

The 2nd Joint Seminar on Computational Intelligence
by IEEE Computational Intelligence Society Thailand Chapter
Thursday 23rd February 2017

School of Information Technology, King Mongkut's University of Technology Thonburi

Abstracts

1. Prof. Dr. Mark Chignell, University of Toronto, Canada

Time: 09:00-10:15

Topic: Gait-Guided Adaptive Interfaces for Dismounted Soldiers

Abstract:

Adaptive interfaces with the goal of maintaining mental workload were proposed by Hancock and Chignell in the 1980s. Adaptation to mental workload levels is important in complex contexts, since it can be detrimental to task performance. For instance, excessively high workload can lead to controlled flight into terrain accidents in aviation, and in low workload vigilance tasks such as sentry duty or radar operation it can lead to missed targets. While many techniques have been proposed, mental workload has proven to be challenging to measure in practice, and it is often measured using self report methods, principally with the NASA TLX scale. Recent research has shown a relationship between the way people walk and the cognitive load that they are under, raising the possibility that modifications to gait can be a proxy measure of mental workload when a person is ambulating while performing tasks. In the interactive media lab at the University of Toronto we have developed a method of gait analysis using a smartphone app. We have validated the app gait results using Vicon motion capture as a gold standard comparison. We have also shown, in an experimental study, that modifications to gait due to a cognitively loading task are correlated with executive function ability as measured by the Stroop task. I will present these experimental results and propose that modifications to gait are an indicator of mental workload. I will then introduce gait-guided adaptive interfaces as a solution to the problem of measuring mental workload in mobile contexts, and as a means of guiding adaptation of tasks so as improve both the well-being and the performance of the operator.

2. Sittichai Sukreep, King Mongkut's University of Technology Thonburi (KMUTT)

Time: 10:30-11:00

Topic: Detecting Falls, Activities of Daily Living and Indoor Positioning using Smartwatch and Beacons

Abstract:

Falls are a key cause of significant health problems, especially for elderly people who live alone. Falls are a leading cause of accidental injury and death. To help assist the elderly, we propose a system to detect daily activities and in-house location of a user by means of a smartwatch's sensor and Beacons. We applied data mining techniques to classify activity detection (e.g., sitting, standing, lying down, walking, jogging, and falling) and in-house location detection. Health risk level configurations (threshold model) are applied for unhealthy activity detection with an alarm sounding and also short messages sent to those who have responsibility such as a caregiver or a doctor. Moreover, we provide various forms of easy to understand visualization for monitoring and include health risk level summary, daily activity summary, and in-house location summary.

3. Pongsaran Boonyopakorn, King Mongkut's University of Technology North Bangkok (KMUTNB)

Time: 11:00-11:30

Topic: The Performance Evaluation of a Hybrid Immune Genetic Algorithm Based on Mathematical Functions

Abstract:

This paper demonstrates a hybrid between two optimization methods that are Artificial Immune System (AIS) and Genetic Algorithm (GA). The novel algorithm called the immune genetic algorithm (IGA), provides improvement to the results that enable GA and AIS to work separately which is the main objective of this hybrid. The key idea of this research is applying negative selection which is a technique in AIS to reduce the number of initial chromosomes and increase strong fitness to a local search space. In addition, the author of this paper has also compared the differences between the minimum fitness values of the testing functions, five mathematical test functions were used to make comparisons. The results from GA, AIS, and PSO illustrated that the IGA produced good quality solutions and outperforms similar methods.

4. Wutthipong Kongburan, King Mongkut's University of Technology Thonburi (KMUTT)

Time: 11:30-12:00

Topic: Distillation of Knowledge from the Research Literatures on Alzheimer's Dementia

Abstract:

Many countries are aging societies. Since abilities generally deteriorate with age, technologies can assist older adults in their daily life. Loss of cognitive status is particularly severe in cases of dementia, with around 70% (according to Alzheimers.net) of dementia cases involving Alzheimer's Dementia (AD), a progressive and currently incurable disease. There is considerable research on AD with thousands of relevant publications being added to the PubMed online database every year. The knowledge incorporated in this large body of work is spread across hundreds of thousands of pages to text making it difficult to distill and mobilize that knowledge in terms of treatments and guidelines. Text mining technology may assist in distilling knowledge from the vast corpus of research literature on Alzheimer's dementia. In this paper, we apply Named Entity Recognition (NER) system, a text mining (TM) method used to group words into classes, in order to extract useful information from free texts. We present preliminary results concerning how well NER can extract information from a corpus of AD research publications.

5. Dr. Sachi Mizobuchi, Toronto Rehabilitation Institute, Canada

Time: 13:00-14:15

Topic: Driver Distraction and Cognitive Workload: Measurement Methods for in-vehicle HMI

Abstract:

Rapid diffusion of mobile information devices and in-car information systems has increased the prevalence of distracted driving, where the driver's attention is not fully directed to the road, with a resulting increased risk to driving safety. While visual-manual distraction impairs driving performance when using a handset, previous studies have also shown that hands-free conversation also impairs driving performance. Researchers have concluded that cognitive distraction, in addition to visual-manual distraction, can have a negative impact on driving safety. Cognitive distraction is difficult to characterize because, unlike visual-manual distraction, it is hard to determine exactly when the driver is being distracted from the primary (driving) task.

In this talk, I am going to address various methods to measure cognitive workload, discuss strength and weakness of each of the methods, and introduce some in-vehicle applications.

6. Yothin Kaewaramsri and Kuntpong Woraratpanya, King Mongkut's Institute of Technology Ladkrabang (KMITL)

Time: 14:30–15:00

Topic: Fractal Dimension for Classifying 3D Brain MRI Using Improved Triangle Box-Counting Method

Abstract:

Although many papers have used fractal dimension (FD) (to analyze magnetic resonance imaging (MRI) (for detecting various brain diseases, especially Alzheimer's disease (AD), they have been unsuccessful to classify the AD patients in case of healthy and AD brain-MRIs. The significant problems are from i) (the lack of the efficient FD estimation method and ii) (the failure of applying statistical analysis to discriminate the subjects in MRIs. Therefore, this paper proposes an alternative way to overcome these problems by using an improved triangle box-counting method (ITBC) (for effective FD estimation and using machine learning for brain-MRI discrimination. The proposed method is evaluated its performance with the Alzheimer's disease patient discrimination dataset of open access series of imaging studies (OASIS). (The experimental results show that the proposed method can achieve the classification accuracy rate up to 86.20% whereas the statistical analysis approaches cannot discriminate healthy and AD.

7. Thanaphon Phukseng, King Mongkut's University of Technology North Bangkok (KMUTNB)

Time: 15:00–15:30

Topic: A Trust in Social Networks for Recommendation Systems

Abstract:

8. Chanawee Chavaltada, Kitsuchart Pasupa, and David R. Hardoon, King Mongkut's Institute of Technology Ladkrabang (KMITL)

Time: 15:30–16:00

Topic: A Comparative Study of Machine Learning Techniques for Automatic Product Categorisation

Abstract:

The revolution of the digital age has resulted in e-commerce where consumers' shopping is facilitated and flexible such as able to enquire about product availability and get instant response as well as able to search flexibly for products by using specific keywords, hence having an easy and precise search capability along with proper product categorisation through keywords that allow better overall shopping experience. This paper compared the performances of different machine learning techniques on product categorisation in our proposed framework. We measured the performance of each algorithm by an Area Under Receiver Operating Characteristic Curve (AUROC). (Furthermore, we also applied Analysis of Variance (ANOVA) to our results to find out whether the differences were significant or not. Naive Bayes was found to be the most effective algorithm in this investigation.