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Detection of Lying Situations in Liar Corpus

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Introduction: Recognizing lies in human interaction is one of the most important and challenging tasks in artificial intelligence. For example, it leads to the development of a human-computer interaction system that detects a liar in a conversation. In another example, some systems in the future might occasionally need to tell a lie for not hurting user's feelings, namely a white lie for trouble-free conversations. In this paper, we apply machine learning techniques, support vector machines with features extracted using OpenPose [1] and OpenFace [2], to our corpus. We discuss the results of the machine learning approaches in our corpus.

Approach: We describe our detection model of lying situations. We apply a machine learning method to the task. Focusing on the facial expressions that we have confirmed in previous study [3], we extracted features from videos. We extract the features using the coordinates of faces detected by OpenPose [1]. In addition, using OpenFace [2] which can estimate facial expressions, we extract the Facial Action Units which is the smallest unit of facial movement such as movements of mouth corner and eyes. The specific features are shown below.

- OpenPose: Standard deviation of coordinate points, mean and standard deviation of movement of coordinate points (eyes, nose, neck, shoulders, ears)

- OpenFace: Appearance rate and strength average Facial Action Units (eyebrow movement, eyelid movement, lip movement, dimple, blink)

Results and Discussion: We used SVM as the machine learning approach. We evaluated the two detection methods with leave-one-out cross-validation. Table 1 shows the experimental result. The method with OpenPose or OpenFace cannot outperform that with LBP-TOP features in previous study [3]. One reason was that the accuracy of OpenPose or OpenFace was not always enough for the feature extraction.

Applying neural network based approaches, such as a CNN to the feature extraction and a RNN to the detection task, are prospective improved points in future work. On the other hand, for generating a strong model, the neural network models tend to need a large volume of data. Therefore, we need to increase the size of our corpus for the purpose.

Table. 1: The accuracy, recall,and precision for the detection task.

Features	Accuracy	Lie		Truth	
		Recall	Precision	Recall	Precision
LBP-TOP [3]	0.55	0.55	0.57	0.54	0.53
OpenPose	0.50	0.50	0.63	0.50	0.37
OpenFace	0.50	0.50	0.46	0.50	0.54

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