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BANNED ITEMS RECOGNITION BY OWA OPERATOR

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Abstract - ***International security specially airport security pose serious concern and have to be addressed on priority bases, Security has become one of the foremost issues of apprehension that needs to be thoroughly addressed by every nation, in particular the developed nations, which are playing an active role in counter terrorism.***

The planned system uses appropriate preprocessed X-ray images of passenger's luggage and design to detect the prohibited items like Pistol, Knife, Explosive resources , scissors, and handguns of different size and orientation etc The X-ray imaging is an important technology in many fields, from non-intrusive inspection of delicate objects, to weapons detection at security checkpoints.

In this work we will detect the object by ordered weighted averaging method(OWA) OWA operator provides a parameterized family of aggregation operators, include well-known operators such as maximum, minimum, arithmetic mean, k-order statistics and median. Sometimes, exact "and-ness" is necessary for multi-criteria decision making, which offers minimum value and sometimes exact "or-ness" which offers maximum value. The OWA aggregation operator lies between the two extremes of and-ness and or-ness. Two extremes are restricted to mutually exclusive probabilities for multiplication (like AND gate) and summation (like OR gate). OWA operator is used to estimate the degree of similarity of knives, scissor and handguns.

Key Words: Ordered Weighted Averaging, Security, and Prohibited Items like Pistol, Knife, and Handguns.

1. INTRODUCTION PROBABILITY STUDY

Better security in the aftermath of the 9/11 attack in the United States of America has lead to added congestion in airport terminals, delays, hassle, more limitations on carry-on luggage, a sense of anxiety, and sometimes a breach of retreat amongst the public. All these simply add cost to air-travel and thus have an impact on socio financial factors. It has almost become an acceptable norm that hundreds of flights have been recalled to terminals after being air-born, abundant occasions of emigration, passengers rechecked, or even asked to take your clothes off.

The X-ray imaging is an important technology in many areas, from non-intrusive inspection of delicate objects, to weapons detection at security checkpoints.

1.1 NEED FOR FUZZY LOGIC IN OBJECT DETECTION SYSTEM

With the above scenario, the entire world must be looking forward for a fuzzy object detection system, which responds to perception based query in natural language in an efficient style. However, some of the vital task that needs to be followed prior to object detection is as follows:

i. Estimation of fuzzy validity of hand drawn fuzzy shapes.
ii. Estimation of fuzzy similarity among such family of fuzzy shapes.

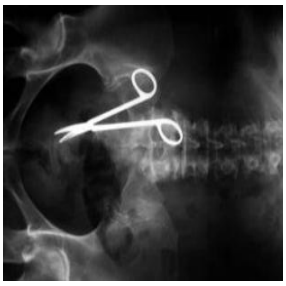
1.2 OBJECT DETECTION TECHNIQUES

In the recent past, the world faces the most hazardous crimes in general. Particularly, the terrorism has panicked people since a decade. The detection of threat objects using X-ray luggage scan images has become an important means of security. Most Computer Aided Screening (CAS) is still base on the manual detection of potential threat objects by human expert's where chances of human error is quite high as thousands of bags need to be scanned every day.

1.3 PICTURE SEGMENTATION

Image segmentation attempts to separate an image into its object classes. Clustering methods, edge based methods, histogram-based methods, and region growing methods offer different advantages and disadvantages. The use of a Gaussian mixture expectation maximization (EM) method has been investigated to realize segmentation specifically for x-ray luggage scans.

Figure 1. Shows an input x-ray image and examples of objects found by segmentation.



Original image

Segmentation Image

2. Fuzzy Logic

In this section, the situations and the desperate need of Fuzzy Logic, where objects for computation are perception based linguistic information, instead of crisp measurements described in terms of numbers. Mostly, the problems of resolving such perceptions in linguistics are brought forward by Zadeh for a long time. In the beginning the attitude of implementing linguistics is initiated in his serial papers.[1]

The fuzzy rule-based classification system generates too many rules for high dimension problems. It is often said that the numeral of fuzzy if-then rules exponentially increases as the number of features increases. [2]For this purpose, only a small number of features are selected for constructing a fuzzy classifier, which decreases its accuracy. To solve this problem, we present a multi-level fuzzy classifier consists of several small fuzzy classifiers with a small number of features, which not only improve the performance of fuzzy classifier but also solve the problem of high dimension.

2.1 RELATIONSHIP FUNCTIONS

The person brain interprets the incomplete and partial information provided by the sensory organs. The fuzzy logic provides a systematic way for estimating this perception or natural language based information. The fuzzy logic used some arithmetical calculation on the basis of linguistic qualifier used in the partial information. The fuzzy inference system (if – then rules) or membership functions are used convert the inaccurate in order into a precise information.

A fuzzy if-then rule assumes the form

If x is A then y is B,

Where A and B are linguistic values defined by fuzzy sets on universes of discourse X and Y, respectively. “x is A” is called antecedent and “y is B” is called conclusion. For example

If pressure is high, then volume is small. In fuzzy logic membership function is used to map imprecise vague information into a precise or crisp value. The membership is the degree of bbelongingness of a particular value to particular attributes. For instance if the temperature of water is 20^{o} then its membership value is closer to the degree of coldness than the degree of hotness of water.

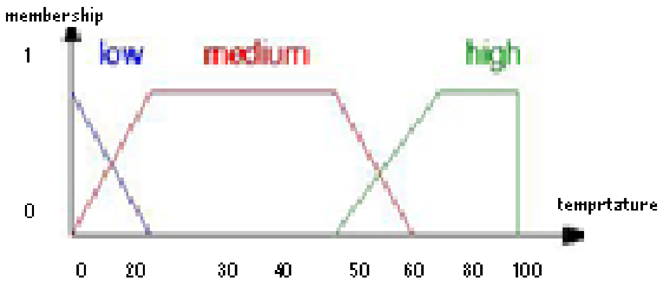


Fig 2. Membership function for estimating of degree of belongingness of water with temperature.

3. ORDERED WEIGHTED AVERAGING METHODS (OWA)

Ordered Weighted Averaging (OWA) is the central concept of information aggregation, was originally introduced by Yager.[3] OWA facilitates the means of aggregation in solving problems that arises in multi criterion decision making. Furthermore, OWA operator provides a parameterized family of aggregation operators, including well-known operators such as *maximum, minimum, arithmetic mean, k-order statistics* and *median*. Sometimes, exact “*and-ness*” is required for multi-criteria decision making, which offers minimum value and sometimes exact “*or-ness*” which offers maximum value.

The OWA aggregation operator lies between the two extremes of *and-ness* and *or-ness*. Two extremes are restricted to equally exclusive probabilities for multiplication (like AND gate) and summation (like OR gate). Subsequent part discloses a brief account of OWA operators, a detailed conversation about the behavior of operators. The OWA operation involves three following steps - 1) Reordering of inputs, 2) Weight determination related with OWA operators, and 3) Aggregation process.

3.1 DESCRIPTION OF OWA

Mapping the OWA operator R from $R^m \rightarrow R$, (where R = [0, 1]), with dimension *m*, has weighting vector $w = (w_1, w_2, w_3, \dots w_m)^T$, where $w_j \in [0, 1]$ and $\sum w_j = 1$, the summation of individual weights will always found to be one. Thus, for the multi-criteria of size *m*, the input parameter $(x_1, x_2, x_3 \dots\dots x_m)$, the OWA determines the f-validity in f-geometric shapes as follows:

$$\mathrm{OWA}\ (x_1, x_2, x_3 \dots\dots x_m) = \sum_{j=1}^{m} w_j y_j$$

where y_j is the j^{th} largest number in the vector$(x_1, x_2, x_3, \dots x_n)$, and $y_1 \geq y_2 \geq y_3 \geq \dots \geq y_m$. However, the weights w_j of the operator R are not related with any exact value of x_j, instead they are related with the ordinal position of y_j.
The *minimum* and *maximum* range of values can be decided based upon the concept of *or-ness* (β).

$$\beta = \frac{1}{\mathrm{m-1}} \sum_{j=1}^{m} w_j (m-1)$$

3.2 MANIPULATIVE OWA WEIGHTS

One of the vital tasks is to compute the weights. We use the linguistic quantifier denoted as *Q(r)*, to generate the weights w_j. *Q(r)* satisfies two properties: i) *Q* (0) = 0, ii) □*r* ∈ [0, 1], such that *Q*(r) = 1. Furthermore, *Q*(r) is non-decreasing if possesses the following property:

$$\forall a, b \in [0,1],$$

when a > b then *Q* (a) ≥ *Q* (b).
The membership function of a relative quantifier can be represented as:

$$Q(r) = \begin{cases} 0 & if \quad r < a \\ \dfrac{r-a}{b-a} & if \quad b \leq r \leq a \\ 1 & if \quad r > b \end{cases}$$

where a,b,r ∈ [0,1].
In Yager calculates the weights wj of the OWA aggregation from the function Q describing the quantifier, with m number of criteria.

$$w_j = Q\left(\frac{j}{m}\right) - Q\left(\frac{j-1}{m}\right)$$

The following figures are *atmost,atleast half* and *as many as possible.*

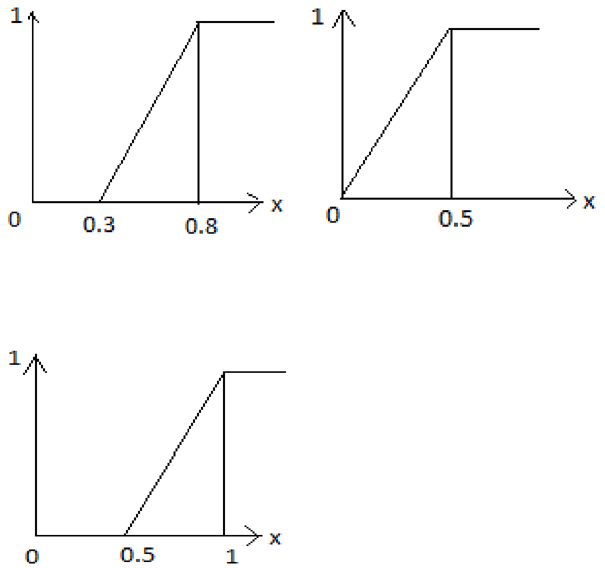


Figure 3. Atmost , Atleast half and as many as possible.

4. Experiments and results

The experiment are performed on some sample images after preprocessing. Some images of knives, scissors and handguns have been shown in figure respectively. Each image is of 96x96 pixel per inches and height and width of image scale for 1x1 inch. Moreover Tables consists of mutual membership values of all the sample images of knives, scissors and hand guns respectively.

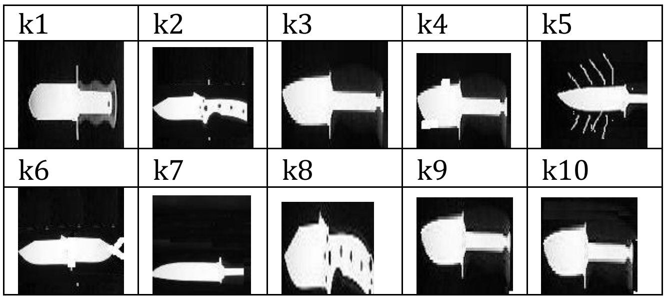


Figure 4. Sample Images Of Knives Taking As Inputs

Table 1. Membership values of Knives

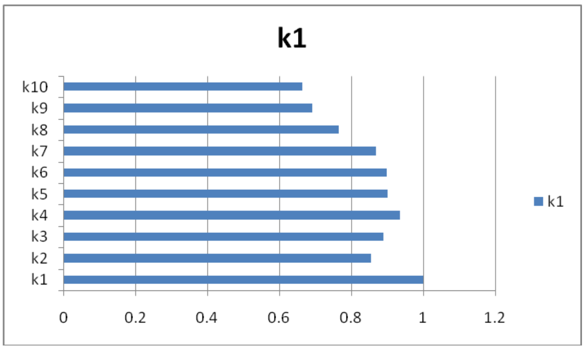
	k1	k2	k3	k4	k5	k6	k7	k8	k9	k10
k1	1	0.574	0.5117	0.5098	0.3838	0.5846	0.455	0.8446	0.5374	0.5916
k2	0.9395	1	0.5909	0.5908	0.4238	0.8031	0.8135	0.5145	0.6608	0.6608
k3	0.9741	0.4286	1	0.9613	0.359	0.4962	0.4746	0.8201	0.4845	0.6212
k4	0.975	0.4286	0.9274	1	0.3599	0.4895	0.4595	0.8019	0.476	0.606
k5	0.8963	0.5845	0.6083	0.6074	1	0.6406	0.5479	0.8301	0.612	0.6212
k6	0.9415	0.6535	0.5196	0.524	0.3484	1	0.4709	0.7558	0.4852	0.6088
k7	0.8232	0.519	0.5296	0.5421	0.4493	0.5498	1	0.7525	0.5569	0.6069
k8	0.9949	0.1947	0.196	0.207	0.1568	0.2528	0.2408	1	0.2916	0.2772
k9	0.9038	0.4945	0.5557	0.561	0.3655	0.5316	0.4421	0.7195	1	0.62
k10	0.9671	0.3469	0.4431	0.4562	0.2871	0.3974	0.3829	0.7201	0.4417	1

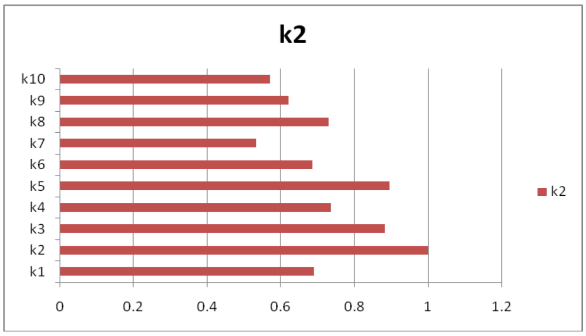
We have taken only one example from the above mentioned items.

4.1 RESULTS FOR KNIVES(VSM)

An image of object is a collection of pixel values. This image can be considered as a 2-dimensional vector space (matrix) each subscripts of vector consists of pixel value. Lets two matrixes A and B of different image are subtract for finding the parallel. [5]The resultant vector is a matrix C. The resultant matrix consists of subscripts value zero due the similar pixel values. These zero values are taken as count of similarity measure. The high number of the zero counts in each column leads to the higher similarity. The above said concept is basic of the VECTOR SPACE MODEL. Each object is represented as vector. The size of the vector is number of column. Each element of vector has sum of matching count i.e. zeros of that particular column.

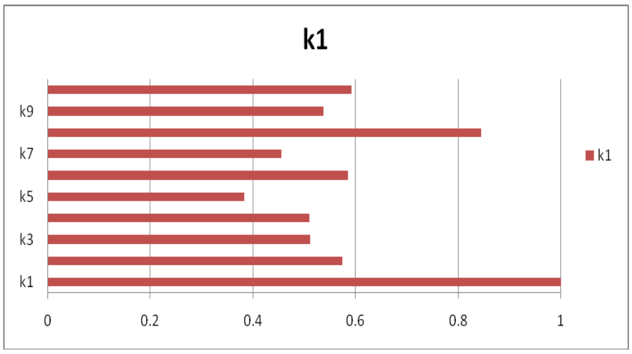
The 'Figure 4.1 to 4.2' compared the results for similarity for different images of knives taken by the VSM Method.





4.2 RESULTS FOR KNIVES(FSM)

In the environment where judgment making is very critical for time saving as well as security, for example air port or railway station there is a long line of passengers. And safety personnel have to make decision on the basis of their perception at the moment very quickly. Either they have to stop some body for security check or allow him or her to passes through. Both the thing detain the innocent person very painful as well as slipping of prohibited object may be very dangerous. The exact interpretation of objects inside the heavy and dense luggage is very costly. In this case extended fuzzy logic can be used for estimating the shape of purpose. The ending decision can be taken by using Ordered Weighted Operator method. [4]



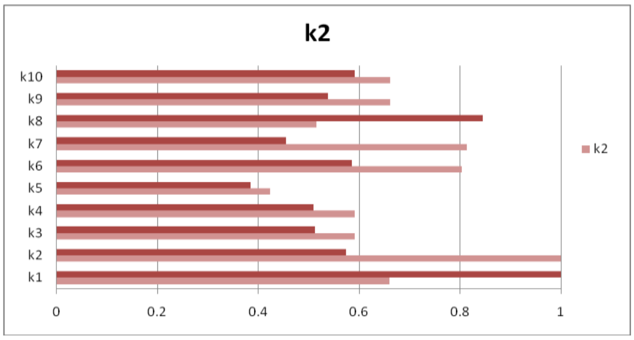


Figure 4.3 Comparison between VSM and FSM.

5. CONCLUSION

The most common method for screening luggage at airports is with the use of X-ray technology. There are a number of reasons why it is commonly adopted including safety factors and the fact that the technology is well understood and relatively inexpensive. As the digital X-ray technology becomes more prominent and based on the current state-of-the-art in image processing, feature extraction and classification technology. The role of computers in screening luggage will increase in order to enhance manual screening procedures. A new method is proposed to determine the optimal number of clusters when segmenting X-ray images and to evaluate the results acquired by different segmentation methods Compared with the statistical validity index method; our method considers both the spatial and statistical information of the image. [6]Preliminary experimental results show that our method produces results consistent with the human assessment. Another advantage of our method is that it is computationally efficient. Our procedure only calculates the Euclidian distance and Key Points.

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REFERENCES

[1] L.A.Zadeh, Toward Extended Fuzzy Logic - A First Step, Fuzzy Sets and Systems, Information Sciences, Pg: 3175-3181, (2009).

[2] L.A.Zadeh, From Computing with Numbers to Computing with Words – From Manipulation of Measurements to Manipulation of Perceptions, IEEE Transactions on Circuits and Systems-I, vol. 45, Pg: 105-119, (1999).

[3] B.M.Imran, M.M.S.Beg, Image Retrieval by Mechanization and f-Principle, Proc. II International Conference on Data Management (ICDM'2009), February 10-11, IMT Ghaziabad, India, McMillan Advanced Research Series, ISBN 023-063-762-0, Pg: 157-165, 2009.

[4] L.A.Zadeh, A Note on Web Intelligence, World Knowledge and Fuzzy Logic, Journal of Data & Knowledge Engineering, Pg.291– 304,(2004).

[5] H.R.Tizhoosh, Fuzzy Image Processing: Potentials and State of the Art, IIZUKA'98, 5th International Conference on Soft Computing, Iizuka, Japan, October 16-20, Vol. 1, Pg: 321-324, (1998).

[6] M.Thint, M.M.S.Beg, Z.Qin, Precisiating Natural Language for a Question Answering System, Proc. 11th World Multi-conference on Systemics, Cybernetics and Informatics (WMSCI 2007), Orlando, USA, July 8-11, Pg:165-170 ,(2007).

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