CONFERENCE AT-A-GLANCE

Time	Events
	Monday, March 25, 2019 (IUP Auditorium)
13:00-14:15	Opening Ceremony & Electrical Engineering Exhibition
14:15-14:30	Coffee Break
14:30-15:30	Keynote Speech 1 (Prof. Shinji Hara)
15:30-16:15	Poster session
	Tuesday, March 26, 2019 (KU Home : Nontri 3)
9:00-10:20	**Session 1 (4)** Communication System and Information Technology
10:20-10:40	Coffee Break
10:40-12:00	**Session 2 (4)** Signal Processing, Image Processing and Sensors
12:00 -13:00	Lunch
13:00-13:45	Invited Talk 1 (Dr. Apichart Intarapanich)
13:45-14:30	Invited Talk 2 (Assoc.Prof. Vutipong Areekul)
14:30-14:50	Coffee Break
14:50-16:10	**Session 3 (4)** Embedded System Applications and Emerging New Topics
18:00-21:00	Banquet
	Wednesday, March 27, 2019 (KU Home : Nontri 3)
9.00-10:00	**Session 4 (3)** Short Paper
10:00-10:15	Coffee Break
10:15-11:00	Invited Talk 3 (Dr.Kihoko Tokue, Leave a Nest Singapore CEO)
11.00-12.00	Keynote Speech 2 (Prof.Tsuyoshi Isshiki)
12:00-13:00	**Lunch**

Password: ICTES@KU

Session 1 : Communication Systems and Information Technology
Date:Time Tuesday, March 26, 2019 (KU Home) : 9:00-10:20
Room: Nontri 3

1.1 Exploiting Extra CPU Cores to Detect NOP Sleds Using Sandboxed Execution

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Abstract:
At present, antivirus software backed by database of virus signatures is the most popular solution to malware detection problem. Even though its shortfalls are well-known – it requires large database that needs to be updated constantly and it is vulnerable to zero-day exploit - the security community has not successfully come up with better alternatives to it. However, the advent of multicores allows us to revisit this problem and look for alternatives that were deemed inefficient with previous generations of hardware.

1.2 Fuzziness Detection in Thai Law Texts Using Deep Learning

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Abstract:
Machine understanding research aims to build machine intelligences. To make a machine understand, precise concepts are necessary. Numerous domains contain vague meanings when making decisions, such as a diagnosis or a legal interpretation.Once an artificial intelligence pretends to be human while dealing with imprecise data, a fuzziness in knowledges must be detected before constructing.

1.3 ROS-Based Mobile Robot Pose Planning for a Good View of an Onboard Camera using Costmap

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Abstract:
This paper presents a pose planning method for ROS-based mobile robot equipped with an onboard computer.The system aims for archiving a remote 3D reconstruction using an onboard RGB-D camera and mobile robots autonomously. To plan a robot pose with a good view point for fixed position of an onboard camera configuration is a task we are addressing in this work. The proposed method is just a part of our system to find a good view point before performing 3D reconstruction tasks. Such system is suitable for a low-power onboard computer in cooperating with a remote server to support for rich computational tasks. A low bandwidth data stream between the onboard computer and the server is used most of time while a high bandwidth data will just be used when needed. Our method uses basic triangulation and transformation to find a good view point based on reference surface points. Reference surface points are extracted by using a cost value from ROS costmap data. The method is implemented and tested in a simulation software and realizing ROS environment. Outcomes with output from camera and visualization software are observed and evaluated.

1.4 Multi Q-Table Q-Learning

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Abstract:
Q-learning is a popular reinforcement learning technique for solving shortest path (STP) problem. In a maze with multiple sub-tasks such as collecting treasures and avoiding traps, it has been observed that the Q-learning converges to the optimal path. However, the sum of obtained rewards along the path in average is moderate. This paper proposes Multi-Q-Table Q-learning to address a problem of low average sum of rewards. The proposed method constructs a new Q-table whenever a sub-goal is reached. This modification let an agent to learn that the sub-reward is already collect and it can be obtained only once. Our experimental results show that a modified algorithm can achieve an optimal answer to collect all treasures (positive rewards), avoid pit and reach goal with the shortest path. With a small size of maze, the proposed algorithm uses the larger amount of time to achieved optimal solution compared to the conventional Q-learning.

Session 2 : Signal Processing, Image Processing and Sensors
Date:Time Tuesday, March 26, 2019 (KU Home) : 10:40-12:00
Room : Nontri 3

2.1 Defect Segmentation of Hot-rolled Steel Strip Surface by using Convolutional Auto-Encoder and Conventional Image processing

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Abstract:
Defects on steel strip surface can long-term cause undesirable effects, since they make physical and/or chemical properties mismatched from steel's specification. Nowadays,automatic visual-based surface inspection is adopted, in order to detect the defects on steel strip surface after being produced.Moreover, since these defects appear in wide variety of forms and various classes, machine learning methods are generally involved to visual surface inspection for coping with these appearances. In this paper, we present a novel defect detection model to perform defect segmentation of hot-rolled steel strip surface,byusing onvolutional Auto-Encoder (CAE) and sharpening process to extract the defect features of input image, then applied postprocessing for visualization. In the experiments, the NEU database, which provides six kinds of typical surfaced efects of hot-rolled steel strip, was applied to evaluate the efficiency of the proposed model. This database also provides difficulty challenges regarding diversity of intra-class and similarity of inter-class. The results show that the proposed model can perform defect segmentation in all kinds of defects in database, however the efficiency was compromised by illumination changes. Notable that, this segmentation is based on unsupervised learning with small training dataset and no labeling procedure, so it can be easily extended to the real world application. Eventually, this defect detect on shall improve the productivity and reliability of steel strip's production process.

2.2 Multi-objects detection and classificationusing Vision Builder for autonomous assembly

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Abstract:
In this paper, we proposed the methods of objected tection and object classification to obtain the location information of each objects on the placement mat through the state diagram process using Vision Builder for Automated inspection (AI). By using the state diagram design detect and classify object on placement mat found that the state diagram can detect and classify almost it objects, both objects with similar surface pattern and objects with similar size. The location of the objects data can be detected and classified have the accuracy is about ±0.5 millimeter. And after using this object's location data with the automation system, it was found that the robot moved to the position of the object correctly and was able to pick the object for assembly.

2.3 Target Advertising Classification using Combination of Deep Learning and Text model

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Abstract:
In recent years, there has been a great interest in online advertising not only to promote products and services but to build a brand of the company as well. To satisfy customer needs, some businesses apply intelligent technology to advertise their products and services based on customer interests. Other advertisers allow customers or members to upload their promotions using image and/or message to advertise their businesses and services. However, filtering of promotional advertising is an essential part to detect improper information before posting on the websites and social media. As a result, a model to classify promotional advertising is proposed to identify whether relevant promotion content for a specific business or service in order to meet precise customers' attention. The proposed algorithm in this study based on deep learning is designed to handle promotional image and message in competition with the 2nd KU Data Science Boot Camp 2018. Its performance is evaluated on the promotional advertising data provided by Wongnai. Finally, the accuracy of the proposed method can achieve satisfactory performance of 82.95% in testing data.

2.4 ON BUILDING DETECTION USING THE CLASS ACTIVATION MAP: CASE STUDY ON A LANDSAT8 IMAGE

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Abstract:
Traditionally, the land cover mapping process needs a ground data to be collected with high precision in both class labeling and spatial locations. To collect enough, high precise ground data require resources. As a result, we proposed an approach for building an image classification based on the class activation map (CAM) where the goal is not to identify the relationship between each pixel and a class label, but to identify whether each sub-images contain the class of interest or not. The output of the class activation map is the filter responds where pixels with high respond are likely to belong to the class of interest. We examined the performance on a LANDSAT 8 and found. The result of CAM showed that the proposed method achieves high accuracy in identifying whether a sub-image contains the class of interest or not. However,the precision in localizing the class is relatively moderate.

Session 3 : Embedded System Applications & Emerging New Topics
Date:Time Tuesday, March 26, 2019 (KU Home) :14:50-16:10
Room : Nontri 3

3.1 Food categories classification and Ingredients estimation using CNNs on Raspberry Pi 3

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Abstract:
Foods are important things to human lives, especially for elderly or diabetics. Tradition nutrition book is not the effective way for people to use and not cover all kind of foods. Most of the food nutrition in the book focused on Western dishes not Asian dishes. This research proposed the new way to categorized Thai fast food dishes, classified and localized the ingredients in each dish. Convolutional Neural Networks (CNNs) are used to achieve these tasks. MobileNet is used as food categorizer while You Only Look Once (YOLO) network works as the ingredients classifier and localizer. Then, ingredients in the pictures are cropped and passed through traditional image processing to calculate area and compared with real ingredient's dimension. Non-uniform shape ingredients are segmented, then, the nutrition of the dish can be calculated. Finally, the networks are transferred in to Raspberry Pi 3 platform to simulate limited resources and calculation power platform likes in a mobile phone. The networks in Raspberry Pi 3 produce good prediction accuracy but slow speed. PeachPy is introduced to speed up the network and it can run at 3.3 seconds per food image.

3.2 Indoor Room Identify and Mapping with Virtual based SLAM using Furnitures and Household Objects Relationship based on CNNs

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Abstract:
In order to make autonomous home service robot able to navigate through its environment, one requires a surrounding map and the robot's location. The Simultaneous Localization And Mapping or SLAM is the method that gathers information from an interested unknown environment, and creates a map and also predicts robot position at the same time. SLAM map is not enough for robot builder companies to sell their service robot because the robots cannot recognize the room in house without complex setup from the experts. The robot cannot be opened from its package and immediately ready to be used. In this research, one method to overcome this issue is proposed by enhancing SLAM algorithm with furniture and household object detection CNN network in order to increase robot ability. Robot will create maps by using a Laser Scan Matcher based on visual SLAM using 3D Orbbec camera. YOLO v3 tiny network is selected as the CNN detector for localize and classify household objects and furnitures in a house. Furnitures and objects images are used to train the CNN networks separately in desktop PC and are installed into the robot after training is finished. CNN detector is combined with SLAM algorithm via ROS. Now, SLAM map can be generated and room can be detected simultaneously in the unknown environment automatically. Finally, experiment is conducted to test the proposed method.

3.3 A Multi-Protocol IoT Gateway and WiFi/BLE Sensor Nodes for Smart Home and Building Automation: Design and Implementation

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Abstract:
This paper presents the design and implementation of a multi-protocol gateway that relies on a multi-hop wireless network for smart home and building automation applications. This paper describes how to construct such a multi-hop treebased wireless network to coexist with ZigBee mesh networks, using low-cost commodity 2.4GHz WiFi/BLE SoC modules. The gateway supports both wired and wireless connectivities to other sensor nodes, including the RS485/Modbus fieldbus and wireless networks based on two different protocols, namely the ESP-Now peer-to-peer wireless protocol developed by Espressif Systems and the ZigBee protocol. In this work, the ESP-NOW protocol was utilized to construct the core low-power multi-hop wireless network, whereas the ZigBee standard was used to build subnetworks of sensor nodes. A single-board computer (SBC), running an embedded Linux operating system, was chosen as a platform for implementing the proposed IoT gateway which utilized the MQTT protocol for message delivery. Field experiments were conducted to evaluate the performance of the ESP-Now multi-hop wireless network, comprised of up to 5 hops. To illustrate the functionality of the proposed gateway, a use case was presented, in which a building automation system prototype was developed for control and management of air-conditionersand AC power meter units.

3.4 Simplified Stream Discharge Estimation for Hydrological Application based on NB-IoT Deployment

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Abstract:
In order to support and provide more accurate information which is needed to better operate and manage in hydrological applications, this paper proposes the simplified estimation of the stream discharge based on width, depth and water flowing rate measurements. In this paper, the NB-IoT deployment composed of width sensor, depth sensor and water flow sensor is designed and implemented for water resource management such as stream, canal, river, etc. The proposed hydrological WSN comsists of two main parts: 1) a remote control via mobile application and 2) a small boat built-in all sensing devices. As the focus of this paper, the hardware selections are discussed in detail. Based on the Arduino UNO microcontroller platform, the system can collect data and send out all measured data through Bluetooth communication. Moreover, it is controlled by features of the localization and then can represent its positioning with the Google mapping application via mobile device. Experimental results of the simplified stream discharge estimation verified that the proposed NB-IoT system can accurately monitor the width and depth parameters and also estimate the stream discharge properly.

Session 4 : Short papers
Date:Time March 27, 2019 (Wednesday) : 9:00-10:00
Room : Nontri 3

4.1 Short Term Prediction of Sun Coverage Using Optical Flow with CNN

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Abstract:
Solar irradiance fluctuation forecast is a big challenge in PV power generation. This paper presents a technique using Optical flow with CNN for raising trigger events in advance before the sun cover happens. The result shows an accuracy around 66.67%. This trigger can correctly predict from 8 out of 11 events. The proposed system can be further improved by collecting more images with fluctuation events.

4.2 ON THE USE OF MACHINE LEARNING FOR CROP PLANNING

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Abstract:
This paper represents the use of machine learning in agriculture planning to achieve the best action for the rice farmers. We chose the deep Q-learning, a type of reinforcement learning. In our work, we simulated different rice cultivation dates and then used the decision tree with Ada boosting with weekly averaged humidity, maximum and minimum temperatures, and total rains to predict the yield. Our experimental results showed that the Reinforcement Learning can provide the optimum cultivation dates for rice farmers.

4.3 PIPELINE SEGMENTATION USING LEVEL-SET METHOD

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Abstract:
Autonomous underwater vehicles (AUVs), unmanned underwater vehicle, is cheaper to operate than remotely operatedvehicles (ROVs) since an AUV does not require a trained human operator to control. As a result, in this paper, we proposed the pipeline tracking algorithm using sequences of the forward looking sonar images installed on a pre-program AUV. The forward-looking sonar (FLS) is more suitable to be used in the sub-surface environment than a optical camera due to the limited visibility and floating particles in the sub-sea surface environment. In our work we first employed the speckle noise reduction to FLS images. Then, we applied the level-set method (LSM) to extract a pipeline boundary in each frame. Lastly, the post-processing step is designed to link the unconnected segments together to from a complete pipeline. Our algorithm can perform the segmentation and tracking with more than 89% accuracy.