

In This Issue...

- **Computational Intelligence:** A new approach to create high level features from low level features of audio clips .
- **Pattern Recognition:** A Novel approach to transformed biometrics - using ANN.
- **Signal Processing:** Brain Computer Interface Analysis using Wavelet Transforms and Auto Regressive Coefficients
- **Reader's Space:** Surround View Camera System by Smita Patil, M.Tech, Communication systems.

Dear friends! COMPSIG NITT is a monthly newsletter to share the research work done in the Pattern recognition and computational intelligence laboratory, Department of Electronics and Communication Engineering, National Institute of Technology Trichy.

Concepts, Ideas pertaining to Computational intelligence, Pattern recognition and Signal processing are also included in this newsletter.

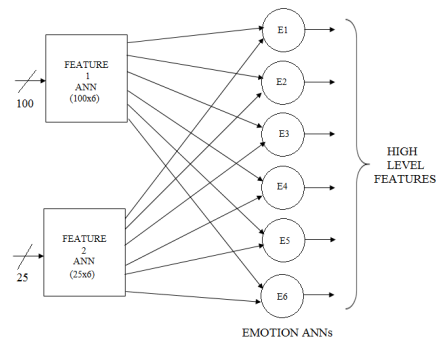
We expect the feedback, comments and articles from you all.

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Team members

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Computational Intelligence

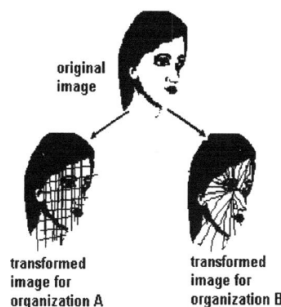


Existing search engines utilize text representing the required audio clips as the index for searching and retrieving the same from the huge database. Instead, a six dimensional High Level Feature vector based on the human feelings experienced on listening to the audio clips can be used as the index for searching, which is comparatively better in obtaining the optimal audio clips since it takes into account the user's subjective perception of similarity. High

Level Feature vector is defined as the vector consisting of the ranks assigned by humans based on the emotions experienced while listening to a song, such as happy, sad etc. However, it is not practical to assign a human ranked High Level Feature vector for the millions of songs available in the database. Hence, a technique of mapping the Low Level Features of a song such as Cepstrum, Harmonicity to its High Level Features is proposed.

For further details : [http://ieeexplore.ieee.org/High level features from low level features of audio clips](http://ieeexplore.ieee.org/High%20level%20features%20from%20low%20level%20features%20of%20audio%20clips)

Pattern Recognition

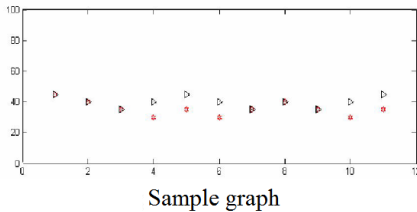


Biometrics is the technique that utilizes the distinct genetic features collected from face, thumb, retina, eye etc. as an authentication code. The number of valid biometrics is finite for a human. The innovative idea is to use a technique that utilizes the same biometric in different organizations. The technique must be such that it is difficult to invert (i.e.) the original biometric must not be retrievable by any inverse transformations. It proposes a novel approach to transform a biometric feature using Artificial Neural Network in 'Spatial domain'. By this method, different distorted biometric images by using different trans-

formations can be created from the originally collected biometric and hence the same biometric data can be used by different organizations. The results of the proposed approach are very promising and have been validated by the 'Image Transformation' principles.

For further details : [http://ieeexplore.ieee.org/session5A/Transformed Biometrics using ANN](http://ieeexplore.ieee.org/session5A/Transformed%20Biometrics%20using%20ANN)

Signal Processing



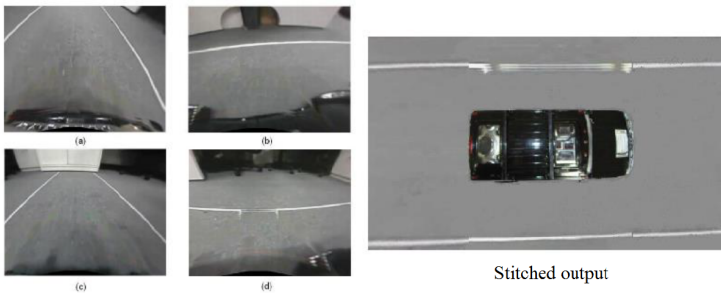
recorded from the C3 and C4 electrodes pertaining to motor activities was done. The data obtained was preprocessed with techniques like wavelet transform and linear predictive coding was applied to it to determine the Auto Regressive coefficients which are treated as feature vectors to train an Artificial Neural Network for appropriate classification. In the sample graph, the circle represents the actual imagined movement while the triangle represents the movement after classification. The efficiency of this approach was found to be 71.50.

For further details : [http://ieeexplore.ieee.org/BCI analysis using wavelet transforms and auto regressive coefficients](http://ieeexplore.ieee.org/BCI%20analysis%20using%20wavelet%20transforms%20and%20auto%20regressive%20coefficients)

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Reader's Space

Surround view camera system is an emerging technology that assist the driver in parking the vehicles safely by allowing him to see a top down view of the 360 degree surrounding of the vehicle. Four images are captured by mounting four cameras around the vehicle ,each facing at different direction (ex.one at the front bumper another at the rear bumper and one under each side of mirror). From these camera input a composite view of the surrounding is generated which is shown to the driver in real time during parking.Three steps are involved. 1. Fish eye correction of input image or video frame 2. Convert it into bird eye perspective or can be called as inverse perspective mapping(IPM) 3. Generate the composite stitched output . The experiment was done on toy car consisting of 4 captured images by using front,right,left and back camera. The output is the stitched image of those 4 camera images.



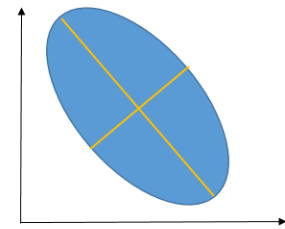
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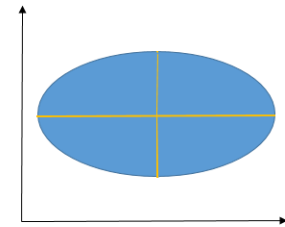
Quotes

"End is not the end, if fact END means "Effort Never Dies" - If you get No as an answer, remember NO means "Next Opportunity". So Let's be positive." — Dr. A.P.J.Abdul kalam

PUZZLE



(A)



(B)

Can you find the angle through which the ellipse in fig.(A) is rotated, so that it is possible to obtain the ellipse in fig.(B) whose major and minor axes are parallel to the co-ordinate axes. This puzzle exploits the Principal Component Analysis(PCA), where one of the principal components(axis) is in the direction of maximum variance.

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Feedback

COMPSIG NITT invites articles and innovative ideas from readers for the [Reader's Space](#) column. We expect feedback, comments and the articles to monthly newsletter [COMPSIG NITT](#).

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