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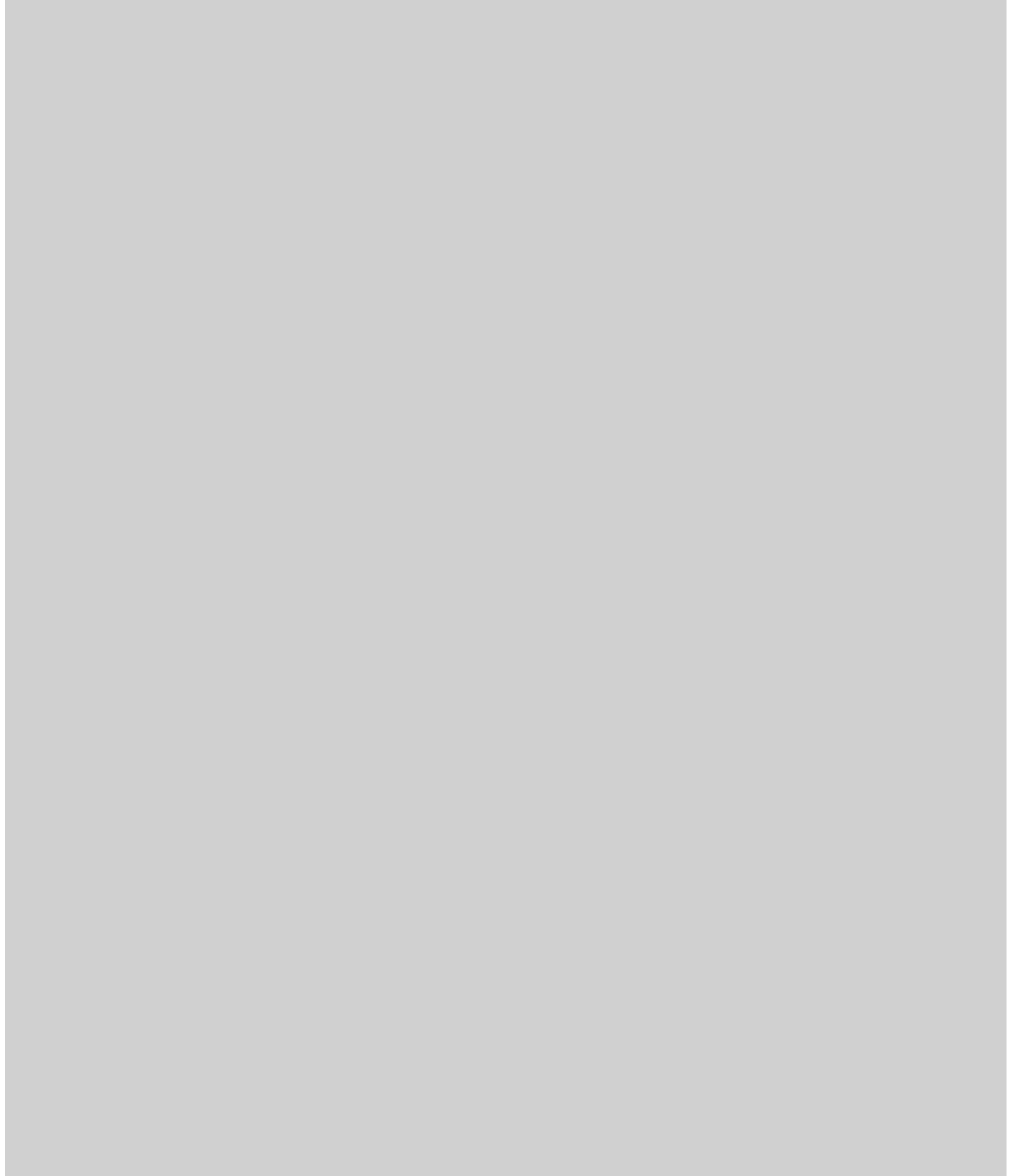
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A Quick Filtering for Similarity Queries in Motion Capture Databases

Worawat Choensawat, Woong Choi and Kozaburo Hachimura

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Abstract

A similarity retrieval of motion capture data has received substantial attention in recent years. In this paper, we focus on feature extraction and quick filtering methods in the similarity retrieval system. A representation of motion capture data is joint angles, which can distinguish different human body poses. We propose a new technique for dimensionality reduction based the average and variance of joint angles. Our dimensionality reduction is simple to understand and implement. In experiments, twenty dance motion clips each of which is different in length and style, are used in the test data set with a total of 60,000 frames. The results of our quick filtering show an achievement on the recall and precision up to 100% and 70%, respectively.

Keywords Similarity Retrieval - Motion Capture - Body Motion Data - Dimension Reduction - Minimal Bounding Envelop - Feature Extraction

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Abstract. A similarity retrieval of motion capture data has received substantial attention in recent years. In this paper, we focus on feature extraction and quick filtering methods in the similarity retrieval system. A representation of motion capture data is joint angles, which can distinguish different human body poses. We propose a new technique for dimensionality reduction based the average and variance of joint angles. Our dimensionality reduction is simple to understand and implement. In experiments, twenty dance motion clips each of which is different in length and style, are used in the test data set with a total of 60,000 frames. The results of our quick filtering show an achievement on the recall and precision up to 100% and 70%, respectively.

Keywords: Similarity Retrieval, Motion Capture, Body Motion Data, Dimension Reduction, Minimal Bounding Envelop, Feature Extraction.

1 Introduction

Nowadays, the digital archiving systems have been used to preserve historical and cultural properties. The information in digital form has many advantages in making the information available to large groups of people as well as reusing the archived information for creating new information. The targets of digital archiving range from planer material, such as paintings and photos, and solid material, such as sculptures, pottery, architecture, and archaeological ruins. However the intangible cultural properties like dance and performing arts are also very important targets for digital archiving.

Hachimura et al. [1,2,3,4,5] have investigated digital archiving of Japanese dance movements using motion capture system. Their researches and findings have related to motion segment, motion and/or player identification, extraction of characteristic poses, similarity retrieval of dance motions, and qualitative analysis of dance motion by employing Laban motion analysis and Kansei information processing. In this paper, we focus on the motion similarity retrieval systems.

Normally, a full human motion can be obtained by up to 40 markers, each of which consists of three dimensional coordinates per frame. The similarity matching in the high dimensional data is resolved by finding the efficient features such as joint angles. Prior to applying Dynamic Time Warping (DTW) [6,7,8],

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