An Ontology-Based Model for Treatment Guidelines of Internet and Games Addiction

Jutaporn Lertkrai, Puriwat Lertkrai, Nattapong Kaewboonma

Abstract: Internet and games addiction will become a difficult problem for the parents, because the internet and games easier to access and has more contents. Thus, the number of internet and games addiction will be increasing in the future. This study recommends ontology expansion for treatment guidelines of internet and games addiction that will use as the component of recommendation system in web technology. This study's methodology can be condensed into three states; data collection ontology development, and evaluation. This ontology included seven main classes, there are profile, characteristics, risk factors, devices, treatment, and GAST. The evaluation result that conducted by domain experts included a highly-superior concentration of 88.34%, which confirms that this ontology may be employed for developing a recommendation system.

Keyword: Clinical Practice, Internet and game addiction, Ontologies, Recommender system.

I. INTRODUCTION

Nowadays, internet and game, as the product of modern electronic information technology. Internet and game become a way of entertainment activity for people worldwide because of it easier to access and has more contents if compare to the past. At the same time, Internet and game addiction also become a difficult problem in Thailand. The result of a behavior survey from the DQ Institute identified that 60% of children in Thailand aged between 8 and 12 years tend to be subjected to a minimum of one cyber-risk. Roughly 1 in 8 children qualify as having some form of internet addiction. Around 35 hours are spent in front of digital screens for entertainment by Thai children aged between 8 and 12, which means 3 more hours than the worldwide average. Using devices to watch TV shows, videos, play games, and use social media sites or apps are included in this time [1]. The causes of internet and game addiction can be separated into many factors following: gender, age, family, environment, psychological risk, and devices [2]. Mostly, psychiatrists will screen Internet and games addiction by using questionnaires, interviews and behavioral observations. Thai Government agencies have created a guide to treatment internet and games addiction patient but it's difficult to access because it is in book form. Therefore, bringing technology to help parents assess internet and games addiction of their children.

Revised Manuscript Received on June 22, 2019.

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This will help parents take care of their children immediately. Semantic Web technologies can help achieve a standardized knowledge representation for internet and games addiction domain and the knowledge base can be passed to parents using web technology.

Ontologies are thought to be one of the cornerstones of the semantic web. Ontologies have become core components of many large applications. Various fields now advance normalized ontologies that domain experts may employ to allocate and interpret data in their fields. Such fields may be conveyed between users and devices. An ontology comprises an official and precise account of perceptions in the sphere of communication often termed Class. The aspects of each perception define certain elements and characteristics of the concept. Many ontologies focus on Classes, with each Class comprised of sub-classes that denote concepts that are more explicit compared to the super class [3].

In this paper, we suggested the ontology model with ontology classes, properties and class hierarchy to represent the concept for internet and games treatment guidelines by using HOZO ontology editor that can be used to develop recommender system for internet and games treatment according to "Clinical practice guidelines for treatment of internet and game addiction" [2].

II. LITERATURE REVIEW

Disproportionate amounts of time spent online, habitual use of the Internet, trouble managing time spent on the Internet, thinking everything outside of the Internet is uninteresting, being annoyed if interrupted while online, lessened social connections with "real" people, and heightened loneliness and depression are some of the aspects detailed by researchers concerning the syndrome of passionate obsession with Internet use [2] [4]. A complete summary of clinical studies concerning Internet-use related addictions from a holistic view has been specified by clinical research studies [4]. Organized literature reviews tend to concentrate on clinical and treatment research concerning Internet addiction and Internet gaming problems. They may also employ clinical examples and center on the qualities of treatment seekers as well as online addiction therapy. For major forms of clinical research studies have been identified by the results including psychopharmacotherapy, mental rehabilitation, and collective action.

To assess the influences of isolation and melancholy on hostility and observe the overall results of the psychosocial variables on game addiction, Eui Jun Jeong et al. [5] studied an integrated model in 2016.

Hostile people tend to be more prone to playing online game since they often have less social relations and engage in withdrawal from social situations, as identified by the results. Therefore, having hostility may likewise cause a tendency to play online games more frequently. Melancholy and isolation also exhibit significant links to violence. Miserable people may respond with aggression when faced with social isolation or rejection since they are susceptible to external stimuli. Isolation displayed a meaningful effect on game addiction. People tend to look for ways to meet their needs and reduce anxiety when faced with social exclusion or loneliness. Consequently, those who feel lonely or insulated from other people may be engrossed in online games since they can easily gain emotive gratification from online social interactions. Basically, they combat their feelings of isolation by interacting while playing online games.

Additionally, people who become depressed from relationship issues may be comforted by playing games. Depression is likely linked to assorted factors including social issues, anxiety due to disappointment, disease or illness, which is not the same as loneliness. Also, researchers have suggested the method to reduce games addiction in the college student by made the tasks as same as game [6], their analyzed college students' internet game addiction phenomenon, discusses the subjective and objective factors of college students' online game addiction, several countermeasures are put forward. It has certain scientific significance for college students' network game addiction and proposed some strategies that can increase learning of undergraduate students. The method is made the reality become as same as the game by design the game with goals, process, system, title, and rewards with strong pleasure, learners can complete research assignments impulsively and like studying without feeling significant anxiety. They had suggested some strategies that they can use to increase interests in learning: 1) Each step with clear goals; 2) Heaving a rapid feedback on action; 3) There is a balance between challenge and skill; 4) Acton and consciousness are only a common goal; 5) Eliminate distractions; 6) Don't worry about failure; 7) Self-awareness disappearing by creating the concentrate and the forget self be extended; 8) Distorted sense of time; and 9) Behavior has its own purpose, the biggest reward to do one thing is to be gained the experience of it. If we can do creative in learning, it will also help students realize the online game addiction, foster a good network life habit, prevention, relieve or mitigate the discomfort of the online game addiction symptoms. In the term on ontology model, we have no found exited ontology about internet and games addiction. However, some researcher was built the ontology about nutrition guidelines for personal that we can reuse their idea to design our ontology according to the ontology for a customized diet proposal system intended to help users with their everyday diet according to various health strategies [7].

III. MATERIAL AND METHODS

Material

We have inspected for existing resources on the internet and game addiction treatment. The main resource, which was selected for all study purposes including "Clinical Practice Guidelines for Treatment of Internet and Game Addiction" that was created by Thai government agencies [2]. Apart from that, we had interviewed domain experts who are a psychologist working in a hospital to developing ontology model.

Methods

How the ontology could be enhanced and coordinated with the knowledge management system is detailed in this section. In order to create ontologies based on the two primary steps, the methodology used in this study can be condensed as below:

Build Ontology

The ontology has been constructed using HOZO Ontology Editor [8]. The primary moves for ontology advancement include:

- Setting the scope: The ontology scope was determined by thinking about the kind of knowledge that should be covered by the ontology. Roughly, it is knowledge about profile, gender, characteristics, risk factors, devices, treatment, and addiction screening test.
- Linked to existing ontologies: we have no found exited ontology about internet and games addiction. However, there are some classes of ontologies from [7] that will guide to developing our ontology.
- Enumerating important terms: a full list of all potential terms that could be used to define the concept was constructed in this work. For example, the important treatment terms will include pharmacological, psychosocial and multi-model.
- Defining classes and class hierarchy: To organize the concepts, a top-down enhancement procedure was employed. The main expressions are deemed the super-classes and using 'is-a' relation to describe sub-classes. In addition, we using 'part-of' relation to linked classes as properties of the other classes [9].
- Instant creation: Instances of the classes are created in the ontology Application Management Framework (OAM) [10]. Constructing class instances can assistance to accurate mistakes and fine-turn the class and properties in the ontology.

Ontology Evaluation

To verify that the ontology model made by this study is accurate, an assessment will be carried out by domain specialists [11].

IV. RESULTS

Ontology model in this research was developed based on [2] with 7 main classes based on following:

- Profile: profile in this ontology refer to children at risk to internet and games addiction.
- Gender: gender is the state of being male or female, because male is higher risk than female.
- Characteristic: Characteristic describe identify individual characteristics of a person, and also has affect the chance of

internet and gaming addiction such as stubborn, bargain, attention deficit/ hyperactivity disorder (ADHD), strain, naughty, and overcome.

- Risk Factors: This class is the main class of this ontology, risk factors increase the chances of getting Internet and game addiction included psychological, environment, Family, gaming place, and gaming times.
- Devices: Devices class is the equipment to play internet or game such as console, personal computer, and mobile.
- Treatment: Treatment class describes the guidelines for treatment who has internet and games addiction included pharmacological treatment, psychosocial treatment, and multi-treatment model.
- GAST: GAST class is a game addiction screening test that describes the level of game addiction included normal, Obsessed, and addiction.

In a class of "Risk Factor", we apply *'is-a'* relation to define class hierarchy including 4 sub-class; "Psychological Risk Factors", "Environmental and Social Factors", "Gaming Place" and "Gaming Times". One of the most risk factors for internet and game addiction is gaming place because the patients often build relationships with other players and may be the place where they feel they're the most accepted including; home, friend's house, and internet and games cafe. Moreover, internet and games cafe that close to school, home, or tutorial school it affects the higher risk of getting addicted to the internet and games as shown in Fig 1.

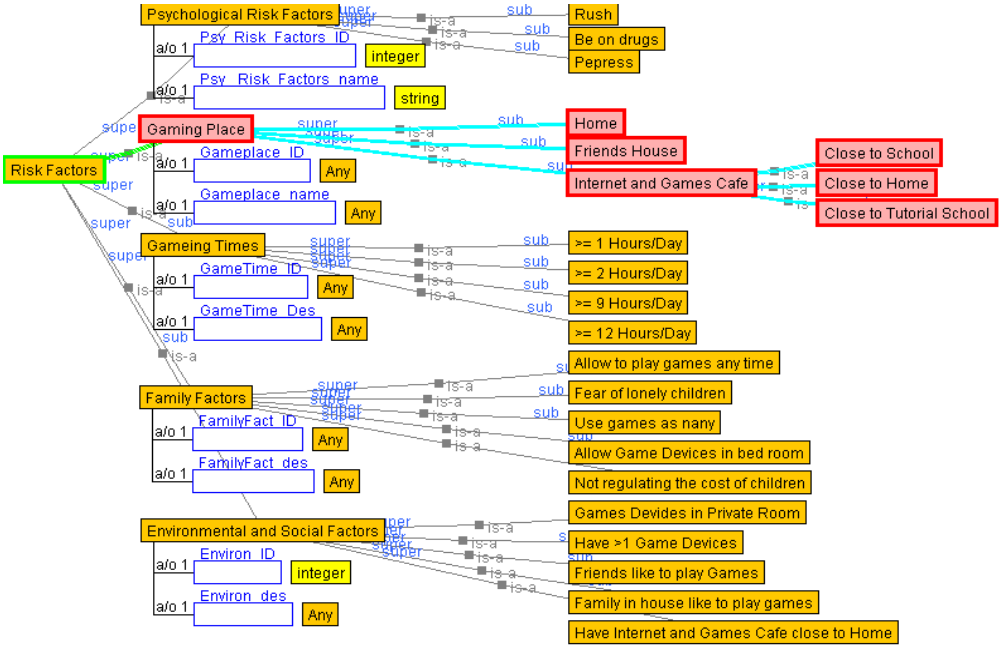
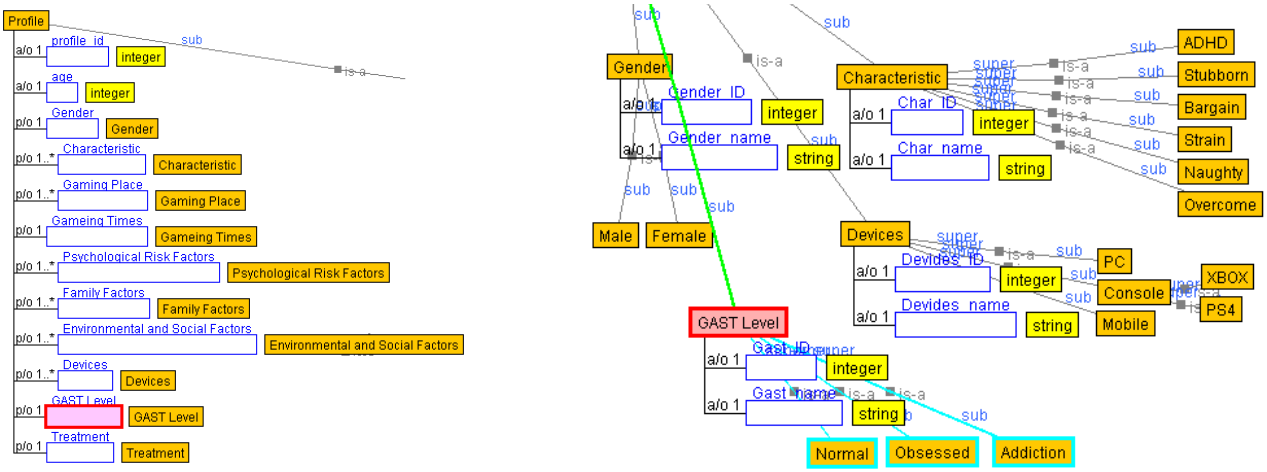


Fig. 1 Class Hierarchy of "Risk Factors" Class.

In a class of "Profile", was apply the *'part-of'* relations to linked other classes as class properties of "Profile" class such as "GAST Level" class in Fig 2(b) linked with the "Profile" class hierarchy as shown in fig 2(a).



(a)Properties of "Profile" Class. **(b) Example of Defining Classes.**

Fig. 2 Defining 'part-of' Relation (a) Linked with (b).

According to the class of "Treatment" also apply with 'is-a' relation including 3 sub-classes; "Pharmacological", "Psychosocial" and "Multi-Model". In the sub-class of "Psychosocial" class include 4 main classes. For example, "Motivation Interview (IM)", "Cognitive Behavior Therapy (CBT)", "Support Groups", and "Family Interventions". Another interesting of the "Family Interventions" class hierarchy is the 'is-a' relation of two classes, e.g. "Family Therapy" and "Parent Management Training (PMT)" as shown in Fig 3.

To verify that the ontology model made by this study is accurate, an assessment will be carried out by 3 domain specialists in ontology development using criteria a long with the quality and reasonableness of the following items: defining the scope, objective, classes and sub-class, properties, instances, and future application. The assessment result was high-quality level at 88.34% and reasonable for developing recommendation system.

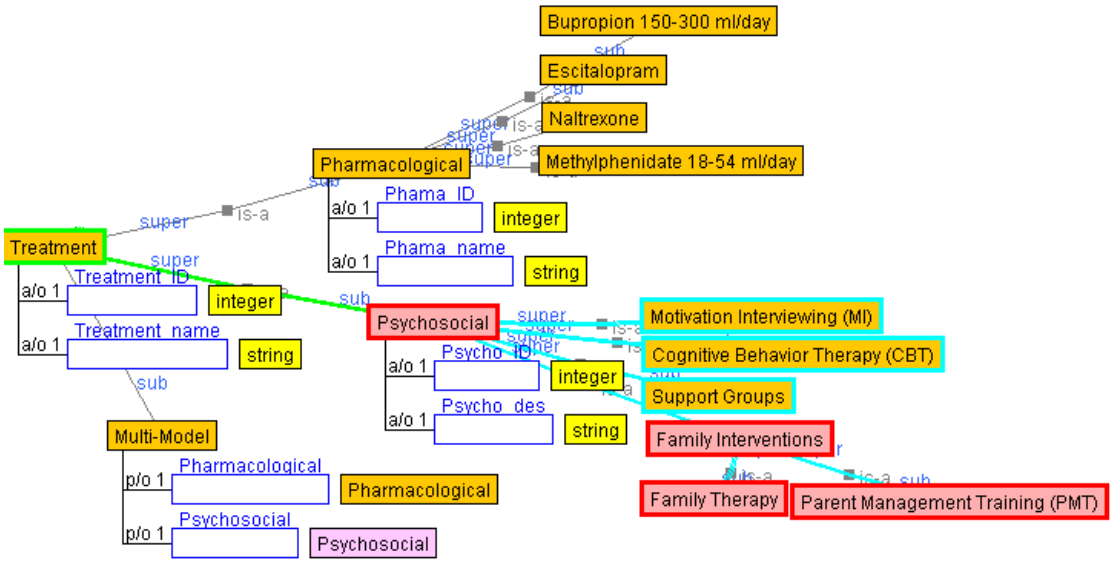


Fig. 3 Hierarchy of Treatment Class.

Otherwise, we provided rules-based to automated data classification. Knowledge from [2] and domain experts were used in building rules-based. GAST can be estimated from 3 groups: male, female and parent. We can classify patients into 3 groups: normal, obsessed, and addiction. The sample rules-based can be described as shown in Fig 4.

GAST Versions			GAST Score									GAST Level
Male	Female	Parent	<16	<20	<24	16-22	20-29	24-32	>23	>30	>33	
x					x							Normal
	x		x									Normal
		x		x								Normal
x								x				Obsessed
	x					x						Obsessed
		x					x					Obsessed
x											x	Addiction
	x								x			Addiction
		x								x		Addiction

Message:
If male patienthas more than 33 of GAST Score. So, the patient is in Addiction level.

Rule:
IF Patient.Gender = "Male"
AND Patient.GastScore = ">33"
THEN Patient.GASTLevel = "Addiction"

Fig. 4 Example of Rules-Based.

V. CONCLUSION

Internet and game addiction will become a difficult problem in many countries also in Thailand. Thai Government agencies have created a guide to treatment internet and games addiction to help parents assess internet and game addiction of their children. The main factors of internet and games addiction are loneliness, depression, stress, social and environment will increase risk to internet and games addiction [2] [4-5]. The treatment guidelines based on the addiction level such as pharmacological, psychosocial and multi-treatment model [2] [4].

In this paper, we have designed ontology to represent the knowledge from the exited source [2] combined with tacit knowledge from domain experts. This ontology was developed by using HOZO Ontology Editor [8] and applying "*is-a*" and "*part-of*" relations to define class hierarchy [9]. In this ontology model, we proposed 7 main class, there are profile, characteristic, risk factors, devices, treatment, and GAST. The evaluation result shown that this ontology is good enough to be used in the recommendation system. In the future work, we will use this ontology to promote the future development of the recommendation system for treatment guidelines of internet and games addiction.

VI. ACKNOWLEDGMENT

The authors would like to thank the Faculty of Management Technology, Rajamangala University of Technology Srivijaya, Thailand for providing financial support for the research. Additionally, we would like to express gratitude to the Language and Semantic Technology Laboratory and National Electronics and Computer Technology Center, Thailand (NECTEC) for supporting HOZO editor and OAM framework for building the ontology.

REFERENCES

1. DQ Institute, "2018 National DQ Impact Report Thailand," DQ Institute, United States, (2018).
2. C. Pornnoppadol, Clinical Practice Guidelines for Treatment of Internet and Game Addiction, Nontaburi: National Health Commission Office Thailand, (2016).
3. N. F. Noy and D. L. McGuinness, "Ontology Development 101: A Guide to Creating Your First Ontology," (Standford University, Standford, 2001).
4. D. J. Kuss and O. Lopez-Fernandez, "Internet addiction and problematic Internet use: A systematic review of clinical research," World Journal of Psychiatry, no. 2220-3206, (2016), pp. 143-176.
5. J. J. Eui, J. K. Dan, M. L. Dong and R. L. Hye, "A Study of Digital Game Addiction from Aggression, Loneliness and Depression Perspectives," 2016 49th Hawaii International Conference on System Sciences (HICSS),(2016),pp. 3769-3780.
6. C. W. Guo, G. Chuang and S. T. Mei, "An efficient method for changing undergraduate students' addiction to the computer games into the interest of learning," 2017 IEEE 6th International Conference on Teaching, Assessment, and Learning for Engineering (TALE), (2017), pp. 160-162.
7. N. Suksom, M. Buranarach, Y. Thein, T. Supnithi and P. Netiosopakul, "A Knowledge-based Framework for Development of Personalized Food Recommender System," in The Fifth International Conference on Knowledge, Information and Creativity Support Systems, (2010).
8. K. Kozaki, Y. Kitamura, M. Ikeda and R. Mizoguchi, "Hozo: An Enviroment for Building/Using Ontologies Based on a Fundamental Consideration of “Rule” and “Relationship," in Proceedings of the 13th International Conference Knowledge Engineering and Knowledge Management (EKAW2002), (Siguenza, Spain, 2002).
9. S. Ngamsrithepparit, T. Supnithi, Y. M. Thein, K. R. Saikaew, M. Buranarach and S. Poltree, "Rule Management System for Ontology-based Recommendation System," in Proceeding of Joint International Symposium on Natural Language Processing and Agricultural Ontology Service 2011 (SNLP-AOS 2011), (2012).
10. M. Buranarach , Y. Myat, and T. Supnithi, A Community-Driven Approach to Development of an Ontology-Based Application Management Framework, Proceeding of the Second Joint International Conference (JIST2012), (Nara, Japan, 2012), pp.306-312.
11. J. Brank, M. Grobelnik and D. Mladenić, "Survey of Ontology Evaluation Techniques," in Proceedings of 8th Int. multi-conf. Information Society, (2005).