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## Kidney Tumour Segmentation and Classification Using Deep Learning

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#### Abstract:

Diagnosis and subtype classification of kidney cancer, one of the most lethal illnesses, are critical to improving the prognosis of individual patients. As a result, there is an immediate need to create automated technologies that can correctly classify kidney cancer into its various subtypes. Scientists in the biomedical sector have discovered that miRNA dysregulation can result in cancer. We propose a machine learning strategy for subtyping kidney cancer from miRNA genome data in this study. Using a combination of computational and experimental methods, we identified 35 miRNAs that help diagnose certain subtypes of kidney cancer. To categorise a given miRNA sample into kidney cancer subtypes, the proposed method uses Neighborhood Component Analysis (NCA) to extract discriminative features from miRNAs. Only a few kidney subtypes have been examined for classification in the literature. The miRNA quantitative read counts data was obtained from the Cancer Genome Atlas data source and used in the experimental study (TCGA). Three-score and five of the most discriminatory microRNAs (miRNAs) were chosen using the NCA method. The ML system achieved an average accuracy of 95% when using this selection of miRNAs to classify miRNAs involved in kidney cancer into distinct subtypes. In our research, we compared the performance of the K-Nearest Neighbor (KNN) method, which is currently in use, with that of our suggested system, which makes use of Long Short-Term Memory (LSTM).

**Key words:** K Means Nearest Neighbor, Long Short-Term Memory, Mathematical Laboratory, Deep Embedded Clustering, Semi-Supervised Learning with Deep Embedded Clustering, Magnetic Resonance Imaging, Region of Interest.

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### Introduction

Diagnosis and subtype classification of kidney cancer, one of the most lethal illnesses, are critical to improving the prognosis of individual patients [1]. As a result, there is an immediate need to create automated technologies that can correctly classify kidney cancer into its various subtypes. Scientists in the biomedical sector have discovered that miRNA dysregulation can result in cancer [2]. We propose a machine learning strategy for subtyping kidney cancer from miRNA genome data in this study [3]. Through empirical studies, we determined 35 miRNAs that possess distinct essential properties that contribute in kidney cancer subtype detection [4-6]. The suggested method employs Neighborhood Component Analysis (NCA) to extract discriminative features from miRNAs, and then uses ML to classify the miRNA sample into subtypes of kidney cancer [7]. In the medical literature, classification of just a small number of kidney subtypes has been attempted [8]. The miRNA quantitative read counts data was obtained from the Cancer Genome Atlas data source and used in the experimental study (TCGA) [9-11]. Three-score and five of the most discriminatory microRNAs (miRNAs) were chosen using the NCA method [12]. The ML system achieved an average accuracy of 95% when using this selection of miRNAs to classify miRNAs involved in kidney cancer into distinct subtypes [13-19].

In our research, we compared the performance of the K-Nearest Neighbor (KNN) method, which is currently in use, with that of our suggested system, which makes use of Long Short-Term Memory (LSTM) [20]. Semi-supervised learning has recently gained great attention due to its capacity to eliminate the demand for massive labelled datasets to efficiently train deep models based on artificial neural networks [21-24]. In practise, obtaining tagged data may involve large expenditures and/or need specialised knowledge [25]. For instance, it takes a lot of effort from a team of professional radiologists or highly educated technologists to correctly classify or segment enormous amounts of medical imaging data [26-29]. For example, manual segmentation of each brain MRI scan in the rigorous infant brain MRI segmentation challenge (iSeg2017) takes, on average, one week of a neuroradiologist's effort. Contrarily, in many fields, particularly medical imaging, access to vast amounts of unlabeled data is both simple and inexpensive [30-33]. When compared to other machine learning algorithms, one of deep learning's primary advantages is the superior modelling capacity that allows it to deal with complicated, high-dimensional datasets by means of feature representations [34-39].

Consequently, neural networks have reached state-of-the-art outcomes in computer vision, exhibiting significant success in making inferences from high-dimensional picture data [40]. However, the vast majority of deep learning algorithms are supervised, meaning that they learn to make predictions or classify data based on labels applied to training samples [41-47]. These algorithms have been updated in many ways, some shown in the next section, to handle semi-supervised or unsupervised learning tasks. Typically, unsupervised learning techniques are used as a form of pre-training for supervised learning projects [48]. Clustering techniques, which fall under the umbrella of unsupervised learning, organise unlabeled data by finding commonalities and differences between records. However, these algorithms are blind to the existence of categories [49-54]. In addition, the "curse of dimensionality" generally hinders the performance of clustering algorithms when working with high-dimensional data, even if these algorithms typically excel when working with low-dimensional data [55].

Clustering algorithms need an excessive number of data points to accurately quantify the effect of factors on data in order to draw conclusions, as data samples move further apart in high dimensional spaces [56-61]. One of the most common baseline datasets in computer vision is called MNIST, and the infamous K-Means clustering technique only manages an accuracy score of around 55% on this dataset [62-71]. To provide a semi-supervised deep learning approach that is reliable, accurate, adaptable, and computationally efficient, this study makes advantage of the recently established deep embedded clustering (DEC) algorithm. DEC is a hybrid approach that uses a deep stacked autoencoder

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and a clustering algorithm to iteratively optimise a cost function based on target probability distributions, hence improving the accuracy with which cluster centroids are predicted [72-79]. To this end, we introduce a new training strategy for a semi-supervised approach that learns feature representations from unlabeled data while maintaining the model's consistency with the labelled data by adding a clustering layer to a deep convolutional neural network (CNN) [80-85].

We use this technique, which we call Semi-Supervised Learning with Deep Embedded Clustering (SSLDEC), to segment medical images of an extremely difficult infant brain MRI based on the iSeg2017 challenge, as well as benchmark image classification datasets commonly used to evaluate and compare semi-supervised learning algorithms [86-91]. We conducted experiments on MNIST, SVHN, and iSeg2017, all datasets that need semi-supervised learning due to the fact that only a fraction of the data is labelled, and the findings show that our suggested strategy achieves competitive results [92].

In the field of imaging science, analogue and digital image processing are the two mainstays [93-99]. Hard copies, such as printouts and photographs, can benefit from analogue or visual image processing methods [100-109]. As they perform their work, image analysts draw on a wide range of interpretation theory and practise to make sense of the images they see [110]. Analysts' expertise in the field of image processing is limited not just to the subject matter experts study. Visual association is another useful tool in image processing [111-114]. Therefore, analysts utilise both direct experience and external information when processing images. Computers and digital processing techniques assist improve the quality of raw data from imaging sensors on satellite platforms, which otherwise would have to be manually manipulated [115-119]. It requires multiple stages of processing to overcome such faults and obtain data authenticity [120]. There are three main steps that must be taken before any digitally-stored data may be used: pre-processing, augmentation and presentation, and information extraction [121-129]. This hierarchy of image processing is shown in Fig. 1.



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### Images In MATLAB

Realizing that a digital image is made up of a two- or three-dimensional matrix of pixels is the first step in MATLAB image processing [130]. Each pixel in a picture stores a number or integers that denote its hue, saturation, lightness, and other attributes [132]. Depending on the colour representation technique, a colour image can have up to three times the information of a grayscale image [133-139]. As a result, the amount of computing power needed to process a colour image is triple that of a monochrome one [140]. All processing will be done on grayscale photos in this tutorial, which will explain the method for converting colour photographs to grayscale [141-147]. However, we will start with analysing elementary two-dimensional 8-bit matrices in order to grasp the fundamentals of image processing [148].

### **Edge Detectors**

An edge detector's value lies in its ability to recognise and localise objects within a picture [149]. The Sobel edge detector and the Canny edge detector are only two examples of the many available; they will be the focus of this article. The Sobel edge detector may scan in any two dimensions for sharp transitions in either the horizontal or vertical planes [150]. With the Canny edge detector, you may locate weak edges that are connected to strong ones [151-156]. The binary images provided by these edge detectors have white edges on a black background [157-163]. You can see how these edge detectors are put to use in the following example. This example demonstrates both the Canny and Sobel edge detectors [164].

As seen in Example 4.1, the image utilised is the MATLAB file named rice.tif. The Sobel method for edge detection is demonstrated in two different ways [165-169]. The first technique makes use of two MATLAB functions—special, for making the filter, and imfilter, for applying it to the image to accomplish the task. Second, you can use the edge MATLAB function, where you can choose the kind of edge detection you want to utilise [170-174]. In the beginning, the Sobel method was utilised, and then the Canny method was used as the next step in edge detection [175-181]. The top image is the unaltered source material, while the bottom image, labelled "Horizontal Sobel," was created by applying an image filter [182]. When applying the edge filter, the image labelled Sobel is the result of using the Sobel setting, while the image labelled Canny is the result of using the Canny setting [183].

The photographs' finer details were shown with the use of the Zoom In feature. The filter used to generate the Horizontal Sobel image, as can be seen, picks up on horizontal edges far more readily than vertical ones [184]. Sobel images were made with a filter that could identify both horizontal and vertical edges. This is the cumulative effect of MATLAB separately searching for horizontal and vertical edges and then adding their results together [185]. The Canny picture is proof that the Canny technique can pick up on every edge. Similar to the Sobel approach, the Canny method displays both strong edges and the weak edges that are connected to strong edges [186].

#### **Project Introduction**

Unfortunately, early detection of kidney cancer using conventional clinical methods is challenging, despite the fact that it is one of the deadliest diseases. Kidney cancer is understudied despite its status as a leading cancer killer. New methods to identify and cure it have lagged behind because it has been overshadowed by other forms of cancer in the medical world. Patients with kidney cancer have had few alternatives for treatment other than surgery for decades, and the average survival time is less than a year. Therefore, early diagnosis is essential. Research into numerous biomarkers complements conventional clinical methods, bringing us closer to a clearer picture of kidney cancer's start, correct diagnosis, and definitive treatment. However, despite the advances in genetic knowledge and technology, many questions remain unanswered and research avenues remain unexplored. The survival rate of cancer patients might be improved and the number of people who survive the disease

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could be expanded if researchers explored novel methods of detecting the disease and precisely diagnosing the stage and sub-type.

Recently, a number of methods have been developed to classify kidney cancers into their respective subtypes. Analyzing the patient's genetic information is one such promising avenue. Especially since the technological revolution of miRNA information extraction during the past two decades, clinical diagnosis using miRNA expression has piqued the interest of many academics. The Cancer Genome Atlas (TCGA), a joint project of the National Cancer Institute (NCI) and the National Human Genome Research Institute, is a major repository of knowledge on the genetics of different cancers (NHGRI). Kidney cancer is just one of 33 cancer types for which this platform has produced comprehensive multi-dimensional maps of the main genetic alterations.

#### K-Nearest Neighbor (KNN):

The classification of picture details is crucial for extracting the relevant elements from remote sensing images. Detail extraction from an image often requires first classifying the image. To find the most effective classifier in hyperspectral pictures, many researchers have turned to active learning algorithms recently; this work confirms that KNN methods were also tried in this context. The image classification field makes heavy use of the k-nearest neighbour technique. When applied to high-resolution remote sensing data, an enhanced KNN allows for maximum margin classification to be employed in conjunction with the locality. Data reduction for processing is demonstrated using KNN and a synthetic immunological B-cell network.

In later years, KNN was utilised in conjunction with the maximal margin principle, and its effectiveness was demonstrated. When applied to hyperspectral pictures, KNN is combined with the evolutionary algorithm to generate reliable decision thresholds. Using maximum marginal classification, an artificial immunological B-Cell network, and a genetic algorithm, the aforementioned research shows that KNN provides good classification results. Support vector machine is the other technique used for classification. The feature reduction-based strategy was also used to apply KNN to hyperspectral pictures, and the results were compared to those of the other classifier. The KNN distance function is less sensitive to the class label ambiguity, making it an ideal choice for high-efficiency classification of remote sensing images. When classifying remote sensing photos, KNN is now applied to an object-based representation rather than a pixel-based one.

#### **Proposed System**

In deep learning, the recurrent neural network (RNN) architecture known as long short-term memory (LSTM) is frequently employed. LSTM differs from conventional feed-forward neural networks due to the use of feedback connections. It is able to process not only individual data points (like photos), but also complete data sequences (such as speech or video). LSTM can be used for unsegmented, connected handwriting recognition, speech recognition, and anomaly detection in network traffic or IDSs (intrusion detection systems). Every LSTM has the same basic building blocks: a cell, an input gate, an output gate, and a forget gate. The three gates control the influx and egress of data into and out of the cell, and the cell may recall values for arbitrarily long time periods. Since there might be gaps of uncertain duration between crucial occurrences in a time series, LSTM networks excel at classifying, processing, and making predictions based on time series data. The vanishing gradient difficulty in training conventional RNNs inspired the creation of LSTMs. LSTM has many advantages over RNNs, hidden Markov models, and other sequence learning approaches, the most notable of which being its insensitivity to gap length.

#### **Data Dictionary**

The database wouldn't be complete without its own data dictionary. Metadata is the data about data, thus a database contains information about both the database itself and the data it stores. The actual

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database descriptions utilised by the adbms can be found in the data dictionary. An operational and built-in data dictionary is a standard feature of most DBMSs. Any time a database is accessed, a DBMS will first look at the data dictionary. For this reason, it can be difficult to ensure that all users are on the same page about the acceptable data types for each field in a database. As such, a data dictionary is a useful adjunct for maintaining data integrity. There is no universally accepted structure for a data dictionary. The metadata for each table is unique. An easily searchable data dictionary is the only need for its use.

#### System Implementation

The building blocks of any system are its implementation (system breakdown structure). Components of the system can be created, acquired, or repurposed. Hardware fabrication operations include shaping, dismantling, assembling, and polishing, while software realisation methods include coding and testing. A manufacturing system employing conventional techniques and methods of management may be necessary for some forms of implementation. The purpose of the implementation process is to produce a system component that meets the specifications specified for that component during the design phase. This component is built using standard industrial techniques. This phase connects the steps of defining the system to the phase of integrating it.

System The implementation phase of a project is when the plan drawn out in the planning phase is put into action. The most important part is finishing the system successfully and convincing the user that the new system will perform well. Time was a major issue with the previous system. As for the proposed system, it was built in MATLAB. The current setup resulted in a lengthy transmission time. However, the final product is a highly intuitive system with a user-friendly graphical interface that is accessible via a menu system. After the project has been programmed and tested, it must be deployed to the required infrastructure. The goal is to make an executable file and run it. The code is re-tested in the production environment.

#### **Module Description**

Kidney ultrasound pictures are acquired in real-time and stored in the Image Acquisition section of the system. Images are cropped to a predetermined dimension after being captured. In picture preprocessing, the trimmed RGB images are changed to grayscale. A third part is image segmentation. K-means filtering is used to divide up the grayscale images once they've been transformed. The background, lighting, and other such issues are then much easier to fix. Feature Extraction is the process of retrieving and displaying the information from the segmented images that facilitates categorization. Tensor Flow and Long Short-Term Memory (LSTM) are used in the final module's classification.

#### **Image Preprocessing**

One step in the preparation of photos is to convert the RGB colour mode to the Grayscale mode. When an image is shown as RGB, all of its original colours are preserved. Images in grayscale are a mix of black and white. For better use with the current dataset, RGB images are converted to grayscale. If you want a more precise result, converting the photos to grayscale will assist. Noise is minimised and the background is rendered neutral in grayscale photos. Furthermore, it aids in increasing the clarity of the picture by enhancing its contrast. Benefits of data augmentation include the ability to generate more data from fewer data points and the avoidance of overfitting.

#### **Image Segmentation**

Segmenting an image creates more significant divisions within the image. The digital image is cut up into little squares. The objective is to either streamline or transform the illustration into a more

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instructive visual. It separates the objects of interest from any surrounding clutter or background. It comprises of segmenting the transformed grayscale images using K means segmentation.

#### **Feature Extraction**

To facilitate classification, images are segmented and their features are extracted or shown. So that we can tell the photographs apart, we must first extract their distinguishing features. The majority of machine vision algorithms rely on the extraction of features. In order to more accurately describe the segmented objects, the common goal of feature extraction and representation techniques is to transform the objects into representations.

#### Classification

In this case, we employ an LSTM-based categorization strategy. Tensor Flow and other Machine Learning techniques will be employed in the final module's classification process. Tensor Flow is an open-source numerical computation toolkit that is compatible with MATLAB that speeds up and simplifies machine learning. Dataflow graphs are structures that depict the flow of data across a graph or a set of processing nodes, and they may be created with Tensor Flow. Every 'node' in the graph stands in for a different mathematical procedure, and every 'edge' between them is a tensor or multidimensional data array.

#### System Testing

During testing, flaws should be found and fixed. What testing is all about is unearthing every single flaw and weak point in a product. It's a method for verifying the proper operation of individual parts, assemblies, and even final goods. Software testing is the practise of putting a programme through its paces to make sure it won't crash in an unacceptable way and will perform as expected by users. There are many distinct kinds of examinations. Various kinds of tests exist to satisfy various needs. Testing the system as a whole verifies that the integrated software is up to par. It performs a set of tests on a configuration to guarantee that the outcomes will always be the same. A system integration test that focuses on configuration is an example of a system test. The foundation of system testing is made up of detailed descriptions and flows of processes, with an emphasis on the deterministic connections and integration nodes between them.

#### **Types of Tests Unit Testing**

The goal of unit testing is to ensure that the internal programme logic is working as intended and that valid inputs will result in expected outputs. It is important to verify the logic behind every branch of code and every path taken by a program's internal logic. To put it simply, it's the process of verifying the functionality of the application's constituent parts. It's done after each component is finished but before they're integrated. Such intrusive structural testing requires specific information about the structure being tested. Unit tests are simple tests that are run at the component level to examine one particular aspect of a business process, application, or system. A business process's unit tests should have well-defined inputs and outputs, ensuring that every possible branch of the process is tested and works as intended. Typically, the software development life cycle's unit testing is done within the same time as the development of the actual code. On the other hand, splitting off the development process is rather popular.

#### **Integration Testing**

The purpose of an integration test is to ensure that all parts of an application work together seamlessly. Event-driven testing focuses on the most fundamental results of screens and fields. Successful unit testing of each component does not guarantee that the whole will work together correctly and reliably; instead, integration tests prove that the whole is correct and consistent. The goal of integration testing is to reveal issues that manifest as a result of putting different parts together. To simulate failures

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brought on by interface faults, software integration testing incrementally integrates two or more software components on a single platform. The goal of an integration test is to ensure that two or more software components (such as those making up a software system or, more generally, the software applications used by a business) work together without causing any problems.

### **Black Box Testing**

Black Box Testing is the process of evaluating software without being privy to its internals, architecture, or programming language. Such most types of tests, black box tests require a definitive source document, like a specification or requirements document, from which to derive their content. This type of testing assumes no knowledge of how the software being tested works. No one can "see" inside. Without taking into account how the software actually operates, the test merely offers inputs and reacts to outputs.

#### White Box Testing

The software tester in White Box Testing is familiar with the software's internals, structure, and language, or at least the software's intended function. That's the point. In other words, it probes inaccessible depths at the black box level.

#### MATLAB

Right-side Command Window. This window displays MATLAB commands and their outcomes. The Command History window displays recently entered commands. On the left side of the screen, a window can hold three tabbed windows. The Current Directory window lists active M-files. The Workspace pane displays presently utilised variables and their sizes. The Launch Pad window provides simple access to toolboxes, including Image Processing. If these three windows don't appear as tabs, go to View and choose them. Example 2.1 introduces the Command Window. Press return after the >> prompt to get a new prompt. If you don't want code to reappear in MATLAB, put a semicolon after it. Without a semicolon, the code prints in the command window.

Example 2.1 X = 1; percent Click enter to proceed to next line

Z = X + Y percent, press enter

Under the last line of code, MATLAB answered Z = 2. A semicolon after the last statement would have prevented printing. Notice how your variables are listed in the Workspace Pane and your commands in the Command History window. Press the or arrows to retype a command.

#### Images

Digital images are built of a two- or three-dimensional matrix of pixels. Individual pixels are allocated a grayscale or colour value. Depending on the colour scheme, colour photographs carry three times as much info as grayscale. Color images require three times more processing power. All processing will be done on grayscale photos in this course. We'll start by analysing two-dimensional 8-bit matrices to understand image processing.

Image Loading You may want to test a filter on an arbitrary matrix or a specific image. MATLAB requires loading the image before processing. If the image's colour isn't important for the application, convert it to grayscale. Only a third of the pixel values are in the new image, simplifying processing. When looking for a contrasting object in an image, colour may not matter. Below is Example 4.1 for loading images.

#### **Image Properties**

Histograms display data distribution as bar graphs. Histograms in image processing display the number of pixel values. Histograms help determine which image pixels are essential. You can alter an image using this data. Histogram data helps improve contrast and thresholding. Use imhist to produce

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an image histogram. Histeq enhances contrast, while graythresh and im2bw threshold. Imhist, imadjust, graythresh, and im2bw are demonstrated in Example 5.1. To observe the contrast-enhanced image's histogram, run imhist on the histeq image. Negative implies the output image is the input image reversed. In an 8-bit picture, 0 pixels become 255 and 255 pixels become 0. All between-pixel values are reversed. The new image is flipped. Imadjust does this. See Example 5.1 to make a negative image with imadjust. Complement is another way to create a negative image.

#### **Frequency Domain**

To comprehend image processing filters, you must first understand frequency. Image signals are twodimensional. Frequencies define signals. Low-frequency material has little grayscale fluctuation when scanned. A high-frequency picture features wildly varying grayscale values. Let's simplify. Sine waves with various frequencies, magnitudes, and phases represent every signal. A signal is transformed via Fourier. This collection of sine waves can be endless if the signal is difficult to depict, but it's generally cut when adding more signals doesn't improve signal resolution. Digital systems input discrete data, select a sampling rate, and output discrete values via a Fourier Transform. The DFT (DFT) MATLAB's DFT command is FFT. fft2 is MATLAB's 2-D FFT. Image processing determines a picture's frequency content. Uncertain? Two-dimensional image matrix. If you plotted one row per pixel's grayscale value, you'd obtain a fluctuating bar graph. These pixels may not match. Fourier transform calculates signal frequencies. Absolute Fourier Transform magnitude shows frequency content.

#### **Median Filters**

Noise in photos is often very difficult to get rid of, however Median Filters can help. In certain respects, a median filter can be thought of as an average filter. The average filter takes into account the values of both the target pixel and its neighbours, and then outputs a single value that represents the average of the two sets of values. The median filter performs the same analysis on this group of pixels and then calculates the average. The median filter is more adept at accepting wide disparities in pixel values, allowing for the removal of noise while preserving sharper edges.

#### **Erosion and Dilation**

Both erosion and dilation are neighbourhood operations, much like the median filter. During an erosion procedure, the input and neighbouring pixels' values are compared, and the minimum of the two is used to determine the final output. On the other hand, dilation takes a look at the identical pixels and returns their greatest value. The imerode and instantaneous functions, as well as the steel function, allow for efficient erosion and dilation in MATLAB (figures 2 and 3).



Figure 2: Input and Filtration



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Finding things in pictures is a lot easier with the help of a tool called an edge detector. The Sobel edge detector and the Canny edge detector are only two examples of the many available; they will be the focus of this article. The Sobel edge detector may scan in any two dimensions for sharp transitions in either the horizontal or vertical planes. With the Canny edge detector, you may locate weak edges that are connected to strong ones. The binary images provided by these edge detectors have white edges on a black background. To segment an image is to divide it into its constituent parts. There are a number of MATLAB tools that can help you do this. Segmenting touching objects in an image can be done in a number of ways, one of which is through the use of a mixture of morphological processes. Dilation plus erosion is another technique for object segmentation. For this purpose, binary pictures can be processed with the bwperim MATLAB function.

### Conclusion

Kidney cancer is modelled in this study as a classification job, and the ML method for determining whether a tumour is benign or malignant is described. The accuracy of the ML findings was evaluated in comparison to the current system. The classification method used in this study, which is based on the ML methodology, has been found to be more effective than previously used algorithms. In conclusion, the ML algorithm outperforms the state-of-the-art alternatives for detecting kidney cancer. Early detection is key for lowering the mortality rate associated with kidney cancer. This study makes use of CT Kidney images from the mini-MIAS collection. There are 322 photos in this collection; 270 are considered healthy and 52 are considered malignant. A total of ten GLCM texture features were determined along 0°. Using the rank features technique, we can further narrow the features space down to a manageable six features. Using the proposed strategy, we find that the accuracy increases from 92 percent on validation and test data to 94.4 percent overall. Many real-world applications can be found for the proposed method. Some illnesses of the brain can be analysed with little modification. The proposed method can be utilised to locate tumor-ridden tissue sections because it can handle relatively small clusters.

#### **References:**

- 1. Sarvestan Soltani A, Safavi A A, Parandeh M N and Salehi M, "Predicting Kidney cancer Survivability using Data Mining Techniques", IEEE 2019.
- 2. Iranpour M, Almassi S and Analoui M, "Kidney cancer Detection from fna using SVM and RBF Classifier", In 1st Joint Congress on Fuzzy and Intelligent Systems, 2019.
- 3. Mehmet Fatih Akay. Support vector machines combined with feature selection for Kidney cancer diagnosis. Expert systems with applications, 36(2):3240-3247, 2019.
- 4. J. Enguehard, P. O'Halloran and A. Gholipour, "Semi-Supervised Learning With Deep Embedded Clustering for Image Classification and Segmentation," in IEEE Access, vol. 7, pp. 11093-11104, 2019.
- 5. O. Fabela, S. Patil, S. Chintamani and B. H. Dennis, "Estimation of effective thermal conductivity of porous Media utilizing inverse heat transfer analysis on cylindrical configuration," in ASME 2017 International Mechanical Engineering Congress and Exposition, 2017.
- 6. S. Patil, S. Chintamani, B. Dennis and R. Kumar, "Real time prediction of internal temperature of heat generating bodies using neural network," Thermal Science and Engineering Progress, vol. 23, 2021.
- 7. S. Patil, S. Chintamani, J. Grisham, R. Kumar and B. H. Dennis, "Inverse Determination of Temperature Distribution in Partially Cooled Heat Generating Cylinder," in ASME 2015 International Mechanical Engineering Congress and Exposition, 2015.

256 Published by " CENTRAL ASIAN STUDIES" http://www.centralasianstudies.org

- 8. S. Patil, S. Chintamani, R. Kumar and B. H. Dennis, "Determination of orthotropic thermal conductivity in heat generating cylinder," in ASME 2016 International Mechanical Engineering Congress and Exposition, American Society of Mechanical Engineer, 2016.
- 9. R. Upreti, S. Chintamani, S. Patil, A. Akbariyeh and B. H. Dennis, "Stochastic finite element thermal analysis of ball grid array package"," Journal of Electronic Packaging, vol. 144, no. 1, 2022.
- G. Nagamalleswari, P. Prachet, A.E. Prabahar, P.V. Suresh, N. Rama Rao; Enantio Separation By Hplc – A Review; IAJPR. 2015; 5(3): 1078-1083. N. Jaya Raju, Ch.Avinash, P.V. Suresh; Evaluation Of In Vitro Anthelmintic Activity Of Seed Extracts Of Thymus Serpyllum; IAJPR. 2015; 5(3): 1230-1233.
- 11. Gollapalli Nagararaju, Karumudi Bhavya Sai, Kota Chandana, Madhu Gudipati, P.V.Suresh, Nadendla Ramarao; synthesis, evaluation of antioxidant and antimicrobial study of 2-substituted benzothiazole derivatives; Indo American Journal of Pharmaceutical Research; 2015, 50 (03), pg. 1288.
- 12. M.P.Harshitha, P. Venkata Suresh, "Simultaneous determination of residual NSAIDS and antibiotics in raw milk by RP-HPLC", International Journal of Pharmaceutical Sciences and Research, 2014, Vol:5.
- J. Ashok Kumar, P. Venkata Suresh, J. Priyanka, R. Anusha, N. Geetha Anupama, A. E.Prabahar, Rama Rao. N, "A Rapid and Novel Green Analytical Chemistry method for estimation of minocycline hydrochloride in pharmaceutical formulations by Fourier Transform Mid Infrared (FT-MIR) spectroscopy" International Journal of Pharmaceutical Analysis, 2014, 39 (1), 1205 – 1209.
- 14. K. Swathi, P. Venkata Suresh, A.Elphine Prabahar, "Colorimetric estimation of Ezetimibe in bulk and pharmaceutical dosage form by MBTH", Pharm analysis & quality assurance, 2014, 1-3.
- 15. P. Venkata Suresh, Rama Rao Nadendla and B. R. Challa; "Bio- analytical method development and validation of Valsartan by precipitation method with HPLC-MS/MS: Application to a pharmacokinetic study, Journal of Chemical and Pharmaceutical Research, 2013, 5(7):7-20.
- 16. P. Venkata Suresh, Rama Rao Nadendla and B. R. Challa; "Quantification of Desloratadine in Human Plasma by LC-ESI-MS/MS and Application to a Pharmacokinetic Study"; Elsevier Limited; Journal of Pharmaceutical Analysis, issue 2 (2012), 180-187.
- 17. P. Venkata Suresh, Rama Rao Nadendla and B. R. Challa; "Quantification of sibutramine and its two metabolites in human plasma by LC–ESI-MS/MS and its application in a bioequivalence study"; Elsevier Limited; Journal of Pharmaceutical Analysis, Vol.2, issue 4, (2012),pp. 249-257.
- 18. P. Venkata Suresh, Rama Rao Nadendla and B. R. Challa; "Quantitative analysis of eletriptan in human plasma by HPLC-MS/MS and its application to pharmacokinetic study", Springer, Anal Bioanal Chem.2011 Nov; 401(8):2539-48. Epub.2011 Sep 3.
- 19. P. Venkata Suresh, Rama Rao.Nadendla "HPTLC Method for the Simultaneous Estimation of Etophylline and Theophylline in Tablet Dosage Forms"; Asian journal of chemistry, 2011, 23, 1,309-311.
- 20. V. Venkatesh, N. Vijaya Lakshmi, P. Venkata Suresh, P, Mohana rao, K. Siva, G. Dhana Raju and N. Rama Rao, "Determination and validation of Modafinil in Pharmaceutical Formulation by Spectrophotometric and RP- HPLC Methods" Journal of Pharmacy research, 2011; 4(2):509-511.

- 21. Nagamalleswari, G., D.Phanendra, Prabahar, A.E., P. Venkata Suresh, Ramarao, N., "Development and validation of chromatographic method for simultaneous estimation of levocetricine and phenylepherine in pharmaceutical dosage forms" International journal of advances in pharmaceutical research, 2013, Vol 4, issue 7, 1921-26.
- 22. V. Venkatesh, A. Elphine Prabahar, P. Venkata Suresh, Ch. Uma Maheswari, and N. Rama Rao "RP-HPLC Method for Simultaneous Estimation of Azithromycin and Ambroxol Hydrochloride in Tablets" Asian journal of Chemistry, 2011, 23, 1,312-314.
- 23. P. Venkata Suresh, Rama Rao.Nadendla, "A New RP-HPLC Method For Simultaneous Estimation Of Etophylline And Theophylline In Tablets" Research Journal of Pharmacy and Technology; Vol: 4No:1: January-February: 2011.
- 24. V. Venkatesh, N. Vijaya Lakshmi, P. Venkata Suresh, Mohana rao, K. Siva, G. Dhana Raju and N. Rama Rao, "Determination and validation of Modafinil in Pharmaceutical Formulation by Spectrophotometric and RP- HPLC Methods"; Journal of Pharmacy Research, 2011; 4(2):509-511.
- 25. Jamadon, N.H.; Tan, A.W.; Yusof, F.; Ariga, T.; Miyashita, Y.; Hamdi, M. Utilization of a Porous Cu Interlayer for the Enhancement of Pb-Free Sn-3.0Ag-0.5Cu Solder Joint. Metals 2016, 6, 220.
- 26. Jamadon, N.H., Ahmad, N.D., Yusof, F., Ariga, T., Miyashita, Y., Shukor, M.H.A. (2017). Effect of Isothermal Aging on Mechanical Properties of Sn-3.0Ag-0.5Cu Solder Alloy with Porous Cu Interlayer Addition. In: Awang, M. (eds) 2nd International Conference on Mechanical, Manufacturing and Process Plant Engineering. Lecture Notes in Mechanical Engineering. Springer, Singapore.
- 27. Hani, J.N.; Fadzil, J.M.; Farazila, Y.; Tadashi, A.; Yukio, M.; Hamdi, A.S.M. The Effect of Temperature on the Formation Behavior of Reaction Layer in Sn-3.0Ag-0.5Cu Solder Joint with the Addition of Porous Copper Interlayer. Materwiss Werksttech 2017, 48, 283–289.
- 28. Zahri, N.A.M., Yusof, F., Miyashita, Y. et al. Brazing of porous copper foam/copper with amorphous Cu-9.7Sn-5.7Ni-7.0P (wt%) filler metal: interfacial microstructure and diffusion behavior. Weld World 64, 209–217 (2020).
- 29. Nashrah Hani Jamadon, and Nurul Izaan Abdullah Halid, and Abu Bakar Sulong, and Mohd Hamdi Abd Shukor, and Miyashita, Yukio (2020) Evaluation of sintered hydroxyapatite (HA) via powder injection molding. Jurnal Kejuruteraan, 32 (4). pp. 671-676.
- 30. Basir, A., Sulong, A.B., Jamadon, N.H. et al. Process Parameters Used in Macro/Micro Powder Injection Molding: An Overview. Met. Mater. Int. 27, 2023–2045 (2021).
- Basir, A.; Sulong, A.B.; Jamadon, N.H.; Muhamad, N. Feedstock Properties and Debinding Mechanism of Yttria-Stabilized Zirconia/ Stainless Steel 17-4PH Micro-Components Fabricated via Two-Component Micro-Powder Injection Molding Process. Ceram Int 2021, 47, 20476– 20485.
- Basir, A.; Sulong, A.B.; Jamadon, N.H.; Muhamad, N. Sintering Behavior of Bi-Material Micro-Component of 17-4PH Stainless Steel and Yttria-Stabilized Zirconia Produced by Two-Component Micro-Powder Injection Molding Process. Materials 2022, 15, 2059. https://doi.org/10.3390/ma15062059

- 33. Gnanasagaran, C.L.; Ramachandran, K.; Ramesh, S.; Ubenthiran, S.; Jamadon, N.H. Effect of Co-Doping Manganese Oxide and Titania on Sintering Behaviour and Mechanical Properties of Alumina. Ceram Int 2022.
- 34. Jamadon, N.H., Ahmad, M.A., Fuad, H.N.M., Adzila, S. (2023). Mechanical Properties of Injection-Molded Poly-Lactic Acid (PLA) Reinforced with Magnesium Hydroxide for Biomedical Application. In: Emamian, S.S., Awang, M., Razak, J.A., Masset, P.J. (eds) Advances in Material Science and Engineering. Lecture Notes in Mechanical Engineering. Springer, Singapore. https://doi.org/10.1007/978-981-19-3307-3\_33
- 35. O. Alkarabsheh, A. Jaaffar, p. Wei Fong, D. Almaaitah and Z. Alkharabsheh, "The relationship between leadership style and turnover intention of nurses in the public hospitals of Jordan," Cogent Business & Management, Vols. 9, 2022, no. Issue 1, p. Page 1 of 19, 2022.
- 36. F. Yassine, T. Maaitah, D. Maaitah and J. Al-Gasawneh, "Impact Of Covid-19 On The University Education System In Jordan," Journal of Southwest Jiaotong University, vol. 57, no. 1, pp. 1-15, 2022.
- 37. D. AL-Maaitah, T. AL-Maaitah and O. alkharabsheh, "The impact of job satisfaction on the employees turnover intention at public universities (Northern Border University)," International Journal of Advanced and Applied Sciences, vol. 8, no. 5, pp. 53-58, 2021.
- 38. D. Al-maaitah, R. Alias and T. Al-maaitah, "The Impact of Human Resource Management Practices and Leader Member Exchange on Job Performance: A moderating Role of Job Satisfaction in Jordanian Public Universities," Indian Journal of Science and Technology, vol. 12, no. 11, p. 5, 2019.
- 39. D. Maaitah, R. Allias, A. Azmin and T. Maaitah, "Leader member exchange and job performance with job satisfaction as a moderator," National Academy of Managerial Staff of Culture and Arts Herald, vol. 1, no. 1, pp. 1176-1179, 2018.
- 40. D. Maaitah, R. Alias and T. Maaitah, "The Impact Of Human Resource Management Practices On Job Performance In (University Of Jordan)," national academy of managerial staff of culture and arts herald, vol. 1, no. 1, pp. 1180-1183, 2018.
- 41. T. AL-Maaitah, A. Osman, M. Suberi, D. AL-Maaitah and M. AL-Maaitah, "Factors Influencing the Adoption of Electronic Banking in Jordan," Australian Journal of Basic and Applied Sciences, vol. 9, no. 12, pp. 104-108, 2015.
- 42. D. Al-Maaitah, M. Abdul Mutalib, A. Zumrah and T. Al-Maaitah, "A Conceptual Approach of Human Resource Management Practices Towards Organisation Performance: An Evidence from the Private Universities in Jordan," International Journal of Economics, Commerce and Management, vol. 3, no. 8, pp. 426-434, 2015.
- 43. T. AL-Maaitah, A. Osman, M. Suberi, D. AL-Maaitah and F. AL-Dhmour, "Review study on the security of electronic payment systems," International Journal of Economics, Commerce and Management, vol. 3, no. 9, pp. 821-829, 2015.
- 44. D. AL-maaitah, T. AL-maaitah and A. Al-shourah, "Factors Affecting Human Resource Practices In A Sample Of Diversified," International Journal Of Research Science & Management, vol. 12, no. 2, pp. 23-28, 2015.
- 45. Ali-Mohammad Kamali , Milad Kazemiha, Behnam Keshtkarhesamabadi, Mohsan Daneshvari, Asadollah Zarifkar, Prasun Chakrabarti, Babak Kateb, Mohammad Nami "Simultaneous

259 Published by " CENTRAL ASIAN STUDIES" http://www.centralasianstudies.org

Transcranial and Transcutaneous Spinal Direct Current Stimulation to Enhance Athletic Performance Outcome in Experienced Boxers", Scientific Reports , 11 : 19722, 2021.

- 46. Xin Wang, Yuhao Zhou, Tingwen Huang, Prasun Chakrabarti, "Event-triggered Adaptive Faulttolerant Control for a Class of Nonlinear Multiagent Systems with Sensor and Actuator Faults", IEEE Transactions on Circuits and Systems I: Regular Papers, 2022.
- 47. Tuan Pham Van, Dung Vo Tien, Zbigniew Leonowicz, Michal Jasiński, Tomasz Sikorski, Prasun Chakrabarti "Online Rotor And Stator Resistance Estimation Based On Artificial Neural Network Applied In Sensorless Induction Motor Drive", Energies, 13: 4946, 2020.
- 48. Prince, Ananda Shankar Hati, Prasun Chakrabarti, Jemal Hussein, Ng Wee Keong, "Development of Energy Efficient Drive for Ventilation System using Recurrent Neural Network", Neural Computing and Applications, 33: 8659, 2021.
- 49. Papiya Debnath, Pankaj Chittora, Tulika Chakrabarti, Prasun Chakrabarti, Zbigniew Leonowicz, Michal Jasinski, Radomir Gono, Elżbieta Jasińska, "Analysis of earthquake prediction in India using supervised machine learning classifiers", Sustainibility, 13(2): 971, 2021.
- 50. Pankaj Chittora, Sandeep Chaurasia, Prasun Chakrabarti, Gaurav Kumawat, Tulika Chakrabarti, Zbigniew Leonowiz, Michael Jaisinski, Lukasz Jaisinski, Radomir Gono, Elzbieta Jaisinski, Vadim Bolshev, "Prediction of Chronic Kidney Disease-A Machine Learning perspective", IEEE Access, 9:17312-17334, 2021.
- 51. Imayanmosha Wahlang, Arnab Kumar Maji, Goutam Saha, Prasun Chakrabarti, Michał Jasiński, Zbigniew Leonowicz, Elzbieta Jasinska, "Deep Learning methods for classification of certain abnormalities in Echocardiography", Electronics, 10: 495., 2021.
- 52. Rajkumar Soni , Prasun Chakrabarti , Zbigniew Leonowicz , Michal Jasinski , Krzysztof Wieczorek , Vadim Bolshev, "Estimation of Life Cycle of Distribution Transformer in Context to Furan Content Formation , Pollution Index and Dielectric Strength", IEEE Access, 9 : 37456, 2021.
- 53. Yogendra Singh Solanki, Prasun Chakrabarti, Michal Jasinski, Zbigniew Leonowicz, Vadim Bolshev, Alexander Vinogradov, Elzbieta Jasinska, Radomir Gono, Mohammad Nami, "A Hybrid Supervised Machine Learning Classifier System for Breast Cancer Prognosis Using Feature Selection and Data Imbalance Handling Approaches", Electronics ,10(6) : 699, 2021.
- 54. Siddhartha Bhattacharyya, Tulika Dutta, Sandip Dey, Somnath Mukhopadhayay, Prasun Chakrabarti , "Hyperspectral Multi-level Image Thresholding using Qutrit Genetic Algorithm Expert Systems With Applications", Expert Systems with Applications, 181 : 115107, 2021.
- 55. Ashish Kumar Sinha, Ananda Shankar Hati , Mohamed Benbouzid , Prasun Chakrabarti , "ANNbased Pattern Recognition for Induction Motor Broken Rotor Bar Monitoring under Supply Frequency Regulation", Machines , 9(5):87, 2021.
- 56. Sergey Senkevich, Vadim Bolshev, Ekaterina Ilchenko, Prasun Chakrabarti, Michał Jasiński, Zbigniew Leonowicz, Mikhail Chaplygin, "Elastic Damping Mechanism Optimization by Indefinite Lagrange Multipliers", IEEE Access,9 :71784,2021.
- 57. Akhilesh Kumar Sharma, Gaurav Aggarwal, Sachit Bhardwaj, Prasun Chakrabarti, Tulika Chakrabarti, Jemal Hussain, Siddhartha Bhattarcharyya, Richa Mishra, Anirban Das, Hairulnizam Mahdin, "Classification of Indian Classical Music with Time-Series Matching using Deep Learning", IEEE Access, 9 : 102041-102052, 2021.

260 Published by " CENTRAL ASIAN STUDIES" http://www.centralasianstudies.org

- 58. Tapan Behl, Anuja Singh ,Aayush Sehgal ,Sukhbir Singh , Neelam Sharma, Tanveer Naved, Saurabh Bhatia, Ahmed Al-Harrasi, Prasun Chakrabarti, Lotfi Aleya,Simona Bungau "Mechanistic Insights into the Role of B Cells in Rheumatoid Arthritis", International Immunopharmacology, 99 : 108078 , 2021.
- 59. Zuhaib Ashfaq Khan, Hafiz Husnain Raza Sherazi , Mubashir Ali, Muhammad Ali Imran, Ikram Ur Rehman, Prasun Chakrabarti , "Designing Wind Energy Harvester for Connected Vehicles in Green Cities", Energies , 14(17) :5408, 2021.
- 60. Abrar Ahmed Chhipa , Vinod Kumar, R. R. Joshi, Prasun Chakrabarti, Michal Jaisinski, Alessandro Burgio, Zbigniew Leonowicz, Elzbieta Jasinska, Rajkumar Soni, Tulika Chakrabarti, "Adaptive Neuro-fuzzy Inference System Based Maximum Power Tracking Controller for Variable Speed WECS", Energies ,14(19) :6275, 2021.
- 61. M A Berlin, N Upadhayaya, A Alghatani, V Tirth, S Islam, K Murali, P R Kshirsagar, Bui Thanh Hung, Prasun Chakrabarti , Pankaj Dadheech , "Novel hybrid artificial intelligence based algorithm to determine the effects of air pollution on human electroencephalogram signals", Journal of Environmental Protection and Ecology , 22(5): 1825-1835,2021.
- 62. M Abul Hasan, K Raghuveer, P S Pandey, Ashok Kumar, Ashim Bora, Deepa Jose, P R Kshirsagar, Bui Thanh Hung, Prasun Chakrabarti , M M Khanapurkar , "Internet of Things and its applications in Industry 4.0 for Smart Waste Management", Journal of Environmental Protection and Ecology , 22(6): 2368-2378,2021.
- 63. Vivek Jain, Prasun Chakrabarti, Massimo Mitolo, Zbigniew Leonowicz, Michal Jasinski, Alexander Vinogradov, Vadim Bolshev, "A Power-Efficient Multichannel Low-Pass Filter Based on the Cascaded Multiple Accumulate Finite Impulse Response (CMFIR) Structure for Digital Image Processing", Circuits, Systems and Signal Processing, 2022.
- 64. Akhilesh Kumar Sharma, Shamik Tiwari, Gaurav Aggarwal, Nitika Goenka, Anil Kumar, Prasun Chakrabarti, Tulika Chakrabarti, Radomir Gono, Zbigniew Leonowicz, Michal Jasiński, "Dermatologist-Level Classification of Skin Cancer Using Cascaded Ensembling of Convolutional Neural Network and Handcrafted Features Based Deep Neural Network", IEEE Access, 10: 17920-17932, 2022.
- 65. Tanima Bhattacharya, Debashrita Das, Giselle A. Borges e Soares, Prasun Chakrabarti, Zhaoquan Ai, Hitesh Chopra, Alexandru Madalin Hasan, Simona Cavalu, "Novel Green Approaches for the Preparation of Gold Nanoparticles and Their Promising Potential in Oncology", Processes, 10(2): 426, 2022
- 66. Imayanmosha Wahlang, Arnab Kumar Maji , Goutam Saha, Prasun Chakrabarti, Michal Jasinski , Zbigniew Leonowicz, Elzbieta Jasinska , "Brain Magnetic Resonance Imaging Classification using Deep Learning Architectures with gender and age", Sensors , 22 :1766, 2022.
- 67. S. Hemalatha, Pravin R. Kshirsagar, Hariprasath Manoharan, N. Vasantha Gowri, A. Vani, Sana Qaiyum, P. Vijayakumar, Vineet Tirth, Sulaima Lebbe Abdul Haleem, Prasun Chakrabarti and Dawit Mamiru Teressa "Novel Link Establishment Communication Scheme against Selfish Attack Using Node Reward with Trust Level Evaluation Algorithm in MANET", Wireless Communications and Mobile Computing, 2022.
- 68. Gaurav Kumawat, Santosh Kumar Viswakarma, Prasun Chakrabarti , Pankaj Chittora, Tulika Chakrabarti , Jerry Chun-Wei Lin, "Prognosis of Cervical Cancer Disease by Applying Machine Learning Techniques", Journal of Circuits, Systems, and Computers, 2022.

**261** Published by " CENTRAL ASIAN STUDIES" http://www.centralasianstudies.org

- 69. M Vasaghi , S Z Mousavi, M Owrangi, M Zadeh, Ali Kamali, Mehdi Dehghani, Prasun Chakrabarti, Mohammad Nami , "Neural Correlates in Functional Brain Mapping among Breast Cancer Survivors Receiving Different Chemotherapy Regimens; a qEEG/HEG based Investigation", Japanese Journal of Clinical Oncology, 2022.
- 70. Maryam Owrangi, Mohammad Javad Gholamzadeh, Maryam Vasaghi Gharamaleki, Seyedeh Zahra Mousavi, Ali-Mohammad Kamali, Mehdi Dehghani, Prasun Chakrabarti, Mohammad Nami, "Comparative analysis of the chemotherapy-related cognitive impairments in patients with breast cancer: a community-based research", Cancer Investigation,2022.
- 71. Hariprasath Manoharan, Radha Krishna Rambola, Pravin R. Kshirsagar, Prasun Chakrabarti, Jarallah Alqahtani, Quadri Noorulhasan Naveed, Saiful Islam, Walelign Dinku Mekuriyaw, "Aerial Separation and Receiver Arrangements on Identifying Lung Syndromes Using the Artificial Neural Network", Computational Intelligence and Neuroscience, 2022.
- 72. Negin Farhadian, Alireza Moradi, Mohammad Nami, Kamran Kazemi, Mohammad Rasoul Ghadami, Alireza Ahmadi, Reza Mohammadi, Mohammad Naseh Talebi, Prasun Chakrabarti, Babak Kateb, Habibolah Khazaie, "The nexus between sleep disturbances and mental health outcomes in military staff a systematic review", Sleep Science, 15(3),2022.
- 73. Chakrabarti P., Bhuyan B., Chaudhuri A. and Bhunia C.T., "A novel approach towards realizing optimum data transfer and Automatic Variable Key(AVK)", International Journal of Computer Science and Network Security, 8(5), pp.241-250, 2008.
- 74. Chakrabarti P., Goswami P.S., "Approach towards realizing resource mining and secured information transfer", International Journal of Computer Science and Network Security, 8(7), pp.345-350, 2008.
- 75. Chakrabarti P., Choudhury A., Naik N., Bhunia C.T., "Key generation in the light of mining and fuzzy rule", International Journal of Computer Science and Network Security, 8(9), pp.332-337, 2008.
- Chakrabarti P., De S.K., Sikdar S.C., "Statistical Quantification of Gain Analysis in Strategic Management", International Journal of Computer Science and Network Security,9(11), pp.315-318, 2009.
- 77. Chakrabarti P., Basu J.K., Kim T.H., "Business Planning in the light of Neuro-fuzzy and Predictive Forecasting", Communications in Computer and Information Science, 123, pp.283-290, 2010.
- 78. Prasad A., Chakrabarti P., "Extending Access Management to maintain audit logs in cloud computing", International Journal of Advanced Computer Science and Applications ,5(3),pp.144-147, 2014.
- 79. Sharma A.K., Panwar A., Chakrabarti P., Viswakarma S., "Categorization of ICMR Using Feature Extraction Strategy and MIR with Ensemble Learning", Procedia Computer Science, 57,pp.686-694,2015.
- 80. K. Sridhar, Ajay Reddy Yeruva, Renjith P N, Asmita Dixit, Aatif Jamshed, and Ravi Rastogi, "Enhanced Machine learning algorithms Lightweight Ensemble Classification of Normal versus Leukemic Cel", Journal of Pharmaceutical Negative Results, Vol.13, no.SI-9, pp. 496–505, 2022.
- 81. Nita S. patil, Sanjay M. Patil, Chandrashekhar M. Raut, Amol P. Pande, Ajay Reddy Yeruva, and Harish Morwani, "An Efficient Approach for Object Detection using Deep Learning", Journal of Pharmaceutical Negative Results, Vol.13, no.SI-9, pp. 563–572, 2022.

- 82. F. Karim, H. Abulkasim, E. Alabdulkreem, N. Ahmed, M. Jamjoom, and S. Abbas, "Improvements on new quantum key agreement protocol with five-qubit Brown states," Modern Physics Letters A, vol. 37, p. 2250128, 2022.
- 83. H. Abulkasim, E. Alabdulkreem, and S. Hamad, "Improved Multi-party Quantum Key Agreement with Four-qubit Cluster States," CMC-Computers Materials & Continua, vol. 73, pp. 225-232, 2022.
- 84. H. Abulkasim, E. Alabdulkreem, F. Karim, N. Ahmed, M. Jamjoom, M. Hadjouni, et al., "Cryptanalysis and Improvements on Quantum Key Agreement Protocol Based on Quantum Search Algorithm," Security and Communication Networks, vol. 2022, 2022
- 85. H. Abulkasim, M. Jamjoom, and S. Abbas, "Securing Copyright Using 3D Objects Blind Watermarking Scheme," CMC-Computers Materials & Continua, vol. 72, pp. 5969-5983, 2022.
- 86. Elhadad, S. Hamad, A. Khalifa, and H. Abulkasim, "A steganography approach for hiding privacy in video surveillance systems," in Digital Media Steganography, ed: Elsevier, 2020, pp. 165-187.
- 87. Elhadad, S. Abbas, H. Abulkasim, and S. Hamad, "Improving the security of multi-party quantum key agreement with five-qubit Brown states," Computer Communications, vol. 159, pp. 155-160, 2020.
- 88. M. Jamjoom, H. Abulkasim, and S. Abbas, "Lightweight Authenticated Privacy-Preserving Secure Framework for the Internet of Vehicles," Security & Communication Networks, 2022.
- 89. H. Abulkasim and A. Alotaibi, "Improvement on 'multiparty quantum key agreement with fourqubit symmetric W state'," International Journal of Theoretical Physics, vol. 58, pp. 4235-4240, 2019.
- 90. B. R. Rajagopal, B. Anjanadevi, M. Tahreem, S. Kumar and M. Debnath, and K. Tongkachok, "Comparative Analysis of Blockchain Technology and Artificial Intelligence and its impact on Open Issues of Automation in Workplace," 2022 2nd International Conference on Advance Computing and Innovative Technologies in Engineering (ICACITE), 2022, pp. 288-292.
- 91. B.R. Rajagopal, E. Kannapiran, A.D. Gupta, M.Momin and D.S.K. Chakravarthy, "The future prospects and challenges of implementing big data in healthcare management using Structural equation model analysis," Bull. Env. Pharmacol. Life Sci., Spl Issue [1] 2022, pp. 1111-1119, 2022.
- 92. N.P. Krishnam, M.S. Ashraf, B.R. Rajagopal, P.Vats and D.S.K. Chakravarthy and S.M. Rafi, "Analysis Of Current Trends, Advances And Challenges Of Machine Learning (MI) And Knowledge Extraction: From MI To Explainable AI," Industry Qualifications The Institute of Administrative Management UK, Vol.58, pp. 54-62, May 2022.
- 93. A.D.Gupta, S.M. Rafi, B.R. Rajagopal, T.Milton and S.G.Hymlin, "Comparative analysis of internet of things (IoT) in supporting the health care professionals towards smart health research using correlation analysis," Bull.Env.Pharmacol. Life Sci., Spl Issue [1] 2022, pp. 701-708, 2022.
- 94. Roja Boina, "Assessing the Increasing Rate of Parkinson's Disease in the US and its Prevention Techniques", International Journal of Biotechnology Research and Development, 3(1), pp. 1-18, 2022.
- 95. R. Senthilkumar, B. G. Geetha, "Asymmetric Key Blum-Goldwasser Cryptography for Cloud Services Communication Security," Journal of Internet Technology, vol. 21, no. 4, pp. 929-939, Jul.2020.

263 Published by " CENTRAL ASIAN STUDIES" http://www.centralasianstudies.org

- 96. Senthil kumar, R., Geetha, B.G. Signature Verification and Bloom Hashing Technique for Efficient Cloud Data Storage. Wireless Pers Commun 103, 3079–3097,2018.
- 97. K. Kankaew (eds), Global Air Transport Management and Reshaping Business Models for the New Era. Hershey: IGI Global, 2022.
- 98. B. Worasuwannarak, K. Kankaew, "The image value of Southeast Asia airlines: A study of attribute that led to image value of choosing Southeast Asia airlines by Mean-End theory approach," In Global Air Transport Management and Reshaping Business Models for the New Era, K. Kankaew, Eds. Hershey: IGI Global, 2022, pp. 192-206.
- 99. K. Kankaew, K. Kangwol, A. Guzikova, S. Kungwol, B. Sitikarn, T. Suksutdhi, "Organizational Structure Enhancing Airlines Efficiency Amid the Pandemic: Low-Cost Carriers in Thailand as a Case," GeoJournal of Tourism and Geosites, vol. 38, pp. 1189-1194, 2021.
- 100. K. Kankaew, E. Tansiri, R. Waramontri, N. Paethrangsi, K. Kungwol, B. Sitikarn, K. Charernit, "Coping with the changes that challenges: The business and education sector in Thailand 4.0,"International Journal of Asian Business and Information Management, vol. 13, 2021.
- 101.B. Sitikarn, K. Kankaew, Y. Sawangdee, "Coffee value symbiosis toward a mountain geographical community-based tourism in Thailand," GeoJournal of Tourism and Geosites, vol. 42, pp. 657-663, 2022.
- 102. R. Agarwal and N. Rao, "ML-based classifier for Sloan Digital Sky spectral objects," Neuroquantology, vol. 20, no. 6, pp. 8329–8358, 2022.
- 103. R. Agarwal, "Edge Detection in Images Using Modified Bit-Planes Sobel Operator," 2014, pp. 203–210.
- 104. A. Rashi and R. Madamala, "Minimum relevant features to obtain ai explainable system for predicting breast cancer in WDBC," Int J Health Sci (Qassim), Sep. 2022, doi: 10.53730/ijhs.v6nS9.12538.
- 105. R. A. A. Agarwal, "Decision Support System designed to detect yellow mosaic in Pigeon pea using Computer Vision," Design Engineering (Toronto), vol. 8, pp. 832–844, 2021.
- 106. R. Agarwal, S. Hariharan, M. Nagabhushana Rao, and A. Agarwal, "Weed Identification using K-Means Clustering with Color Spaces Features in Multi-Spectral Images Taken by UAV," in 2021 IEEE International Geoscience and Remote Sensing Symposium IGARSS, Jul. 2021, pp. 7047– 7050.
- 107. D.K. Srivastava and B. Roychoudhury, "Words are important: A textual content based identity resolution scheme across multiple online social networks," Knowledge-Based Systems, vol. 195, 105624, 2020.
- 108. S. R. Vadyala, S. N. Betgeri, J. C. Matthews, and E. Matthews, "A review of physics-based machine learning in civil engineering." Results in Engineering, vol. 13, p. 100316, 2022.
- 109. S. R. Vadyala, S. N. Betgeri, and N. P. Betgeri, "Physics-informed neural network method for solving one-dimensional advection equation using PyTorch." Array, vol. 13, p. 100110, 2022.
- 110. S. R. Vadyala and E. A. Sherer, "Natural Language Processing Accurately Categorizes Indications, Findings and Pathology Reports From Multicenter Colonoscopy (Preprint)." 2021, doi: 10.2196/preprints.32973.
- 111.S. R. Vadyala, S. N. Betgeri, E. A. Sherer, and A. Amritphale, "Prediction of the number of COVID-19 confirmed cases based on K-means-LSTM." Array, vol. 11, p. 100085, 2021.

264 Published by " CENTRAL ASIAN STUDIES" http://www.centralasianstudies.org

- 112. J. A. Zarnan, W. M. Hameed , A. B .Kanbar, "New Numerical Approach for Solution of Nonlinear Differential Equations," Journal of Hunan University., 49(7), 163-170, July 2022.
- 113.J.A. Zarnan. On the numerical solution of Urysohn integral equation using Chebyshev polynomial. International Journal of Basic & Applied Sciences IJBAS-IJENS, 16 (06), 23-27, (2016).
- 114. J.A. Zarnan, Numerical solution of Volterra integral equations of Second Kind. Int. J. Comput. Sci. Mobile Comput., 5(7), 509-517, (2016).
- 115. J.A. Zarnan, A novel approach for the solution of a class of Urysohn integral equations using Bernstein polynomials. Int. J. Adv. Res , 5 (1), 2156-2162.(2017).
- 116. J. A. Zarnan, W. M. Hameed.. A comparison study between two approaches for solution of Urysohn integral equation by using statistical method, International Journal of Advances in Applied Mathematics and Mechanics, 6(1), 65-68. (2018)
- 117. J.A. Zarnan. Numerical Solutions of Nonlinear Fredholm Integral Equations of the Second Kind. Journal of Applied Computer Science & Mathematics, 13(27), 39-41. (2019).
- 118. J.A. Zarnan. Nonlinear integral equations solution method based on operational matrices of Chebyshev, International Journal of Advanced and Applied Sciences, 7(5), 104-110. (2020).
- 119. R. Oak, M. Du, D. Yan, H. Takawale, and I. Amit, "Malware detection on highly imbalanced data through sequence modeling," in Proceedings of the 12th ACM Workshop on Artificial Intelligence and Security AISec'19, 2019.
- 120.R. Oak, "Poster: Adversarial examples for hate speech classifiers," in Proceedings of the 2019 ACM SIGSAC Conference on Computer and Communications Security, 2019.
- 121. R. Oak and M. Khare, "A novel architecture for continuous authentication using behavioural biometrics," in 2017 International Conference on Current Trends in Computer, Electrical, Electronics and Communication (CTCEEC), 2017, pp. 767–771.
- 122. R. Oak, "A literature survey on authentication using behavioural biometric techniques," in Intelligent Computing and Information and Communication, Singapore: Springer Singapore, 2018, pp. 173–181.
- 123. M. Khare and R. Oak, "Real-time distributed denial-of-service (DDoS) attack detection using decision trees for server performance maintenance," in Asset Analytics, Singapore: Springer Singapore, 2020, pp. 1–9.
- 124. Satyanaga, H. Rahardjo, and Q. Zhai, "Estimation of unimodal water characteristic curve for gapgraded soil," Soils and Foundations, vol. 57, no. 5, pp. 789–801, 2017.
- 125. Satyanaga & H. Rahardjo, "Unsaturated shear strength of soil with bimodal soil-water characteristic curve," Geotechnique, Vol. 69, No. 9, pp. 828-832, 2019.
- 126. Satyanaga, H. Rahardjo & C.J. Hua, "Numerical simulation of capillary barrier system under rainfall infiltration," ISSMGE International Journal of Geoengineering Case Histories, Vol 5, No 1, pp. 43-54, 2019.
- 127.S. Pandya, T. R. Gadekallu, P. K. Reddy, W. Wang and M. Alazab, "InfusedHeart: A Novel Knowledge-Infused Learning Framework for Diagnosis of Cardiovascular Events," in IEEE Transactions on Computational Social Systems, doi: 10.1109/TCSS.2022.3151643.
- 128. H. Bulut and R. F. Rashid , "The Zooplankton Of Some Streams Flow Into The Zab River, (Northern Iraq)", Ecological Life Sciences, vol. 15, no. 3, pp. 94-98, Jul. 2020

265 Published by " CENTRAL ASIAN STUDIES" http://www.centralasianstudies.org

- 129. Rashid, R. F., Çalta, M., & Başusta, A. (2018). Length-Weight Relationship of Common Carp (Cyprinus carpio L., 1758) from Taqtaq Region of Little Zab River, Northern Iraq. Turkish Journal of Science and Technology, 13(2), 69-72.
- 130. Pala, G., Caglar, M., Faruq, R., & Selamoglu, Z. (2021). Chlorophyta algae of Keban Dam Lake Gülüşkür region with aquaculture criteria in Elazıg, Turkey. Iranian Journal of Aquatic Animal Health, 7(1), 32-46.
- 131. Rashid, R. F., & Basusta, N. (2021). Evaluation and comparison of different calcified structures for the ageing of cyprinid fish leuciscus vorax (heckel, 1843) from karakaya dam lake, turkey. Fresenius environmental bulletin, 30(1), 550-559.
- 132. Rashid, R. (2017). Karakaya Baraj Gölünde (Malatya-Türkiye) yaşayan aspius vorax'da yaş tespiti için en güvenilir kemiksi yapının belirlenmesi/Determination of most reliable bony structure for ageing of aspius vorax inhabiting Karakaya Dam Lake (Malatya-Turkey).
- 133. Kumar, Dhurjati .Rajeswara , Lanke, Govinda Rajulu, "Survey Of Cloud Computing and Its Development And Problem Solving," International Journal of Innovative Research Explorer(ijire), vol. 6, no. 11, p. 8, 2018.
- 134. Govinda rajulu Lanke and T.Bhuvaneswari, "Giving Intelligence to SMEs Business," International Journal of Business Intelligent, vol. 04, no. 02, p. 5, 2015.
- 135. Lanke, Govinda Rajulu, "The Certainty of Bi System For SME," IJCSERD, vol. 1, no. 1, p. 4, 2014.
- 136. Lanke, Govinda Rajulu, "Strategic objectives modeling architecture for Real-Time Business Intelligence (BI)," International Journal of Scientific and Technology Research, vol. 2, no. 6, p. 4, 2013.
- 137. Lanke, Govinda Rajulu. (2013), "Adaptation of Saas In B Usiness I Ntelligence For SME," IJOAR .org, vol. 1, no.3, p.14, 2013.
- 138. Lanke, Govinda Rajulu, "The Inevitability of BI systems for SME," International Conference On Emerging Trends In Science, Engineering And Technology, vol. 1, no. 3, p. 14, 2012.
- 139. Satyanaga & H. Rahardjo, "Role of unsaturated soil properties in the development of slope susceptibility map," Geotechnical Engineering. Vol 175, No 3, pp. 276-288, 2022.
- 140. Satyanaga & H. Rahardjo, "Stability of unsaturated soil slopes covered with Melastoma Malabathricum in Singapore," Geotechnical Engineering. Vol 7, No 6, pp. 393-403. 2020.
- 141. Satyanaga, H. Rahardjo, Z.H. Koh & H. Mohamed. "Measurement of a soil-water characteristic curve and unsaturated permeability using the evaporation method and the chilled-mirror method," Journal of Zhejiang University-SCIENCE A. Vol 20, No 5, pp. 368-375, 2019.
- 142. Satyanaga, N. Bairakhmetov, J.R. Kim & S.-W. Moon. "Role of bimodal water retention curve on the unsaturated shear strength," Applied Sciences. Vol 12, No 3, pp. 1266. 2022.
- 143. Parvathi K, Santhi T, Makeswari M, Nirmaladevi V, Rathinam R. Ricinus Communis Activated Charcoal Preparation, Characterization and Application for Methyl Red Adsorptive Removal. Orient J Chem 2022;38(1), Pg. 110-117.
- 144. Rathinam R, Brindha T, Petchiammal M, Mohamed Ibrahim A, Photo-Electrocatalytic Degradation Of Aqueous Rhodamine B Dye Using Titanium Electrodes Coated With RuO2/IrO2/TaO2, Indian Journal of Environmental protection, 41(12), pp.1365-1371, 2021.

- 145. Umadevi M, Rathinam R, Brindha T, Dheenadhayalan S, Pattabhi S, Application of Electro-Chemical Oxidation for the Treatment of Reactive Red 195 using Graphite Electrode, Asian Journal of Biological and Life Sciences, 2022,10 (3), 620-625.
- 146. Brindha T, Rathinam R, Dheenadhayalan S, Sivakumar R. Nanocomposite Coatings in Corrosion Protection Applications: An Overview . Orient J Chem 2021;37(5), Pg.1062-1067.
- 147. Parvathi K, Santhi T, Makeswari M, Nirmaladevi V, Rathinam R (2022) Ricinus Communis Activated Charcoal Preparation, Characterization and Application for Methyl Red Adsorptive Removal. Orient Journal of Chemistry, 38(1), 110-117.
- 148. Rathinam R, Brindha T, Petchiammal M, Mohamed Ibrahim A (2021) Photo-Electrocatalytic Degradation Of Aqueous Rhodamine B Dye Using Titanium Electrodes Coated With RuO2/IrO2/TaO2, Indian Journal of Environmental protection, 41(12), 1365-1371,
- 149. A, V. V. ., T, S. ., S, S. N. ., & Rajest, D. S. S. . (2022). IoT-Based Automated Oxygen Pumping System for Acute Asthma Patients. European Journal of Life Safety and Stability (2660-9630), 19 (7), 8-34.
- 150. A. A. Shaltout, N. Y. Mostafa, M. S. Abdel-Aal, and H. A. Shaban, "Electron number density and temperature measurements in laser produced brass plasma," EPJ Appl. Phys., vol. 5, no. 1, pp. 11003–11010, 2010.
- 151. Brindha T, Rathinam R, Dheenadhayalan S, Sivakumar R (2021). Nanocomposite Coatings in Corrosion Protection Applications: An Overview. Orient J Chem., 37(5), 1062-1067.
- 152. C. A. Valades Cruz et al., "Quantitative nanoscale imaging of orientational order in biological filaments by polarized superresolution microscopy," Proc. Natl. Acad. Sci., vol. 113, no. 7, pp. E820–E828, 2016.
- 153. D.K. Srivastava and B. Roychoudhury, "Understanding the Factors that Influence Adoption of Privacy Protection Features in Online Social Networks," Journal of Global Information Technology Management, vol.24, no.3, pp. 164-182, August 2021
- 154. E. Miron et al., "Chromatin arranges in chains of mesoscale domains with nanoscale functional topography independent of cohesin," Sci. Adv., vol. 6, no. 39, pp. eaba8811, 2020.
- 155.E. Parimalasundar, S. Jayakumar, R. Ravikumar and K. Suresh, "Investigation analysis of open circuit and short circuit fault on cascaded H-bridged multilevel inverter using artificial neural network approach," International Journal of Electrical and Electronics Research (IJEER), vol. 10, no. 2, pp.320-326.
- 156. Govindaraj M, Babu S., Rathinam R. Vasini V, Vijayakumar K (2022) Integrated electrocoagulation–photoelectrocatalytic oxidation for effective treatments of aqueous solution bisphenol-A using green-synthesized ZnO nanoparticles. Chem. Pap.
- 157.H. A. Shaban and A. Seeber, "Monitoring global chromatin dynamics in response to DNA damage," Mutation Research Fundamental and Molecular Mechanisms of Mutagenesis, vol. 821, no. May–December 2020, p. 111707, 2020.
- 158. H. A. Shaban and A. Seeber, "Monitoring the spatio-temporal organization and dynamics of the genome," Nucleic Acids Res., vol. 48, no. 7, pp. 3423-3434, Mar. 2020.
- 159. H. A. Shaban, A. A. Shaltout, M. Abdou, E. A. Al Ashker, and M. Elgohary, "Determination of Cu, Zn, and Se in microvolumes of liquid biological samples," J. Appl. Spectrosc., vol. 77, no. 6, pp. 771-777, 2011.

- 160. H. A. Shaban, C. A. Valades-Cruz, J. Savatier, and S. Brasselet, "Polarized super-resolution structural imaging inside amyloid fibrils using Thioflavine T," Sci. Rep., vol. 7, no. 1, pp. 1-10, 2017.
- 161.H. A. Shaban, R. Barth, and K. Bystricky, "Formation of correlated chromatin domains at nanoscale dynamic resolution during transcription," Nucleic Acids Res., vol. 46, no. 13, p. e77-e77, Apr. 2018.
- 162. H. A. Shaban, R. Barth, and K. Bystricky, "Navigating the crowd: visualizing coordination between genome dynamics, structure, and transcription," Genome Biology, vol. 21, no. 1, pp. 1-18, 2020.
- 163. H. A. Shaban, R. Barth, L. Recoules, and K. Bystricky, "Hi-D: nanoscale mapping of nuclear dynamics in single living cells," Genome Biol., vol. 21, no. 1, p. 95, 2020.
- 164. Ismail R M A, Rathinam R, Al-Jamal M, Ramachandran S K, Al-Mattarneh H, Pant B, Patil P Y (2022) Mn-BIM Based Photo-Catalytic Degradation of Hazardous Industrial Organic Pollutants in Fresh Water. Advances in Science and Technology. 117, 53-58.
- 165. J. A. Zarnan, A Novel Approach for the Solution of a Love's Integral Equations Using Bernstein Polynomials, IOSR Journal of Mathematics, 13(1), 10-13. (2017),
- 166. J. A. Zarnan, W. M. Hameed, A. B. Kanbar, A Novel Approach for the Solution of a Love's Integral Equations Using Chebyshev Polynomials, International Journal of Advances in Applied Mathematics and Mechanics. 7(3), 96-01, (2020).
- 167.J. A. Zarnan, W. M. Hameed, On The Numerical Eigenvalues of a Spring-Mass System. International Journal of Computer Science and Mobile Computing, 5(8), 51-54. (2016).
- 168. J.A. Zarnan. A Novel Approach for the Solution of Urysohn Integral Equations Using Hermite Polynomials. International journal of applied Engineering Research, 12(24), 14391-14395. (2017).
- 169. Jerusha Angelene Christabel G, Shynu T, S. Suman Rajest, R. Regin, & Steffi. R. (2022). The use of Internet of Things (Iot) Technology in the Context of "Smart Gardens" is Becoming Increasingly Popular. International Journal of Biological Engineering and Agriculture, 1(2), 1–13.
- 170. K. Suresh and E. Parimalasundar, "A Modified Multi Level Inverter with Inverted SPWM Control," in IEEE Canadian Journal of Electrical and Computer Engineering, vol. 45, no. 2, pp. 99-104, Spring 2022.
- 171.K. Suresh and E. Parimalasundar, "A novel dual-leg DC-DC converter for wide range DC-AC conversion," Automatika, vol. 63, no. 3, pp.572-579, 2022.
- 172. Karthick L, Rathinam R, Abdul Kalam Sd., Ganesh Babu Loganathan, Sabeenian R S, Joshi S K, Ramesh L, Mohammed Ali H, Wubishet Degife Mammo (2022) Influence of Nano-/Microfiller Addition on Mechanical and Morphological Performance of Kenaf/Glass Fibre-Reinforced Hybrid Composites. Journal of Nanomaterials, Article ID 9778224, 10 pages ,
- 173. M. I. Abdou, H. A. Shaban, M. I. El Gohary, "Changes in serum zinc, copper and ceruloplasmin levels of whole body gamma irradiated rats". Tenth Radiation Physics & Protection Conference, Cairo, Egypt; 27–30 November 2010. pp 17–26.
- 174. Parimalasundar Ezhilvannan and Suresh Krishnan, "An efficient asymmetric direct current (DC) source configured switched capacitor multi-level inverter," Journal Européen des Systèmes Automatisés, vol. 53, no. 6, pp.853-859, 2020.

268 Published by " CENTRAL ASIAN STUDIES" http://www.centralasianstudies.org

- 175. R. Barth and H. A. Shaban, "Spatially coherent diffusion of human RNA Pol II depends on transcriptional state rather than chromatin motion," Nucleus, vol. 13, no. 1, pp. 194–202, Dec. 2022.
- 176. R. Barth, G. Fourel, and H. A. Shaban, "Dynamics as a cause for the nanoscale organization of the genome," Nucleus, vol. 11, no. 1, pp. 83–98, Jan. 2020, doi: 10.1080/19491034.2020.1763093.
- 177. R. Barth, K. Bystricky, and H. A. Shaban, "Coupling chromatin structure and dynamics by live super-resolution imaging," Sci. Adv., vol. 6, no. 27, pp. eaaz2196, 2020, doi:10.1126/sciadv.aaz2196.
- 178. R. Regin, Steffi. R, Jerusha Angelene Christabel G, Shynu T, S. Suman Rajest (2022), "Internet of Things (IoT) System Using Interrelated Computing Devices in Billing System", Journal of Advanced Research in Dynamical and Control Systems, Vol.14, no.1, pp. 24-40.
- 179. R. Steffi, G. Jerusha Angelene Christabel, T. Shynu, S. Suman Rajest, R. Regin (2022), " A Method for the Administration of the Work Performed by Employees", Journal of Advanced Research in Dynamical and Control Systems, Vol.14, no.1, pp. 7-23.
- 180. Rajest, S. S. ., Regin, R. ., T, S. ., G, J. A. C. ., & R, S. . (2022). Production of Blockchains as Well as their Implementation. Vital Annex : International Journal of Novel Research in Advanced Sciences, 1(2), 21–44.
- 181. Rathinam, R, Singh D P, Dutta A., Rudresha S, Ali S R, Chatterjee P (2022) TiO2 Nanoparticles Based Peroxidase Mimics for Colorimetric Sensing of Cholesterol and Hydrogen Peroxide. Advances in Science and Technology, 117, 85-90.
- 182. Regin, D. R., Rajest, D. S. S., T, S., G, J. A. C., & R, S. (2022). An Automated Conversation System Using Natural Language Processing (NLP) Chatbot in Python. Central Asian Journal Of Medical And Natural Sciences, 3(4), 314-336.
- 183. S. S. Rajest, R. Regin, S. T, J. A. C. G, and S. R, "Improving Infrastructure and Transportation Systems Using Internet of Things Based Smart City", CAJOTAS, vol. 3, no. 9, pp. 125-141, Sep. 2022.
- 184. Singh A, Rathinam R, Yadav A K, Vasudevan R, Kulandhaisamy I, Purushotham M, Patil P Y. (2022) A Simple Approach of CQDs@MoS2 Nanosheets for Turn-On Fluorescence Sensor for Detection of Pb2+ Ions. Key Engineering Materials, 928, 33-38.
- 185. T, S., Rajest, S. S., Regin, R., Christabel G, J. A., & R, S. (2022). Automation And Control Of Industrial Operations Using Android Mobile Devices Based On The Internet Of Things. Central Asian Journal of Mathematical Theory and Computer Sciences, 3(9), 1-33.
- 186. Umadevi M, Rathinam R, Brindha T, Dheenadhayalan S, Pattabhi S (2022) Application of Electro- Chemical Oxidation for the Treatment of Reactive Red 195 using Graphite Electrode, Asian Journal of Biological and Life Sciences, 10(3), 620-625.

269 Published by " CENTRAL ASIAN STUDIES" http://www.centralasianstudies.org