VAGINOSCOPIC IMAGE ENHANCEMENT OF FEMALE CANINES USING SUCCESSIVE MEAN QUANTIZATION TRANSFORM IN HSV SPACE

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ABSTRACT

Veterinarians follow several investigation methods including exfoliating vaginal cytology (EVC), vaginoscopy, and measurement of plasma progesterone concentration level to detect the exact mating period of the canines. Vaginoscopy is a visual examination through which the vaginal vault of the canine is examined. However, due to low contrast in the vaginoscopic images, the visual quality has to be improved for further diagnosis. This work makes an attempt to enhance the vaginoscopic images. The images are obtained from the College of Veterinary & Animal Sciences, Mannuthy, Kerala, India. These obtained images have undergone successive mean quantization transform (SMQT) in the V component of hue, saturation and value (HSV) space. The enhancement has been performed for 2-level, 4-level and 8-level. The 2-level transformation has got better dynamic range. The image is composed of noticeable details and has a significant dynamic range compression ability, which provides clear and natural visualization, complemented by great visual expression. This algorithm helps the veterinarians to clearly evoke the bloody discharge and wrinkles during the mating cycle.

Keywords: Vaginoscopic images, image enhancement, SMQT, histogram equalization.

INTRODUCTION

The field of veterinary imaging is well established in the science of veterinary medicine. With clinical as well as experimental animal research, it can contribute more to disease diagnosis and treatment. Veterinary specialists often use digital radiology [1], computed tomography (CT) [2], magnetic resonant imaging (MRI) [3], ultrasound [4], and endoscopy [5] for the diagnosis of disease.

With dogs gaining popularity as a pet, canine breeding has emerged as a fast-growing sector with great scope for self-employment. By detecting the fertile period of canines, the boarding of canines in season can be reduced [6]. A breeder must understand the exact mating period of a particular breed of dog. Doctors follow EVC, vaginoscopic examination along with behavioural changes, and serum progesterone values to predict the exact mating period [7]. A common method for determining breeding time is progesterone testing. With the advent of controlled breeding, improper timing of mating has become a prime cause of breeding failure in canines.

Usually, endoscopic images are low contrast images due to inaccurate lighting while capturing. For the proper diagnosis, the contrast and brightness levels have to be improved. Algorithms based on histogram equalization (HE) can be used as a tool to address contrast enhancement [8, 9]. However, nonlinear lightning is not addressed in this. The histogram would tend to move toward the middle of its dynamic range because the mean brightness value of the image would get pushed there. This may cause annoying artifacts and saturation of intensity values [10].