



A Review Paper Based on Use of Artificial Neural Network in Pattern Recognition

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Abstract: The addition of artificial neural network ways proposition has been entering significant attention. In malice of nearly 50 times of disquisition and development in this field, the general problem of recognizing complex patterns with arbitrary exposure, position, and scale remains unsolved. New and arising operations, analogous as data mining, web searching, recovery of multimedia data, face recognition, and cursive handwriting recognition, bear robust and effective pattern recognition ways. The ideal of this review paper is to epitomize and compare some of the well-known styles used in various stages of a pattern recognition system using ANN and identify disquisition motifs and operations which are at the van of this provocative and challenging fie

Keywords: Pattern Recognition, correlation, Neural Network.

I. INTRODUCTION

preface Pattern recognition is the study of how machines can observe the terrain, learn to distinguish patterns of interest from their background, and make sound and reasonable opinions about the orders of the patterns. In malignancy of nearly 50 times of exploration, design of a general-purpose machine pattern recognizer remains a fugitive thing. The stylish pattern recognizers in utmost cases are humans, yet we don't understand how humans fete patterns. Ross (1) emphasizes the work of Nobel Laureate Herbert Simon whose central finding was that pattern recognition is critical in utmost mortal decision making tasks This is hopeful news to proponents of artificial intelligence, since computers can surely be tutored to fete patterns. Indeed, successful computer programs that help banks score credit aspirants, help croakers diagnose complaint and help aviators land aeroplanes depend in some way on pattern recognition. We need to pay much further unequivocal attention to tutoring pattern recognition Our thing then's to introduce pattern recognition using artificial neural network as the stylish possible way of exercising available detectors, processors, and sphere knowledge to make opinions automatically

II. PATTERN RECOGNITION

Pattern Recognition Automatic(machine) recognition, description, bracket, and grouping of patterns are important problems in a variety of engineering and scientific disciplines similar as biology, psychology, drug, marketing, computer vision, artificial intelligence, and remote seeing. A pattern could be a point image, a handwritten cursive word, a mortal face, or a speech signal. Given a pattern, its recognition/ bracket may correspond of one of the following two tasks 1) supervised bracket (e.g., discriminant analysis) in which the input pattern is linked as a member of a predefined class, 2) unsupervised bracket (e.g., clustering) in which the pattern is assigned to a heretofore unknown class The recognition problem ten's being posed as a bracket or categorization task, where the classes are either defined by the system developer (in supervised bracket) or are learned grounded on the similarity of patterns (in unsupervised bracket). These operations include data mining (relating a "pattern", e.g., correlation, or an outlier in millions of multidimensional patterns), document bracket (efficiently searching textbook documents), fiscal soothsaying, association and reclamation of multimedia databases, and biometrics. The fleetly growing and available computing power, while enabling briskly processing of huge data sets, has also eased the use of elaborate and different styles for data analysis and bracket the problem sphere dictates the choice of detector(s), pre-processing fashion, representation scheme, and the decision-making model. Learning from a set of exemplifications (training set) is an important and asked trait of utmost pattern recognition systems. The four stylish given approaches for pattern recognition are 1) template matching, 2) statistical bracket, 3) syntactic or structural matching, and 4) neural networks.



III. ARTIFICIAL NEURAL NETWORK

The main characteristics of neural networks are that they've the capability to learn complex nonlinear input- affair connections, use successional training procedures, and acclimatize themselves to the data. The most generally used family of neural networks for pattern bracket tasks (2) is the feed-forward network, which includes multilayer perceptron and Radial- Base Function (RBF) networks. Another popular network is the Self- Organizing Map (SOM), or Korhonen-Network (3), which is substantially used for data clustering and point mapping. The literacy process involves streamlining network armature and connection weights so that a network can efficiently perform a specific bracket/ clustering task. The adding fashion ability of neural network models to break pattern recognition problems has been primarily due to their putatively low dependence on sphere-specific knowledge and due to the International Journal of Software Engineering and I International Journal of Software Engineering and Its operations to operations 4, No. 2, April2010 vacuity of effective literacy algorithms for interpreters to use. Artificial neural networks (ANNs) give a new suite of nonlinear algorithms for point birth (using retired layers) and bracket (e.g., multilayer perceptron's). In addition, being point birth and bracket algorithms can also be counterplotted on neural network infrastructures for effective tackle) perpetration. An ANN is an information processing paradigm that's inspired by the way natural nervous systems, similar as the brain, process information. The crucial element of this paradigm is the new structure of the information processing system. It's composed of a large number of largely connected processing rudiments(neurons) working in accord to break specific problems. Learning in natural systems involves adaptations to the synaptic connections that live between the neurons.

IV. WORK DONE

Interactive Voice Response (IVR) with pattern recognition based on Neural Networks was proposed by Syed Ayaz Ali Shah, Azzam up Assar and S.F. Shaukat [4] for the first time in 2009. In this case, after entering the correct password the user is asked to input his voice sample which is used to verify his identity. The addition of voice pattern recognition in the authentication process can potentially further enhance the security level. The developed system is fully compliant with landline phone system. The results are promising based on false accept and false reject criteria offering quick response time. It can potentially play an effective role in the existing authentication techniques used for identity verification to access secured services through telephone or similar media.

Over also speaker specific features are pulled using Mel frequency Cepstral Coefficient (MFCC) while Multi-Layer Perceptron (MLP) is used for point matching. Our model is rested on 8 kHz, 8-bit format using palpitation law Modulation (PCM). At topmost position, all speaker recognition systems contain two modules point birth and point Matching. also, they operate in two modes Training and Recognition/ Testing modes. Both training and recognition modes include point birth and point Matching. This is also called registration mode in which speakers are enrolled in the database in this mode, useful features from speech signal are pulled and model is trained. The ideal of the model is generality of the speaker's voice beyond the training material so that any unknown speech signal can be classified as intended speaker or pretended in this mode features are pulled from the speech signal of the unknown speaker using the same fashion as in the training mode. And also, the speaker model from the database is used to calculate the similarity score. eventually decision is made rested on the similarity score. Two types of crimes do in speaker verification system- False Reject (FR) and False Accept (FA). When a true speaker is rejected by the speaker recognition system, it's called. also, FA occurs when pretender Neural networks learn complex mappings between inputs and labours and are particularly useful when the underpinning statistics of the considered tasks aren't well understood.

Neural Networks being fairly new approach is delved in this proposed result. In this fashion, a feed forward back propagation network is used for bracket of speakers. The network is trained with the training sets uprooted from the input speech by using MFCC fashion of point birth. The model developed is a textbook-independent speaker verification system which can identify only a specific speaker grounded on his voice and rejects the claim of any other speaker Multilayer Perceptron (MLP) having four layers comprising of one input subcaste, two retired layers and one affair subcaste has been used. The input subcaste has nineteen (19) neurons (as there are nineteen-point vectors from MFCC processor) and uses direct transfer function. The affair subcaste has one neuron (as double decision is to be made) and uses direct transfer function. It's trained using back propagation algorithm. The network is trained by using an erected in train function. This function trains the network on training data (Supervised literacy).

In testing phase, 10 forbearance is present for the intended speaker i.e., if the affair of the network is 10 lower or lesser than 10, still the speaker is honoured as the intended speaker else rejected. pretender speech. The pretender speech data was collected from 13 persons(joker). Out of 50 samples of the intended speaker 41 was honoured. So false reject is only 18. also, for pretender data out of 125 trials only 17 were falsely accepted. therefore, false accept is about 14. Presently, there are substantially two kinds of stock price pattern recognition algorithms the algorithm grounded on rule- matching



and the algorithm grounded on template- matching. still, both of the two algorithms largely bear the participation of sphere experts, as well as their lacks of the literacy capability. To break these problems, Xinyi Guo, Xan Liang & Xiang Li (5) proposed a stock price pattern recognition approach grounded upon the artificial neural network. The trial shows that the neural network can effectively learn the characteristics of the patterns, and directly fete the patterns. As an approach for stock investment, specialized analysis has been extensively scanned by exploration communities, and the specialized pattern analysis is regarded as one of the most important specialized analysis approaches.

In the long- term stock analysis experience, stock judges epitomized numerous specialized patterns salutary for the investment decision- timber, which can be classified into two orders the durability pattern and the reversal pattern. durability pattern indicates that the stock price is going to keep its current movement trend; while the reversal pattern indicates that the stock price will move to the contrary trend. In this paper, 18 typical specialized patterns are chosen as the exploration target, including 10 durability patterns and 8 reversal patterns. The specialized pattern recognition algorithm can substantially be classified into two orders, one is the rule- grounded algorithm, and the other is template grounded algorithm. In this work, an approach counting on neural network has been proposed, whereas the most conspicuous difference lies in that the inputs of the network do not cover every time point in the series. On the negative, a segmentation process is espoused in this work to first transfigure the original time series into a sequence of trend parts and corresponding features, with each of the features calculated in terms of the price at the last time point within the member. ultimately, this sequence of features, rather of the whole time series, is designated as part of the inputs of the network, which not only reduce the computation expenditure but also enable the revision of time granularity for stock patterns by conforming the length of the parts. Then, 18 kinds of typical specialized patterns have been examined

A three- subcaste feed forward neural network is generally composed of one input subcaste, one affair subcaste and one hidden layer. In the input subcaste, each neuron corresponds to a point; while in the affair subcaste, each neuron corresponds to a predefined pattern. The stylish situation is that formerly a certain sample is input into the network, the affair will be a vector with all rudiments as zero only except the one corresponding to the pattern that the sample belongs to. International Journal of Software Engineering and I International Journal of Software Engineering and Its operations to operations 4, No. 2, April2010 nevertheless, due to the actuality of bracket crimes and the fact that some testing samples do not belong to any of the 18 predefined patterns; some samples can't get exactly the anticipated affair. 2029 samples out of 508 stocks from Stock Exchange were taken, which include 593 durability patterns and 1436 reversal patterns, as training samples. At the meantime, 4937 samples as the testing samples out of 155 stocks were uprooted from another Stock Exchange within the same time- interval. There are 54 durability patterns, 270 reversal patterns and 4613 belong to neither of the two. In order to ameliorate the perfection of electric power system short term cargo soothsaying, a new cargo soothsaying model was put forward in 2007 by Wenjing Dai, clunk Wang (6). This paper presents a short- term cargo soothsaying system using pattern recognition which obtains input sets belong tumult-layered fed-forward neural network, and artificial neural network in which BP literacy algorithm is used to train samples. cargo soothsaying has come one of the major areas of exploration in electrical engineering in recent times. The artificial neural network used in short- time cargo soothsaying can grasp interior rule in factors and complete complex exact mapping. thus, it's worldwide applied effectively for power system short- term cargo soothsaying. Short- term cargo soothsaying has been useful in safe and provident planning operation of an electrical power system. It has been also used in launch-up and shut-down schedules of generating units, overhaul planning and cargo operation.

One of the characteristics of electric power is that its ca not be squirreled , that is, the power energy is generated, transmitted, distributed and consumed at the same time. In normal working condition, system generating capacity should meet cargo demand anytime. still, essential measure should be taken similar If the system generating capacity isn't enough as adding generating units or importing some power from the neighboring network. On the other hand, if the system generating capacity is of fat, essential measure should be taken too, similar as shutting- down some generating units, or outputting some power to bordering network. Cargo variation trend and point soothsaying are essential for power dispatch, layout and design department of power system. Artificial Neural Network and Expert System styles belong to quantitative soothsaying styles. In this approach, the ANN traces former cargo patterns and predicts a cargo pattern using recent cargo data. It also can use rainfall information for modelling. The ANN is suitable to perform on-linear modelling and adaption. It doesn't need supposition of any functional relationship between cargo and rainfall variables in advance.

The capability to outperform existential qualitative soothsaying styles especially during fleetly changing rainfall conditions and the short time needed to their development, have made ANN grounded cargo soothsaying models veritably seductive for on line perpetration in energy control canthers. thus, it's worldwide applied effectively for the power system short- term cargo soothsaying. The Back propagation algorithm has been used in the trial. The proposed system doesn't bear heavy computational time and that the patterns considered for training the ANNs also have an impact on soothsaying delicacy. They estimated the performance of the system by applying two photometric normalization ways histogram



equalization and homomorphic filtering, and comparing with Euclidean Distance, and homogenized Correlation classifiers. Over also the face recognition system consists of face verification, and face recognition tasks. In verification task, the system knows a priori International Journal of Software Engineering and Its operations to operations 4, No. 2, April 2010 the identity of the stoner, and has to corroborate this identity, that is, the system has to decide whether the a priori stoner is a fraud or not. In face recognition, the a priori identity is not known the system has to decide which of the images stored in a database resembles the most to the image to fete. The primary thing of this work was to present the performance evaluation carried out using artificial neural network for face verification and recognition. It composed of several modules which are Image Acquisition, Face Discovery, Training, Recognition and Verification.

In registration phase the image is acquired using a web camera and stored in a database. The features of the face image are uprooted using several point birth ways. The features data is also stored together with the stoner identity in a database. In recognition/ verification phase a stoner's face biometric data is formerly again acquired and the system uses this to either identify who the stoner is, or corroborate the claimed identity of the stoner. While identification involves comparing the acquired biometric information against templates corresponding to all druggies in the database, verification involves comparison with only those templates corresponding to claimed identity. therefore, identification and verification are two distinct problems having their own essential complications. The recognition/ verification phase comprises of several modules which are image accession, face discovery, and face recognition/ verification. In image accession/ face discovery module face discovery is used to descry face and to prize the material information related to facial features. In this module, the background or the scenes unconnected to face will be excluded. The system can descry a face in real- time. The face discovery system is also robust against illumination friction and works well with different skin colour and occlusions similar as beards, moustache and with head cover.

The face recognition module comprised of pre-processing, point birth, and bracket sub-modules. The input to the face recognition/ verification module is the face image, which is deduced from two sources from the camera and from the database. From these sources, each image is pre-processed to get the geometric and photometric regularized form of the face image. During point birth, the regularized image is represented as point vectors. The result of the bracket for the recognition purpose is determined by matching the customer indicator with the customer identity in the database. Result of the trial presented a face recognition system using artificial neural networks in the terrain of face verification and face recognition using photometric normalization for comparison. The type ways used also was Artificial Neural Network (NN), Euclidean Distance (ED) and formalized Correlation (NC). The experimental results shorthorn. is superior to the Euclidean distance and formalized correlation decision rules using both PCA and LDA for overall performance for verification. still, for reconditioned. classifier gives the topmost delicacy using the original face image.

Four types of ECG patterns were chosen from the MIT- BIH database to be recognized, including normal sinus cadence(N), premature ventricular contraction (PVC), and atrial premature beat(A) and left pack branch block beat(L). ECG morphology and R- R interval features International Journal of Software Engineering and I International Journal of Software Engineering and Its operations to operations 4, No. 2, April 2010 were performed as the characteristic representation of the original ECG signals to be fed into the neural network models. The SOM network displayed the swish performance and reached an overall delicacy of, and the BP and LVQ network reached 92.5 and 91.5. A typical ECG waveform contains P swell, QRS complex and T swell in each heartbeat. The features being constantly used for ECG analysis in time sphere include the swell shape, breadth, duration, areas, and R- R intervals. ECG signals are defiled by background noises, similar as electrode stir artifact and electromyogram- convinced noise, which also add to the difficulty of automatic ECG pattern recognition. Compared with the traditional clustering styles, the artificial neural network models have good adaptive capability to environmental changes and new patterns, and the recognition speed of neural network is presto, owing to its resemblant processing capability. thus, artificial neural network models for ECG pattern recognition have been used then.

The performance of artificial neural network to fete ECG patterns may be lowered by noise corrupted ECG signals. Indeed, though the neural network has some degree of fault forbearance, it's desirable that clean ECG signals are handed. Three different neural network models, which are SOM, BP and LVQ networks, were employed to fete the ECG patterns. The ECG records of 4 different types of patterns were attained from 11 cases. 200 ECG parts were chosen for each of the pattern, which produces a dataset with a total number of 800 ECG records, each containing a QRS complex. The four types of patterns are independently designated as N, A, L and V. The training strategy of the neural network was as follows, the whole dataset was divided into four groups of equal size with equal number of the 4 patterns in each group, and every neural network model is tested by a different data group, while the other three is used for training. The performance of the neural networks was estimated by the recognition perceptivity, the overall recognition delicacy and the neurons number demanded. The overall delicacy is defined as the rate of the total number of beats honoured rightly to the total number of beats in the test phase. It's observed that the performance of the SOM network is fairly better than



BP network; while the SOM network needs a longer time for training. The error of BP network was defined as the mean difference of the ideal affair and the real affair which was 0.0459 in the training phase and 0.1041 in the testing phase.

While the error of SOM network and LVQ network wasn't considered. predicated on assaying several of factors affecting rain attenuation, a rain attenuation model with artificial neural network was founded after training and vindicating multitudinous different neural network topologies. The work in this paper shows that it's a new and effective way to prognosticate rain attenuation with artificial neural network. To predict rain attenuation from given rain rate is therefore essential for design trust ability and validity of communication system. The vaticination of rain attenuation is a veritably complex and delicate task. Generally, the vaticination models can be either theoretical (also called deterministic), or empirical (also called statistic), or a combination of these two. The deterministic models are grounded on the principles of drugs and thus, can be applied in different conditions without affecting the delicacy but their perpetration generally requires a great database of radio meteorology characteristics similar as atmospheric pressure, atmospheric temperature and so on, which is nearly insolvable to gain. Due to that the perpetration of the deterministic models is generally confined to the special area where radio meteorology data can be available. In the empirical models, nearly all influences are taken into account anyhow of whether or not they can be independently honoured. This is the main advantage of these models. still, the delicacy of these models depends on the delicacy of the measures, parallels between the conditions where the rain attenuation is anatomized, the conditions where the measures are carried out. Proper factors affecting rain attenuation are considered as inputs of neural network and enough data used for neural network are named. After training and vindicating multitudinous different neural network topologies, a usable rain attenuation model is ultimately founded. Under the consideration of the factors affecting rain attenuation, 8 inputs have been named.

The alternate group of inputs contains latitude (in degree), longitude (in degree), altitude (in km) and height (in km) of the earth station, which are intended for taking into account the terrain goods on the attenuation due to rain. The last group of inputs is downfall rate (in mm/ hour) which is the main meteorological factor affecting rain attenuation. When defining the prophecy error as the difference between the measured and the predicted attenuation value at the same condition, the prophecy error distribution of the ANN model and a conventional model (analogous as CCIR model) has been reckoned. The ANN model attained mean prophecy error 1.39 dB, RMS error 2.01 dB and maximum prophecy error 4.7 dB over the range of the evidence set, more accurate than mean prophecy 1.98 dB, RMS error and maximum prophecy error 7.4 dB of CIRR model.

It's easy to see that the ANN model showed satisfactory, indeed truly good delicacy with nearly 0.6 dB adding in average. That was a simple pattern recognition system using artificial neural network to pretend character recognition. The reverse-propagation system was used for learning in neural network. The range of operations includes postal law recognition, automatic data entry into large superintendent systems, banking, automatic cartography and reading bias for visionless. also, the image processing time was significantly reduced while maintaining effectiveness and versatility at the same time. The pivotal factors involved in the performance are an optimal selection of features which categorically defines the details of the characters, the number of features and a low image processing time. The corrosion and dilation operations make the object lower and larger independently. corrosion makes an object lower by removing or eroding down the pixel on its edges. The image corrosion ways have been used for rooting each character from a word.

The pattern editor is veritably useful in creating the training data lines. The advantage is to train the network with stoner defined character sets, numbers and indeed with other languages. Once the network is trained it would produce an associated weight of the particular training train. The trial had shown the recognition rate as 70 for noisy data to over to 99. The main dereliction of this work was that the trial failed for multiple fountain and size characters and hand written character recognition. Young- Sang Han, Seung- Ski Min, Won- Ho Choi and Kyu- Bock Cho(1992)(11) enforced ANN for fault discovery of induction motor(IM). It was a literacy pattern recognition system which barrels prognose and judgments faults as well as growing conditions of the IM. For the opinion, this system uses frequency diapason analysis system grounded on vibration conditions of the rotating machine.

In ANN, inputs are several vibration frequentness. labors of artificial neural networks give the information on the fault condition of motor. The PDP model, vide licet multi-layer perceptron model with an error back propagation literacy algorithm is used for this individual system. As the induction motor(IM) has graces similar as easy conservation, robustness and low cost, IM is the most extensively used motor in assiduity operations. For the reason, it becomes veritably important to diagnose operating conditions, and to descry the faults of the machine for the enhancement of its security and the trustability of the whole system. Although a motor is precisely constructed, it has essential possibilities of faults which affect from stress involved in energy conversion. Hence, it becomes veritably important to diagnose(nascent) faults and to protract the life assessment of the IM for the trustability of the system. Conventional inquiries have been only concentrated on estimating machine parameters that can indicate the conditions of the machine.



In those approaches, one fatal debit is that its accurate dynamics should be known. An ANN grounded nascent fault sensor has two corridors of artificial neural networks.

One part is a disturbance and noise sludge. The other part is a high order nascent fault sensor. It detects faults of turn-to-turn insulation and bearing wear only. Vibration frequency by faults of major faults of the IM are unstable rotor, air gap variation, and unstable glamorous magnet force of niche, disfigurement of ball, inner and external race of bearing. also, a fault passed in the motor, the symptom of the fault is directly shown through vibration. thus, it's veritably reasonable to dissect problems by means of vibration. therefore, the frequency diapason of vibration is employed as inputs and the labours correspond to the information on the disfigurement of IM. For pattern recognition, amulet-layer perceptron model was chosen. It optimizes connection weights by means of error back propagation literacy system; the aft propagation algorithm uses an objective function, which is defined as the totality of square crimes between the asked labours and the network labours. It also employs a steepest- descent hunt algorithm to find the minimum of tie ideal function. However, the capability of If a motor is inoperation.an expert system for these kinds of problems is typically limited because the stoner must be a professed person to reach similar decision making in individual system.

On the other International Journal of Software Engineering and Its operations to operations 4, No. 2, April 2010 hand, the proposed system can be fluently employed by anon-expert. Discovery system of this paper will be applicable for condition monitoring individual problem concerning optimal maintainability and vacuity of being machine, or assurance of product quality control of motors. For pattern recognition, a multi-layer perceptron model was chosen. It optimizes connection weights by means of error back propagation literacy system; the aft propagation algorithm uses an objective function, which is defined as the totality of square crimes between the asked labours and the network labours. It also employs a steepest- descent hunt algorithm to find the minimum of tie ideal function. However, the capability of If a motor is inoperation.an expert system for these kinds of problems is typically limited because the stoner must be a professed person to reach similar decision making in individual system. On the other International Journal of Software Engineering and Its operations to operations 4, No. 2, April 2010 hand, the proposed system can be fluently employed by anon-expert. Discovery system of this paper will be applicable for condition monitoring individual problem concerning optimal maintainability and vacuity of being machine, or assurance of product quality control of motors.

V. CONCLUSION

While probing the workshop chronologically we've noticed that however there are some graces and faults of each individual work the operation of ANN in each pattern recognition case always performed more affect than that of without enforcing ANN. The delicacy position of soothsaying on the base of present data set(experience) was always better.

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