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# Rice variety identification using artificial neural network

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**Abstract**
Rice is considered staple food as it is eaten in large quantity in all over world. And it serves as a crucial source of energy and nutrition. With the diverse array of rice varieties cultivated globally, the need for accurate and efficient identification methods becomes paramount. As all rice varieties are not equally valuable unscrupulous persons become tempted to mix up lower cost variety in costly one. Physical attributes of rice like size, shape, cooking characteristics etc. offer lot of avenues for identification of such practices. Among physical attributes is image analysis. This study was conducted with objective of using image analysis using artificial neural network to identify Basmati and Gujarat 17 verities. It was found in this study that rice variety identification is quite feasible using simple feed forward neural network particularly for those verities which differ in visual parameters i.e. like Basmati and Gujarat 17 used in this study.

**Keywords:** Rice variety identification, artificial neural network

## Introduction
Rice (*Oryza sativa* L.) is a staple food for a significant portion of the world's population, serving as a crucial source of energy and nutrition. With the diverse array of rice varieties cultivated globally, the need for accurate and efficient identification methods becomes paramount. As all rice varieties are not equally valuable unscrupulous persons become tempted to mix up lower cost variety in costly one. Physical attributes of rice like size, shape, cooking characteristics etc. offer lot of avenues for identification of such practices. Various similar studies are reported in literature [1-6] but no study is reported which focuses on using ANN to identify verity Gujarat 17 from Basmati rice for the future purpose of adulteration detection. This study focuses on this less explored area.

## Materials and Methods

**Fig 1:** Gujarat 17 and Basmati rice photographs

Rice samples of Gujarat 17 and Basmati were procured from local market. Vernier calipers were used to measure length as well as diameter. The samples of rice were taken in in beakers and photographed using mobile camera. Care was taken to take photographs in identical illumination conditions for both kind of rice and all samples. The resultant photographs were 6144 wide by 8192 pixels long in jpeg format. Open source library libjpeg-turbo was used to crop images and then in second step convert images in Microsoft Bitmap format. Commands used for this task were jpegtran -crop 1024x1024+2504+3584 and djpeg -scale 1/4 -bmp or similar. This commands were used repeated for each file. The resultant cropped bitmap files were used for detection of adulteration using feed forward ANN. 200 images were taken for each rice variety. As there were two verities of rice in study in the study total 400 images were taken. Out of this 400 images 320 were used for training ANN and 80 were used to test ANN. For ANN analysis simple feed forward ANN was implemented. As 258 by 256 pixel images were used as input the ANN contained 198144 input neurons. There were two hidden layers in ANN and each contained 44 neurons. Finally there was output layer with two neurons. Input pixel values were shifted by -128 and scaled down by multiplying it with 0.04. Learning rate used were 1E-5 and 0.9 was value of momentum. Sigmoid like function was used for activation of neurons.

## Results and Discussion

### Capturing Images

**Fig 2:** Representative Basmati images used for ANN analysis

**Fig 3:** Representative Gujarat 17 images used for ANN analysis

Image capturing was done suing mobile camera. The main problem during this state was getting uniform illumination and conditions between image acquisitions. It was found that we can put rice in beaker and place beaker in same position and put camera on the beaker at fixed position with fixed focus to get images as uniform as possible.

It was found that original images are too large to process using ANN on computer having limited RAM. For example original images were of 6144 pixel width and 8192 pixel height. This resulted in around 150 mega inputs. Now if we connect this with next layer using 64 bit floats as connection and the next hidden layer has just 100 neurons then RAM requirement will be 120 GB only for connections. Not to mention such ANN will be very slow to train and use due to large size.

### ANN Based Identification

ANN parameters chosen are already mentioned in materials and methods. Due to special activation function time only one or two epochs training was necessary before 100% correct identification was achieved with training data. Once network was trained it was tested on test data and every time network identified all samples in test data with 100% accuracy.

## Conclusion

It was found in this study that rice variety identification is quite feasible using image analysis and feed forward neural network for those verities which differ in such visual appearance i.e. like Basmati and Gujarat 17 used in this study. Not only we can identify pure sample but even detection of adulteration is looks possible and can be undertaken as future research direction. Similar conclusions are reported for other rice varieties in literature [2, 6-8].

## References


1. Cp M, Ramesh D, Prakash J. Physico-Chemical and Cooking Properties of Selected Rice Varieties. Acta Sci Nutr Health. 2019;3(3):23-30.
2. Kumar MS, Javeed Md. An Efficient Rice Variety Identification Scheme Using Shape, Harlick & Color Feature Extraction and Multiclass SVM. Int J Eng Adv Technol. 2019;8(6):3629-3632. doi:10.35940/ijeat.F9362.088619
3. Mondal SC, Haque MA, Mahomud MS, Karmoker P, Shams-Ud-Din Md. A comparative study on the physicochemical properties of selected varieties of rice grains in Bangladesh. Published online 2021. Accessed September 20, 2023.
4. Sethy PK, Chatterjee A. Rice Variety Identification of Western Odisha Based on Geometrical and Texture Feature. Int J Appl Eng Res. 2018;13(4).
5. Singh N, Kaur L, Singh Sodhi N, Singh Sekhon K. Physicochemical, cooking and textural properties of milled rice from different Indian rice cultivars. Food Chem. 2005;89(2):253-259. doi:10.1016/j.foodchem.2004.02.032
6. Weng S, Tang P, Yuan H, *et al*. Hyperspectral imaging for accurate determination of rice variety using a deep learning network with multi-feature fusion. Spectrochim Acta A Mol Biomol Spectrosc. 2020;234:118237. doi:10.1016/j.saa.2020.118237
7. Aznan AA, Ruslan R, Rukunudin IH, Azizan FA, Hashim AY. Rice Seed Varieties Identification based on Extracted Colour Features using Image Processing and Artificial Neural Network (ANN). Int J Adv Sci Eng Inf Technol. 2017;7(6):2220. doi:10.18517/ijaseit.7.6.2990
8. Komal, Sethi GK, Bawa RK. Automatic Rice Variety Identification System: state-of-the-art review, issues, challenges and future directions. Multimed Tools Appl. 2023;82(18):27305-27336. doi:10.1007/s11042-023-14487-x