

Determination of Forehead Lesion in Facial Paralysis using Gabor Filter

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Abstract. Facial paralysis is a loss of the voluntary muscle movement due to any damages in facial nerve. The need for fast and accurate facial nerve assessment is crucial for further efficient treatment of facial nerve paralysis. Any impairment of its function can severely affect the social and psychological of a patient with this paralysis. Traditional methods are solely dependent on the subjective evaluation of clinicians and consequently lead to observant error, time-consuming and may obtain a different decision on the treatment method. A novel approach has been proposed in this study which capable to distinguish the type of lesions of facial paralysis since these lesions become the main attribute for differentiating the type of paralysis before deciding the further treatment for the patient. Gabor Filter Method with different orientation and scales have been experimented in this study. Two powerful parameters, Mean Amplitude and Local Energy, were extracted from Gabor magnitude response to determine the lesions in facial paralysis. From the results, the Local Energy measurements are better than Mean Amplitude measurements in classifying between LMN and UMN. Besides, $\pi/2$ orientation of Local Energy feature gives the most stable and good results in classifying the data throughout the scales. In addition, Scale 1 has shown the most reasonable scale for all orientations. As a conclusion, this wrinkle analysis is capable of determining the type of lesions of facial paralysis and become a helpful tool for the clinicians in facial nerve assessment.

Keywords—*Facial Paralysis, Facial Nerve Assessment, Bell's Palsy, Lower Motor Neuron (LMN), Upper Motor Neuron (UMN), Gabor filter, Local Energy (LE), Mean Amplitude (MA)*