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博　士　論　文　の　要　旨

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博士論文題名

Gender Classification Using Human Gait Based on Skeleton-Model-Based Method Through Joint Angle Estimation and Model-Free Method with Gait Energy Motion Derived from Wavelet
(ウェーブレット係数から導出するパワースペクトル及び骨格モデルを用いる関節角度に基づく人間歩行映像による性別判定法)

Biometrics as an identification system had been famous recently due to their wide implementation in security, identification and recognition. Application of biometrics such as gender, ages, pregnancy, disable classification and human recognition. Many researcher had focus in finding best feature for biometrics. One of the topics is finding best feature for gait biometrics. Due to the high technology improvement, also improve the image processing technology. Using image processing technology to be used as a feature extractor is a promising application in near future because of the small and cheap existence camera in the market today. Gait is very unique compare to other biometrics which is used video as the input rather than image or frequency signal. Gait also can only be detected in further distance compare to other biometrics creating an obtrusiveness. Spatial and temporal information is hiding behind and hope to be found.

This research provide the experimental results of some feature extracted from gait using Chinese Academy of Sciences (GAIT) Database. The first feature is extracted the kinematics feature, one of the simple and tradition feature extractor in biometrics. We used skeleton model to extract this kind of feature based on Nixon model, then we compare our kinematics feature to their feature. To improve the skeleton model, we proposed 3d skeleton model using depth sensor Kinect Camera and implement it in disable gait classification. The third step is experiment on gait images and analyze the images itself if they can or cannot be used as feature. Some of the researcher also shown that gait image feature extraction giving promising results. We use Image motion sequences as the image feature and 2D Discrete Wavelet Transform (2D DWT) Energy as the feature extractor. The fourth experiment is creating best gait image to be used as a feature. The purpose is to improve the image motion sequences and we call our image “Gait Energy Motion (GEM)”.

From the experimental results shown that our kinematics feature from skeleton model giving 81.6% classification accuracy compare to Nixon kinematics. 3d skeleton model also giving good results around 86.7% classification accuracy. This results cannot be compare because there are not such of this kind of research before. Our image feature extractor giving 92.9% classification accuracy using motion image sequences and 97.63% using GEM.