Non-destructive Identification of Unmilled Rice Using Digital Image Analysis

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Abstract — In this paper, digital image analysis is applied for non-destructive classification of rice and sticky rice seeds that are mixed together. It is a difficult task because of the similar surface color of the seeds. This paper presents an automatic classification method based on RGB color features. Hardware of image capturing is designed using back light source in order to maximize the contrast between the rice seeds and their background. RGB histogram is then calculated. The rule of classification between rice seed and sticky rice seed are created. Almost 97% of rice seeds are identified correctly. The correct classification rates for two rice varieties are: rice seeds 'Jasmine' 96.34% and sticky rice seeds 100%.

Keywords— Identification of rice seed; RGB color model, Digital image processing

I. INTRODUCTION

Rice is an important agricultural product worldwide. Total annual production figures are in hundreds of millions of tons [1]. The most of Thailand's rice production is traded to the world. Thailand is the largest traded approximately 36% of trends in world rice exports [2]. For the good quality of rice, Bureau of Research and Development, Thailand separates rice seed in 4 levels, 1) selected rice seed, 2) principal rice seed, 3) breed rice seed, and 4) distributed rice seed [3]. The rice product in the market comes from distributed rice seed. The high priorities of the seed are 1) to 4) respectively. For this reason the standards also grant special status to specific rice seed in the first level. The problem is in one ear of paddy as shown in Figure 1. There are sticky rice seeds mixed in. There are many existing methods currently used for rice identification, such as certain physical characteristics in minimum average length and aspect ratio are specified explicitly in the standards [4], [5] or DNA testing [6], [7]. Though these reliable methods are expensive, tedious, laborious, and destructive of the sample material. On non-destructive method research in classification of rice seeds, there was an algorithm to segment the images of both variety of different shades, colors and feed-forward neural network was trained to identify rice seeds [8]. In this method, the different shape and colors quite clear. In one ear of paddy there is sticky rice seeds mixed in rice seeds. The shape and colors are shown in Figure 2. This paper proposes a visual classification system to identify the varieties of rice seeds by their color features and its appearance size of the rice seeds. The method entailed the development of an algorithm to segment images of both varieties of different shades and colors. Seed boundaries are separated using morphological processing techniques and the RGB color model is used to identify the rice seeds with the correct identification rate.

Figure 1. One ear of paddy

Figure 2. Rice seeds and sticky rice seeds