FINDING SUMMARY TABLE

our findings	example post
Describe contextual information and personal condition to point out barriers to diet	"My schedule at work is unpredictable"
People like to connect with other people who share similar conditions	"I am 45 and have about 40-50 lbs to lose, as well. Let's help each other along!"
Experiences in diet are shared to either solving similar problems or showing similarity between peers.	"I have a friend who uses liquid orange-flavored fish oil in her supershakes and she says even her kids like to drink the shakes."
Express feeling to food	"...I hate veggies..."
Celebrate success or complain frustration on diet	"I feel fantastic, and alot of body fat is gone!"
Ask other people to review public information or confirm own understandings and practice	"Just wondering if people agreed that a small handful of mixed nuts (almonds, brazil etc.) was about 50 cal?"

C. Sharing Similar Experiences

On both forums, we noticed that similarity is the strategy people usually employ to answer questions. Users tend to share their experience if it is similar to a question posed by someone else, or to use their own experience to analyze the problem posed by other users and in this way provide suggestions and solutions. For instance, one post on PN mentioned "*Foods sometimes taste metallic to us*"; someone replied: "*...I get that taste frequently when I lower my carb intake. I know it sucks. Not sure how to get rid of it though. Maybe send a PM to Noel Cruz.*" On TWYE, there are also similar cases. One common problem people shared on the forums is emotional eating: when people feel stressed or bored they want to eat. One person on TWYE wrote: "*Hey, I did the same as you: I was always hungry when I was bored...*".

On PN we also observed that users answering questions point out similarity between the behaviour of the person asking the question and someone else they know. For example this may be based experiences of friends or family members. In these cases users would share an anecdote, they would analyse the posed problem and offer suggestions for a solution. One example of such answer from PN: "*I have a friend who uses liquid orange-flavored fish oil in her supershakes and she says even her kids like to drink the shakes.*" Moreover, since people log food information online and this information is accessible by others on the forum, sometimes a person answering would suggest people asking questions to directly check the food log of specific users know to be in similar situations. One person on PN answered question in this way : "*Look up what Ryan Andrews eats on this site. He gets enough protein without eating any meat, but from legumes, vegetables, nuts, seeds, etc.*" The same pattern was not observed on TWYE. This might be because TWYE's users are less professional than PN's users and therefore usually don't refer to others' logs and opinions.

D. Emotion: Loving Food

The correlation between emotion and food is another thing we clearly found in the data. On both forums we observed people writing how they love food and reporting their pleasure in eating. This is the natural reaction of humans to food. Because food meets humans' needs of getting energy, the perception of being full and the good taste of food can cause

brain to trigger pleasure signals, so people feel happy. In forums, when people talk about food, they use emotional words to express their relationship with specific items. For example, on PN we read about how a user loves the a specific product: "*the taste of the chocolate one [GNC brand Whey Protein Isolate] is pretty good.*". Beyond talking about feelings of food, people also express how emotions can make it difficult to change the way they eat. One person on TWYE wrote "*Want to get down to 9st 7lb and tweeting is helping although I love food especially chocolate*". The passion for specific food makes it hard for people to get weight down and reach specific goals. This kind of conversations were also found on PN. For instance, one person on PN wrote: "*...I hate veggies...*" while they are required by the PN programme.

E. Emotion: Enjoying Diet

On both forums, we observed people either celebrating their success or reporting their frustration about the ability or inability to follow a diet and observe results. One user on PN wrote a post to announce he will try some new plan, after a period of practice, he replied to his own post to celebrate his own success: "*just wanted to post that this is going GREAT! I feel fantastic, and a lot of body fat is gone!*". Another example from TWYE showed people expressing frustration about diet: "*My current weight is 197, I'm so mad because the amount food, and calories, I put in my body was cut in half. I even work out, but no results*". Besides expressing emotion explicitly, people also used some implicit cue to celebrate own success , for example, one person on TWYE showed off that "*Today I'm wearing jeans which had not fit the last fix months...*" and the author wrote that such good feelings really "*...help me going on(diet)...*"

Another aspect related to emotion that we found on the PN forum is that some people consider diet an experiment which is playful and enjoyable. For example, one person wrote on PN: "*I'm just experimenting with some stuff to see what else is out there*". For those people, diet is a process like research which means they enjoy the exploration of food-health relationship to see how food will affect their own health and still keep them happy. However, similar words were not found on TWYE, we think it is because PN users have a clear diet plan and a specific attitude towards it. In contrast, TWYE users have goals that are not clearly defined and they might not be following a diet

at all, so they usually care more about whether they eat less or equal to a specific calorie value and do not focus on testing new ways.

F. Share Opinions on Products and Information

We found that people use forums as a place to share information about methods or products and ask others' opinions about them. For example, one person on PN asked: "Hey everyone, I was reading an interesting article on 'the myth of meal frequency'; over at elite and will like to know your thoughts on it. Here's the link <http://articles.elitefts.com/article...eal-frequency/Cheers,pshake>".

Besides asking opinions about published articles, people also confront others about their own thoughts on diet methods (e.g. specific techniques, attitude towards products, recipes, etc.). One reason for this is that people have doubts. For instance, one person on TWYE asked: "Just wondering if people agreed that a small handful of mixed nuts (almonds, brazil etc.) was about 50 cal? ". Another reason might be that people find something is not covered by books, so they ask others to provide suggestions and confirmations, as one post on PN demonstrates: "My concern is that i noticed that alcohol is not addressed in the books and when I did a search I didn't find much. I'm just curious what leave of alcohol (if any) is allowed on the PN plan for someone with my goals".

V. CONCLUSION

In this paper, we presented an exploratory study of online discussion forums related to two diet services: TWYE and PN. Through our analysis, we found there are two types of social interaction patterns in diet-related social networks: one is social review mechanism and the other is similarity-based interaction. The first one, social review mechanism, consists of the fact that people want to use social networks as a platform to review public information and confirm their own thoughts. The second one consists of people wanting to find similarity between with others in the community and, based on such similarity, connect with them, share similar experiences and solve problems. Based on these two social interaction patterns, we further found two types of information people share on forums to either show similarity between each other or validate thoughts. The first one is contextual information. Information like personal condition, lifestyle, preference are used to show similarity between peers then peers will be happy to connect each other or they could learn from others' similar case to solve own problem. The other important element we found is emotion. We noticed that people's emotion towards food and diet suggest possible reason for why people will not accept diet plan and why they enjoy it. And similarity in feeling to food or diet will increase the chance that two peers will connect with each other and be willing to support each other.

Based on these results, we suggest future design of diet-related software applications and services should take into account contextual information, personal profiles and emotion to help people analyze their problems and possibly find similar

buddies in a social network to share solutions. Secondly, our findings suggest that each person is different and in different conditions, therefore when we design tools to provide food-related information or educate people, we should tailor information to each users' specific needs and condition. Thirdly, based on above two points and our finding which is people need a review mechanism in social network, we propose to design a similar mechanism in either food log application or food knowledge system to help people confirm their findings on own problem and review different opinions from public media.

In our future work, we plan to firstly further validate our findings on two forums via conducting interview or survey study. And based on that, we plan to design a new food log system which integrates nutrition value with contextual information and emotion. We also want to design new tools which will take advantage of what user recorded to further support their decision making and the updating of their knowledge.

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