

**On Flow Rate of “UONOGAWA” from Rainfall
with Tank Model**

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The tank model was proposed in 1972 to calculate the flow rate of a river from rainfall [1]. The Japan Meteorological Agency (JMA) currently uses it as a prediction method of the criteria for the warning information of sediment-related disaster and flood [2]. In the tank model, there are some important parameters to predict the flow rate, such as the outflow coefficient, penetration coefficient, height of outflow hole etc.. Therefore, many researches have estimated such parameters of various rivers. Based on these researches, JMA has also decided the parameters that can be applied to general rivers. On the other hand, it is realistic that these parameters are different in each river. In order to obtain more accurate flow rate of each river, it is natural to consider the difference of such parameters in each river.

In this poster, taking the “Uonogawa”, which is the largest tributary from the central “Shinano river”, as a case study, we investigate the optimum parameters of the “Uonogawa” by the simulation of the tank model with the data of past rainfall and flow rate. By using the obtained parameters of our simulation, we found that the actual flow rate could be almost reproduced. We compared the parameters of JMA with the our obtained parameters and evaluated them.

To obtain more accurate result, it is necessary to accurate flow rate of the river can be obtained by estimating the outflow amount from non-urban and urban areas.

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**Estimation Method of Turn Section by Ensemble Learning
for Swimming Motion Coaching System**

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We aim to develop a swimming motion coaching system for beginner to intermediate swimmers using an inertial sensor [1]. One of the requirements of the system is the process of automatically estimating and dividing the section of swimming motions (such as stroke and turn etc.) from the sensor data.

In the previous study [2] which performed automatic estimation of the swimming motion by non-ensemble learning, it was impossible to remove different motion patterns by individuals, and the generalization ability was low (F-measure was .713 for all swimming styles).

In this research, in order to learn a common pattern in each motion and realize the motion estimation with high accuracy, we propose an estimation method of the turn section by using random forest which is one of ensemble learning.

As a result of the verification in the generalization ability of the classifier by test data, F-measure is .851 for all swimming styles. Therefore, it is suggested that the turn section can be estimated with higher accuracy than non-ensemble learning method [2] in all four swimming styles.

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Tree Assigning Approach for Many-to-one Assumption in Semi-Supervised Document classifier

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The conventional supervised classifiers work on labeled data in the form of an instance and a label pairs, they find a complex function or inferences from instances to labels using a set of observed labeled data. Semi-supervised classifiers employ an efficient way to enhance the inference performance when there exists much more unlabeled data (instances without a label) in addition to ordinary labeled data. The presentation discusses an approach to assign a hierarchical tree to a label in the case where a label is constituted of multiple components in semi-supervised classifiers of documents.

In the maximum likelihood estimation (MLE) approach, we estimate the parameters of an assumed data model for which the observed data are the most likely. The expectation maximization (EM) algorithm [1] is an efficient iterative method to solve the MLE problems when there are unlabeled data. In general, EM algorithm consists of two repeated steps: The first is the expectation step, which predicts the expected label for unlabeled data using the previous observed estimated parameters. The next is the maximization step, where the MLE function will be estimated corresponding to the predicted label. In the extension of EM algorithm, many-to-one assumption [2] was proposed to deal with the case where a label may be a name assigned to a set of many similar but different components. An important open issue of this approach is how to construct these components of each label.

We treat each document as a histogram of word counts and propose our idea of constructing a hierarchical tree for assigning documents to components. It directly addresses the problem of random assignment of conventional method when we use a stable structure in searching for components number and assigning the documents.

Keywords: semi-supervised learning, mixture model, EM algorithm, many-to-one assumption.

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An Automatic Text Generation System for Video Clips Using Machine Learning Technique

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Due to the expansion of a video posting site, demand of searching for videos is increasing. In general, a video search system retrieves videos based on matching between a query word set and a word set annotated by a contributor. The system often fails to search even if the content of the video matches to the query. The method using the short explanation sentence that automatically generated from a video is solution to the issue. The purpose of this study is to establish a precise method to automatically generate an explanation sentence from a video clip.

Our approach focuses on distinctive frames in a video clip and extracts information for objects, actions, backgrounds, and times from the frame. Figure 1 is the outline of the proposed system which generate an explanation sentence. The system firstly cuts the video clip into several parts based on sense changes and repetition. Then it extracts a frame from each of the parts. After that the system generates a sentence for each of those frames using im2text method. Finally, the system combines the sentences into one sentence using LSTM machine learning technique. Table 1 shows the performance of the proposed system measured with METEOR score. The table also compares with performance of other conventional systems.

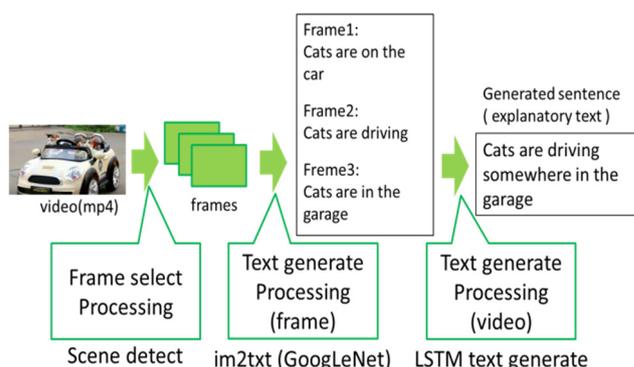


Fig.1 System outline

As can be seen from Table 1, the proposed system achieves a good score than the others. Therefore, our approach is effective for automatic explanation sentence generation from a video clip. In addition, as the number of frames used in the proposed system is half of that in the conventional system, our approach can reduce the processing resource.

Tab.1 METEOR scores

	Approach	METEOR score (average)
	Our approach	0.323
existing method	Multi-Scale Word2VisualVec	0.196
	CNN + LSTM	0.180
	VGG + AlexNet	0.298

A Study on Effectiveness of Omnidirectional Vision in Drone's Precise Maneuvering

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In recent years, an unmanned aerial vehicle called a drone has attracted attention. A drone is used in many fields such as aerial photography, surveying and inspection. If the drone maneuverability improves and precise maneuvering becomes possible, the range of utilization of the drone will be widened. Regarding the drone maneuvering, automatic piloting is increasing, but manual piloting is mainstream at present. Therefore, this research aim to improve maneuverability in manual drone piloting.

Since the perception of the drone situation is almost based on visual information, it is considered that improvement of visual feedback is important for improving maneuverability. Until now, we are maneuvering while confirming the camera image with a tablet etc. We call this "forward vision" in this paper. On the other hand, we install an omnidirectional camera on the drone and output the captured image to the head mounted display, thereby improving the circumstance perception of the drones and improving the maneuverability. The drone using this method is called "omnidirectional vision" in this paper.

In order to improve the maneuverability of the drone, the purpose is to clarify the maneuvering characteristics of omnidirectional vision drone in precision maneuvering.

In order to achieve this objective, a comparative experiment was carried out between omnidirectional view and forward view. Subjects were asked to maneuver the drone with three flight courses, straight, bend and descend at narrow places, and the number of collisions with the obstacle and the maneuvering time were measured. The experiment was carried out with each of three distances between obstacles (100cm, 90cm, 80cm) for each flight course. We also measured the distance recognition by the subjects for each of the two methods. In addition, we measured the subjective evaluation of the maneuvering using questionnaire.

As a result of the experiment, in the case of complicated flight courses such as flexion, it was found that omnidirectional viewing has less collision count and superior distance recognition compared to the forward viewing, so the drone maneuverability has improved. Also in the subjective evaluation, it was found that omnidirectional viewing is easier to see around the circumstances and felt more precise maneuverability.

Study on the Low-carbon Measures at Sugar Production Plant in Thailand Focusing on Biofuel and Ethanol Production Process

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The objectives of this study are to find how to lower carbon emission in Sugar Production plant in Thailand, which is considered to be one of major agriculture industry playing vital role in carbon emission activities. The major results revealed in this study were based on the survey and calculated data received and analyzed at the manufacture and using the Clean Development Mechanism (CDM) as reference project and activities to benchmark carbon emission.

In this study, energy and environmental management policy in Thailand are analyzed in term of the CDM, and a case study of energy and environment management for sugar industry is also investigated. Moreover, barriers and procedure suggestion of CDM in Thailand are summarized.

In 2018, 222 projects were approved with Letter of Approval (LoA) Certified Emissions Reduction (CER) while only 64 projects received Issuance of CER to actively reduce greenhouse gas by 12,879,045 tCO₂e / year. According to a case study of energy and environmental management for the large size sugar industry, there are 12 measurements for energy management, which can reduce expense up to 622,400 baht per year. Only one measurement for environment management can reduce expense about 8,400 baht per year. The total of measurements can reduce greenhouse gas emission by 1,210 tCO₂e / year. If the sugar industry participates CDM project, it will earn the revenue from selling carbon credit up to 762,300 baht per year. The revenue from reducing expenses and selling carbon credit are approximately 1,393,100 baht per year whereas the expense of CDM preparation is 2,575,000 baht per year. Consequently, the project implementation should be at least 7 years with the net present value of 7,176,700 baht. The energy and environmental management can be applied as policies for the sugar industries in Thailand which number of measurements can be varied accordingly to the capacity and investment.

Facility Location Dynamics of E Commerce Retailers: A case of worldwide facility location network of Amazon company

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The recent growth in e commerce – internet based business- in the world with unlimited selection opportunities, lower prices/ search costs/ information/ personalization/ convenience and speed [1] continued to change the way in which the traditional business is carried out and given birth to new forms of supply chain configurations and logistics facility requirements[2]. Logistics which aimed at delivering products at right time, to right place, in right configuration, require physical infrastructure network and supporting logistics facilities[3].

These new forms of businesses can be distinguished from traditional facility locations. Accordingly, several phenomena that is potentially has spatial implications can be observed. Firstly, the existence of traditional logistics facilities which had as strong connection with the terminal location are transforming in to more valuable and competitive forms of land uses such as retail, business service and housing. Secondly the logistics services are being attracted to strategic places within and outside the urbanized territory [3].

In that context, this paper discusses the location of facility location by Amazon company at Japan, India, United Kingdom, Spain, Germany, France, Germany, Italy and United States of America. Amazon can be recognized as one of the pioneering firms in the e commerce industry. Further, there are different types of logistics facilities used by Amazon company worldwide. The main findings discuss the location aspect of facility location in above countries and relate with the distribution of population distribution of these countries. These findings will be useful in understanding the new trends in logistics facility location and analyze with spatial parameters including population distribution and the location of general retailer facility location dynamics.

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Brain Responses in Easy and Difficult Visual English Words Recognition Using EMOTIV EPOC+: a Pilot Experiment

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In the recent globalized world, the acquisition of English skills has become more important in various fields. It is also true for the students in Nagaoka University of Technology, whose majors are engineering. We would like to develop a supporting system for English vocabulary learning which can increase the motivation to continuously study English in these students, who have strong interests in new technologies and prefers objective (numerical) data. Specifically, we plan to develop the system which measures brain response during English words recognition by electroencephalography (EEG) headset and gives performance feedback to the participants.

In this pilot study, we used EMOTIV EPOC+, which is low cost wireless EEG headset, to measure brain responses during visual English words recognition from one participant, and examine whether we could obtain different brain response between in easy and difficult English words presentations.

Result showed that decreases in 10–40 Hz frequency band (observed in all channels in English word conditions) were the strongest in the unknown English condition. Thus, they might reflect the effort for word recognition. Thus, they might reflect the required effort for word recognition. Power increases in 4–8 Hz (theta) frequency band were prominent in known difficult English word condition, but also observed in easy English word condition. Furthermore, similar responses were also observed in Japanese word condition in the limited channels (i.e., the left frontal and temporal channels). Thus, they might reflect the successful recognition of the word.

In conclusion, we could obtain different brain response depending on the difficulty of English words with using low-cost EMOTIV EPOC+ headsets.