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A FUZZY APPROACH TO PATTERN RECOGNITION: A REVIEW

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I. INTRODUCTION

People have developed very sophisticated skills to perceive their environment and take actions they have noticed, such as facial recognition, understanding spoken language, reading handwriting, and distinguishing between fresh food and aroma. [1] This ability is called "human perception": we want to give the machine similar capabilities. In the 1960s, pattern recognition in the field of research developed significantly. Is a highly interdisciplinary discipline, including statistics, engineering, artificial intelligence, computer science, psychology, physiology and other aspects of development. People have natural wisdom and can identify patterns. [3] Style is a vaguely defined entity that can give a name, such as fingerprint image, handwritten text, face, speech signal, DNA sequence. [1] Most children can recognize numbers and letters at the age of five, while young people can easily recognize lowercase letters, large letters, handwriting, and automatic printing. Characters can be written on crowded backgrounds or on curled paper or even partially closed. Pattern recognition is to study how the device monitors the environment, learn how to distinguish the patterns and backgrounds of interest, and make reasonable and reasonable decisions about the pattern categories. [5] However, despite nearly 50 years of research, the design of a universal machine tool kit remains an elusive goal. The best model to identify in most cases is humans, but we do not understand how humans perceive patterns. You can use a more convenient model and your decision will be better. This is understandable news for AI supporters. In this case, the computer can certainly be taught to identify patterns. In fact, successful computer programs can help banks register applicants' credits, help doctors diagnose diseases and help pilots. Pattern recognition technology is used to automatically classify physical objects (binary or three-dimensional) or abstract images (points in dimension d) into known or unknown categories. There are many business identification systems for character recognition, handwriting recognition, document classification, fingerprint recognition, speech recognition and amplification, white cell classification, and military target recognition. Most automated vision systems use pattern recognition techniques to identify objects for classification, inspection, and assembly. The design of the pattern recognition system requires the following modules: sensors, feature extraction, selection, decision making and system performance evaluation. The availability of low-cost and high-resolution sensors (such as CCD cameras, microphones, and scanners) and on-line data sharing have led to a large number of storage libraries for digital documents (text, voice, images, and video). The need to efficiently archive and retrieve these data has led to the development of pattern recognition algorithms in new application areas such as text, images, video, bioinformatics, and facial recognition.
Key Area: Fuzzy Logic, Patter Recognition, Neural Network & machine learning approach.

II. LITERATURE SURVEY

Rui-Ping Li, Masao Mukaidono and I. Burhan Turksen studied on A Fuzzy Neural Network for Pattern Classification and Feature Selection. In their study they said that the recognition of patterns is the basis of all science. The aim is to discover a structure in a system that is partial subsystems. Generally, something is structured in the context of a partial subsystem. Techniques of pattern recognition can be described as deterministic, statistical, or fuzzy in terms of their autonomous bases.

Yann LeCun, et al., studied on learning algorithms for classification (a comparison on handwritten digit recognition) and they gave their views. They stated that Great strides have been achieved in pattern recognition in recent years. Particularly striking results have been attained in the area of handwritten digit recognition.
Jianxiong Luo and Susan M. Bridges studied on Mining Fuzzy Association Rules and Fuzzy Frequency Episodes For Intrusion Detection in August 2000 and they concluded that the Intrusion detection is an important but complex task for a computer system. Data mining methods are capable of extracting patterns automatically and adaptively from a large amount of data. Association rules and frequency episodes have been used to mine training data to established normal patterns for anomaly detection.
Michael S. Lew et. al studied on Content-Based Multimedia Information Retrieval: State of the Art and Challenges in February 2006 and stated that Multimedia information retrieval (MIR) is about the search for knowledge in all its forms, everywhere. Indeed, what good is all the knowledge in the world if it is not possible to and anything? This sentiment is mirrored as an ACM SIGMM grand “make capturing, storing, finding, and using digital media an everyday occurrence in our computing environment.” This article is meant for researchers in the area of content-based retrieval of multimedia. Currently, the fundamental problem has been how to enable or improve multimedia retrieval using content based methods. Content based methods are necessary when text annotations are nonexistent or incomplete. Furthermore, content-based methods can potentially improve retrieval accuracy even when text annotations are present by giving additional insight into the media collections.
Shang-Hung Lin, Sun-Yuan Kung and Long-Ji Lin studied on Face Recognition/Detection by Probabilistic Decision-Based Neural Network in January 1997 and stated that the

technological advance on microelectronic and vision system, the high performance automatic techniques on biometric recognition are now becoming economically feasible. Among all the biometric identification methods, face recognition has attracted much attention in recent years because it has potential to be most nonintrusive and user-friendly. The PDBNN face recognition system consists of three modules: First, a face detector finds the location of a human face in an image. Then an eye localizer determines the positions of both eyes in order to generate meaningful feature vectors. The facial region proposed contains eyebrows, eyes, and nose, but excluding mouth. (Eye-glasses will be allowed.) Lastly, the third module is a face recognizer. The PDBNN can be effectively applied to all the three modules.

Zhexue Huang and Michael K. Ng studied on a Fuzzy k-Modes Algorithm for Clustering Categorical Data in August 1999 and described extensions to the fuzzy k-means algorithm for clustering categorical data. By using a simple matching dissimilarity measure for categorical objects and modes instead of means for clusters, a new approach is developed, which allows the use of the k-means paradigm to efficiently cluster large categorical data sets. A fuzzy k-modes algorithm is presented and the effectiveness of the algorithm is demonstrated with experimental results.

Shang-Hung Lin, Sun-Yuan Kung and Long-Ji Lin studied on Face Recognition/Detection by Probabilistic Decision-Based Neural Network in January 1997 and stated that in recent years, there has been an explosion of interest in mining time series databases. As with most computer science problems, representation of the data is the key to efficient and effective solutions. One of the most commonly used representations is piecewise linear approximation. This representation has been used by various researchers to support clustering, classification, indexing and association rule mining of time series data. A variety of algorithms have been proposed to obtain this representation, with several algorithms having been independently rediscovered several times. In this paper, they undertake the first extensive review and empirical comparison of all proposed techniques. They show that all these algorithms have fatal flaws from a data mining perspective. They introduce a novel algorithm that They empirically show to be superior to all others in the literature.

P. Nassery (Ph.D. Student) and K. Faez (Associate Prof.) studied on Signature Pattern Recognition Using Pseudo Zernike Moments And A Fuzzy Logic Classifier in the year of 1996 and introduced a new method, taking advantage of an image moment transformation combined with fuzzy logic approach. For this purpose first we tried to model the noise embedded in signature patterns inherently and separate that from environmental effects. On the basis of the first step results, They have extracted the most optimum mapping to unit circle using LMS criteria. Then they derived some orientation invariant moments introduced in former reports and studied their own statistical properties in our special input space, using a new defined criterion. Afterwards they defined error matrix for signature patterns and studied its behavior and concluded that a fuzzy classifier seems to be the best choice for our application. Then they defined a fuzzy complex space and also a fuzzy complex similarity measure in this space, and constructed a training algorithm to learn the fuzzy classifier.

III. GOAL OF PATTERN RECOGNITION

1) Hypothesize the models that describe the two populations.
2) Process the sensed data to eliminate noise.
3) Given a sensed pattern, choose the model that best represents it.

IV. VARIOUS AREAS OF PATTERN RECOGNITION

a) Template matching: - The pattern to be recognized is matched against a stored template while taking Into account all allowable pose (translation and rotation) and scale changes.

b) Statistical pattern recognition: - Focuses on the statistical properties of the patterns (i.e., probability Densities)

c) Artificial Neural Networks: - Inspired by biological neural network models.

d) Syntactic pattern recognition: - Decisions consist of logical rules or grammars [13] generally; Pattern Recognition Systems follow the phases stated below.

- Data acquisition and sensing: Measurements of physical variables, Important issues: bandwidth, resolution, sensitivity, distortion, SNR, latency, etc.
- Pre-processing: Removal of noise in data, Isolation of patterns of interest from the background.
- Feature extraction: Finding a new representation in terms of features.
- Model learning and estimation: Learning a mapping between features and pattern groups and categories.
- Classification: Using features and learned models to assign a pattern to a category.
- Post-processing: Evaluation of confidence in decisions, Exploitation of context to improve performance, Combination of experts.

V. DESIGN OF A PATTERN RECOGNITION SYSTEM

In 1965 Zadeh introduced mysterious groups as a new way of expressing ambiguity in everyday life. This theory provides an approximate and effective way to describe the characteristics of a highly complex or undefined system to define an accurate mathematical analysis. The vague approach is based on the assumption that the basic elements of human thinking are not only numbers, but can be rounded up to a group of crickets. In other words, the transition from organic to inorganic is gradual rather than sudden. Most of the logic behind human logic is not a valuable or even multidimensional logical logic, but the logic of ambiguous facts, confusing connections, and mysterious rules of reasoning. This fuzzy logic plays a key role in all aspects of human thinking. Fuzzy population theory is the oldest and most important report of software computing components (or arithmetic intelligence) at present, involving the design of a flexible information processing system.

These provide soft decision by taking into account characteristics like tractability, robustness, low cost, etc., and have close resemblance to human decision making. The significance of fuzzy set theory in the realm of pattern

recognition. Is adequately justified in

- Representing linguistically phrased input features for processing.
- Providing an estimate (representation) of missing information in terms of membership values.
- Representing multiclass membership of ambiguous patterns and in generating rules and inferences in linguistic form.

Extract undetermined photo areas, priorities and attributes, and describe the relationship between them as confusing subgroups. It can be seen that the concept of the mystery group can be used in the level of features in the input data can use a representation of the values represented as a group of members to possess certain properties; in the input language of the functions that make the functions represent them to handle them; The weakening of the promise to extract non-specific, characteristic and image areas between the priorities and relationships between them; and the classification level, used to represent the membership of the object category, and to provide an estimate of information lost based on the membership value (Or indicate). In other words, the theory of unidentified groups provides an inclusive concept. We have found that by observing a better solution at the beginning of a large area of fragile problems, it has different limits (usually below), which allows the algorithm more freedom in order to avoid being entrusted with a solid answer belt in the middle stage. The use of language features can be thought of as a form of data compression that can be referred to as granular. Information particles are groups of entities grouped by their similarity, proximity, functional or spatial proximity. Conventional quantification can also achieve similar results. However, in the case of quantization, these values are intervals, and in the case of graining, these values are entangled with ambiguous sets. The advantages of granulation over quantization are that:

• It is more general.

•It mimics the way in which humans interpret linguistic values.

•The transition from one linguistic value to a contiguous linguistic value is gradual rather than abrupt, resulting in continuity and robustness. In this position paper we mention the role of fuzzy sets in traditional pattern recognition and image processing, followed by its hybridization with other soft computing tools. We conclude by highlighting its recent developments in mining large datasets, along with possible future applications.

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