CSC446: Pattern Recognition Course
Computer Science Department
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A Report of the Final Project
By

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Project Title

"*Interacting with PC using Facial Gesture Recognition*"

1st Semester 2015\2016

I. K-Nearest Neighbours Algorithm

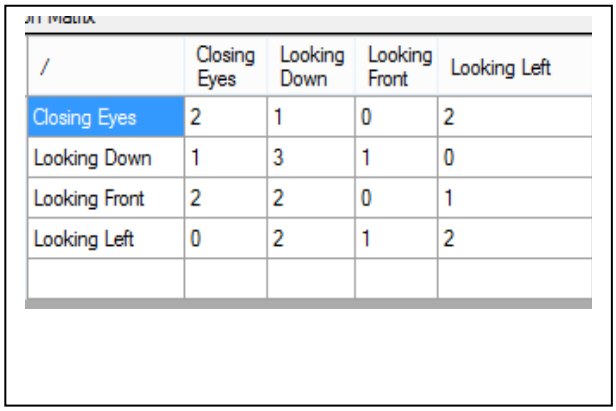
TABLE 1. KNN RESULTS

Standards	K =5	K = 7	K =10	K =15	K =20	K =25	K =29
Overall Accuracy (%)	40%	45%	30%	40%	30%	25%	30 %
Accuracy from Cross validation (%)	76%	79%	82%	83%	83%	85%	82%

II. Results and Discussion

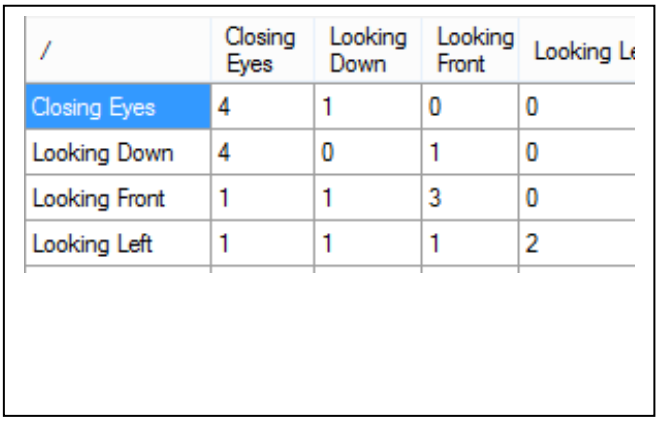
TABLE 2. RESULTS

Standards	Bayesian	KNN
Overall Accuracy (%)	35%	45%
Accuracy from Cross validation (%)		80%



/	Closing Eyes	Looking Down	Looking Front	Looking Left
Closing Eyes	2	1	0	2
Looking Down	1	3	1	0
Looking Front	2	2	0	1
Looking Left	0	2	1	2

FIGURE 1. CONFUSION MATRIX OF METHOD(1)



/	Closing Eyes	Looking Down	Looking Front	Looking Le
Closing Eyes	4	1	0	0
Looking Down	4	0	1	0
Looking Front	1	1	3	0
Looking Left	1	1	1	2

FIGURE 2. CONFUSION MATRIX OF METHOD(2)

Firstly, K-Nearest-Neighbor Estimation (KNN) is a non-parametric method, secondly this given feature space is divided into cells / bins. Each cell has a computed probability depending on the number of samples falling in such a cell relative to the total number of training samples. However, the resulting probability estimation varies dramatically depending on the chosen fixed volume. This can be avoided by allowing the cell volume to vary to search for the k nearest neighbors to a given test feature vector.

III. Conclusion

We conclude KNN classification is produced more accrue than Bayesian classification, to classify the gestures of a centered image of a head to four classes, as either the person is looking down, left, front, or closing his\her eyes, there are different predefined actions related to each class for computer control.

K-Nearest-Neighbor Estimation (KNN) is a non-parametric although KNN suffers from a high complexity in terms of time and space. A more reasonable approach in terms of complexity is the Nearest-Neighbor estimation, online training, the training is done every input so is online.

However the Bayesian classification: Although Bayesian Estimation. The main conceptual difference is that MLE considers the parameters as fixed values. Then, they can be obtained by solving a maximization problem resulting in a delta-function. However, Bayesian Estimation assumes that the parameters are random variables and then applies *Bayesian Learning* to obtain them, the training is done one so is offline.

In final we've used KNN, Bayesian Inference. However, we find KNN is more accurate, but Bayesian is faster. We'd recommend KNN for future classification.