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Abstract Index

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Classification of Privacy Preserving Data Mining Algorithms: A Review

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Nowadays, data from various sources are gathered and stored in databases. The collection of the data does not give a significant impact unless the database owner conducts certain data analysis such as using data mining techniques to the databases. Presently, the development of data mining techniques and algorithms provides significant benefits for the information extraction process in terms of the quality, accuracy, and precision results. Realizing the fact that performing data mining tasks using some available data mining algorithms may disclose sensitive information of data subject in the databases, an action to protect privacy should be taken into account by the data owner. Therefore, privacy preserving data mining (PPDM) is becoming an emerging field of study in the data mining research group. The main purpose of PPDM is to investigate the side effects of data mining methods that originate from the penetration into the privacy of individuals and organizations. In addition, it guarantees that the data miners cannot reveal any personal sensitive information contained in a database, while at the same time data utility of a sanitized database does not significantly differ from that of the original one. In this paper, we present a wide view of current PPDM techniques by classifying them based on their taxonomy techniques to differentiate the characteristics of each approach. The review of the PPDM methods is described comprehensively to provide a profound understanding of the methods along with advantages, challenges, and future development for researchers and practitioners.

Keywords: Database, data mining, privacy preserving data mining, sensitive information.

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BLDC Motor Control Optimization Using Optimal Adaptive PI Algorithm

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The main problem of using a Proportional Integral (PI) Controller in Brushless Direct Current (BLDC) motor speed control is tuning the PI's parameter and its performance cannot adapt to the system behavior changes. Particle Swarm Optimization (PSO) has been chosen to optimize the tuning. Fuzzy Logic Controller (FLC) is used to online tuning PI's parameters to adapt to system conditions. Optimal adaptive PI, which combines the PSO method and FLC method to tune PI, is proposed. It was successfully implemented in the simulation environment. The test was carried out in three conditions: step responses, set-point changes, and disturbance rejection. The proposed algorithm is superior with no overshoot/undershoot. Whereas in terms of settling time is in between PI and PI-PSO. PI controller has the smallest control effort. However, the other parameter is the worst. PI-PSO is superior in terms of settling time and Integral of Absolute Error (IAE) except for the step response test. The proposed method has lower IAE and higher control effort by 78.73 % and 60 % compared to PI control. On the other hand, it has a higher IAE and lower control effort by 11.82 % and 33.88 % compared to PI-PSO. Therefore, the optimal adaptive PI control can reduce energy consumption compared to optimal PI with better performance than PI control.

Keywords: PID, fuzzy, optimal, adaptive, control, motor, BLDC.

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Band-Pass Filter Microstrip at 3 GHz Frequency Using Square Open-Loop Resonator for S-Band Radar Applications

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In telecommunication, filters are often used to pass the desired frequency. One of them is the Band-Pass Filter (BPF) which is passing signals between the upper cut-off frequency and the lower cut-off frequency. This research aims to make a band-pass filter that can pass 3 GHz frequency with a bandwidth of 200 MHz. This filter is designed with a square open-loop resonator simulated using Advanced Design System (ADS) software. The filter is made using FR 4-epoxy substrates with a dielectric constant (ε_r) of 4.6 and substrate thickness (h) of 1.6 mm. Based on the simulation results obtained in the form of a comparison graph between the response of magnitude to frequency, it shows that the value of the return loss (S_{11}) parameter of -23.549 dB, insertion loss (S_{21}) parameter value of -1.397 dB, and a slightly shifted middle frequency of 2.890 GHz. Then for the measurement results obtained a parameter value return loss (S_{11}) of -16.364 dB, parameter value insertion loss (S_{21}) of -3.561 dB with a center frequency of 3.185 GHz.

Keywords: bandpass filter, filter, microstrip, square open-loop resonator.

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Parameter Estimation and Target Detection of Phased-MIMO Radar using Capon Estimator

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Phased-Multiple Input Multiple Output (PMIMO) radar is multi-antenna radar that combines the main advantages of the phased array (PA) and the MIMO radars. The advantage of the PA radar is that it has a high directional coherent gain making it suitable for detecting distant and small radar cross-section (RCS) targets. Meanwhile, the main advantage of the MIMO radar is its high waveform diversity gain which makes it suitable for detecting multiple targets. The combination of these advantages is manifested by the use of overlapping subarrays in the transmit (Tx) array to improve the performance of parameters such as angle resolution and detection accuracy at amplitude and phase proportional to the maximum number of detectable targets. This paper derives a parameter estimation formula with Capon's adaptive estimator and evaluates it for the performance of these parameters. Likewise, derivation for expressions of detection performance such as the probability of false alarm and the probability of detection is also given. The effectiveness and validation of its performance are compared to conventional estimator for other types of radars in terms of the effect of the number of target angles, the RCS of targets, and variations in the number of subarrays at Tx of this radar. Meanwhile, the detection performance is evaluated based on the effect of Signal to Noise Ratio (SNR) and the number of subarrays at Tx. The evaluation results of the estimator show that it is superior to the conventional estimator for estimating the parameters of this radar as well as the detection performance. Having no sidelobe makes this estimator strong against the influence of interference and jamming so that it is suitable and attractive for the design of radar systems. Root mean square error (RMSE) on magnitude detection from LS and Capon estimators were 0.033 and 0.062, respectively. Meanwhile, the detection performance for this radar has the probability of false alarm above 10-4 and the probability of detection of more than 99%.

Keywords: Capon estimator, MIMO radar, phased-array antenna, subarrays, target detection.

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Impact of The Number of Light Emitting Diode Towards The Accuracy in Indoor Positioning System Based on Visible Light Communication

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This research detects the random position with received signal strength (RSS) method based on the received power in the room with a size of 5×5×3 cubic meter and several numbers of light emitting diode (LEDs). The first scenario uses 4 LEDs, the second scenario uses 6 LEDs and the third scenario uses 8 LEDs. Random points as the detector are placed spread at the room as many as 25 points.

The simulation result shows that the use of more LEDs reduces the positioning error and increases the accuracy. If the accuracy reduces, the positioning error increase and affect the detection results. Using 8 LEDs, the number of the detected random point increases 30%, the positioning error is 47%, and the accuracy increase from 33%. In addition, our research is useful for finding the locations of small items such as sensors that are scattered in a closed room.

Keywords: visible light communication, light emitting diode, received signal strength, accuracy, positioning error.

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Cooperative Game Theory Approach for Energy-Efficient Node Clustering in Wireless Sensor Network

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Energy consumption is one of the critical challenges in designing wireless sensor network (WSN) since it is typically composed of resource-constrained devices. Many studies have been proposed clustering to deal with energy conservation in WSN. Due to its predominance in coordinating the behaviors of many players, game theory has been considered for improving energy efficiency in WSN. In this paper, we evaluate the performance of cooperative game theoretic clustering (CGC) algorithm which employs cooperative game theory in a form of 3-agent cost sharing game for energy-efficient clustering in WSN. Furthermore, we compared its performance to a well-known traditional clustering method, low-energy adaptive clustering hierarchy (LEACH), in terms of network lifetime and stability, and total residual energy. The simulation results show that CGC has better performance compared to LEACH due to the cooperation among cluster heads in coalition. CGC has higher alive nodes with stability improvement of first node dies (FND) by 65%, and the improvement by 52.4% for half node dies (HND). However, with the increasing of the number of nodes, the performance of LEACH is getting better compared to CGC.

Keywords: WSN clustering algorithm, CGC, LEACH, cooperative game theory, cost sharing game, shapley value, FND, HND.

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Thermopower Enhancement of Rutile-type SnO_2 Nanocrystalline Using Facile Co-Precipitation Method

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Metal oxide semiconductor has attracted so much attention due to its high carrier mobility. Herein, thermoelectric study of nanocrystalline SnO_2 through a simple co-precipitation method is conducted to enhance the Seebeck coefficient (S). X-ray diffraction, thermogravimetric analysis (TGA), resistivity (ρ), Seebeck coefficient (S), and power factor (PF) measurements are conducted to analyze the thermoelectric properties of the material. The measurements show that there are two interesting results, which are the unusual resistivity behavior and the high value of the S. Resistivity behavior shows a non-reflective intermediate semiconductor-metals behavior where the turning point occurs at 250°C. This behavior is strongly correlated to the surface oxide reaction due to annealing temperature. The maximum S likely occurs at 250°C, since the curve shows a slight thermopower peak at 250°C. The value of the S is quite high with around twenty times higher than other publications about SnO_2 thermoelectric material, this happens due to the bandgap broadening. The energy gap of SnO_2 calculated using density functional theory (DFT), which was performed by Quantum Espresso 6.6. The result shows that there is a broadening energy gap at different momentum or wave factor. Nanocrystalline semiconductors material is giving an impact to increase the width of bandgap due to quantum confinement and could enhance the thermopower especially in SnO_2 nanocrystalline.

Keywords: nanocrystalline, metal-oxide, thermoelectric, tin-dioxide, Seebeck, co-precipitation.

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Author Index