

Image segmentation of women's salivary ferning patterns using harmony frangi filter

Heri Pratikno^{a,b} & Mohd Zamri Ibrahim^b

^a Faculty of Technology and Information, Department of Computer Engineering, Universitas Dinamika, Surabaya, Indonesia

^b Faculty of Electrical and Electronic Engineering, Universiti Malaysia Pahang, Kuantan, Malaysia

ABSTRACT

Medical research proves that entering the fertile period, especially during ovulation, all-female body fluids contain ferning patterns in the form of crystallization of salt shaped like a fern tree. Until now, not many research topics have been carried out related to the segmentation process in the salivary ferning pattern, this is due to several problems including first, the unavailability of a database of image salivary ferning pattern online. Second, the salivary ferning pattern has several hidden layers and uneven intensity. The purpose of this study was to detect and determine the line shape of the salivary ferning crystal pattern using the Harmony Frangi Filter method based on the Hessian matrix operation. The results of the segmentation process from this study are a crucial basis in determining the level of accuracy and precision at the next stage of research, namely: the prediction process of a woman's ovulation in each menstrual cycle. The measurement of segmentation results has an average value of MSE 2.25, PSNR 44.86 dB, FSIM 0.954, accuracy 99.88%, sensitivity 99.98% and specificity 99.88%.

KEYWORDS

Frangi filter; Ovutest scope; Salivary ferning

REFERENCES

1. Patel DK, Prajapati DG (2018) Study the accuracy of salivary ferning test as a predictor of ovulation. *Int J Reprod Contracept Obstet Gynecol* 7(7):2699–2705 2.
2. Dorling KindersleyTM Limited (2009) Temperature and mucus changes during the menstrual cycle 3.

3. Eissa HM, Ahmed AM, Elsehely EA (2014) Implementatin of smart ovulation detection device. Recent Adv Biomed Chem Eng Mater Sci. ISBN: 978–1-61804-223-1 4.
4. Ravinder R, Kaipa O, Baddela VS (2016) Saliva ferning, an unorthodox estrus detection method in water buffaloes (*Bubalus bubalis*). *Theriogenology* 86:1147–1155 5.
5. Kubatova A, Fedorova T (2016) Saliva crystallization occurs in female bornean orangutans (*Pongopygmaeus*): could it be a new option for monitoring of menstrual cycle in captive great apes? *PLoS ONE*

