**Intoduction:**

Biometric authentication systems is based on person’s anatomical features (fingerprints, face, palm veins, hand geometry, iris, voice) or behavioral traits (signatures, gaits, etc). Because these traits are physically user related, biometric authentication is one of the most reliable authentication systems. One of the perspective types of biometrics recently has proved to be electroencephalogram (EEG), since EEG signal is hard to fake because of the way EEG is recorded.

Identification [1, 2, 3 ] \ authentication [4, 5, 6]: could be used same recordings, their preprocessing and feature extraction, but (explanation why identification is shit). We choose authentication. Mention Yeom (accuracy is better).

Most of the researches [citations] focused on identification rather than authentication. However, identification is way too complex system in a real-world system with a lot of users, especially in case of using neural networks for classification. Moreover, systems that use identification it would be hard to add a new user, since it would require to change an output of the whole system retrain it from scratch.

3 types are usually used: rest[], VEP[], imaginary (motor) activity[].

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In the table 1, the summary of previous works is shown.

An obvious challenge in building such system is to leave the most appropriate features and channels for authentication.

As soon as nobody knows the best features and channels, an obvious way to use as much as possible. And the perfect way to classify a high dimension data with a low cost resources and appropriate time is neural network.

Moreover, some of the works showed that usage of NN+svm => improve accuracy. Thus, we used it as well.

Additionally, PCA did the same, so we compared this 2 methods.

Description of the problem

*Previous works:*

General:

* A. Riera (fisher discriminative analysis)

Identification

* Sebastien Marcel (MAXIMUM A POSTERIORI MODELADAPTATION )

Authentification (overview about it), bad res, there are FRR and FAR

2205

* Yeom(SVM)

Authentification, was twins n a set, bad FAR and FRR

2012

* Z´uquete (OCC: KNN, SVDD)
* Paranjape

Identification

* Das (SVM)

Identification

*Neural networks!!*

* Sun

Identification

* Palaniapppan – nn+VEP

Identification

* Sharma

Identification,

* Poulos and al.

Authentification, FRR and FAR can be calculated, but are very bed!!!

Rest state

Neural network(LVQ)

4 persons

1999

* Hu

Identification and authentification (compared), 3 subjects, test an training set, no FAR\FRR info

2009

* Qunjian Wu,1 Ying Zeng

Authentification, good FAR\FRR, features as matrix, BUT extended by zeros (stupid)

2018

The paper is structured as follow….