



ARF

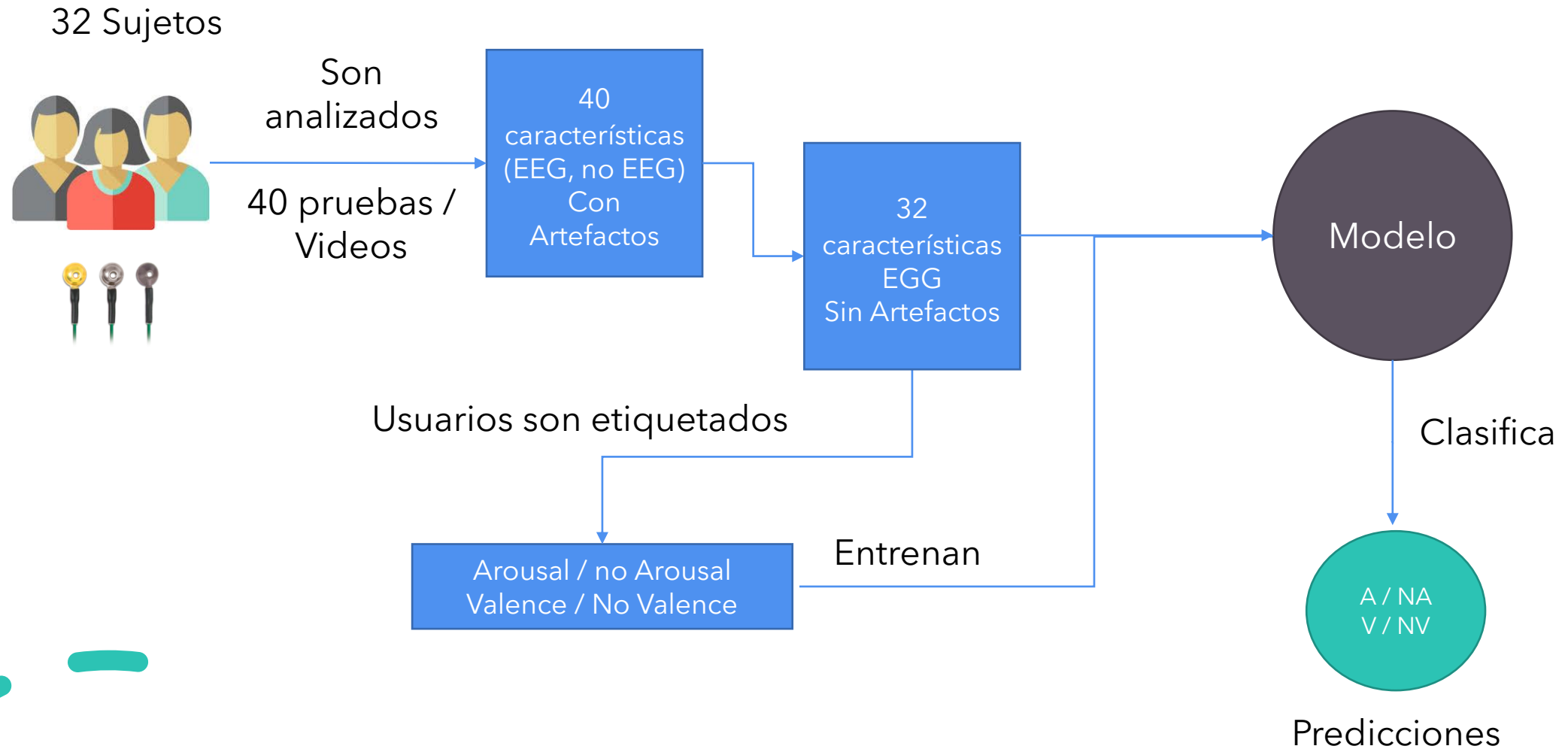
”Análisis de emociones de sujetos a partir de señales de EEG”

José Javier Calvo Moratilla

Puntos



1. Introducción



2. Trabajos relacionados

Classification of Human Emotions from Electroencephalogram (EEG) Signal using Deep Neural Network. (2017)

Input data:

Power Spectral Density (PSD)
Frontal EEG Asymmetry

Labels: {Excitement, Meditation, Boredom, and Frustration}

A random forest model based classification scheme for neonatal amplitude-integrated EEG. (BIBM 2013)

Input data:

Minimum amplitude
Maximum amplitude
Mean value of amplitude
Percentage if the lower margin values under 5 micro volts
Histograms FFT?

Labels: {Normal, abnormal}

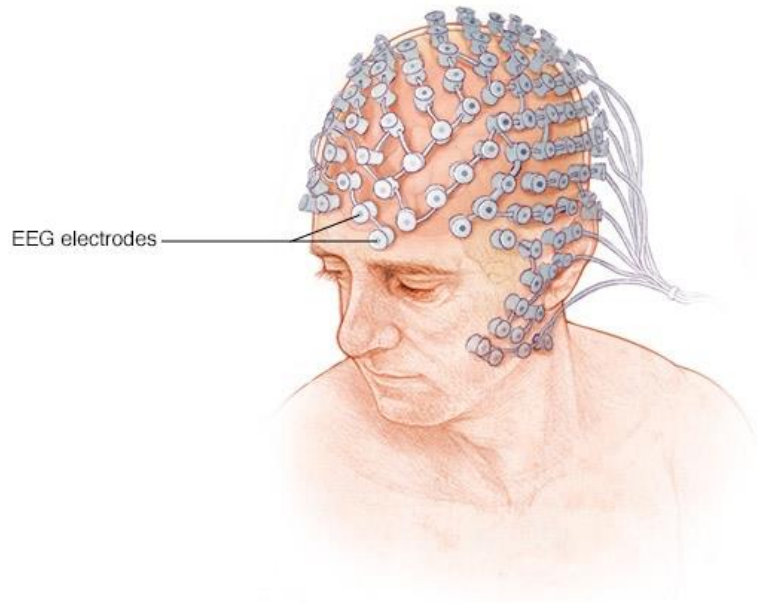
Classification of EEG data for human mental state analysis using Random Forest Classifier (2018).

Input data:

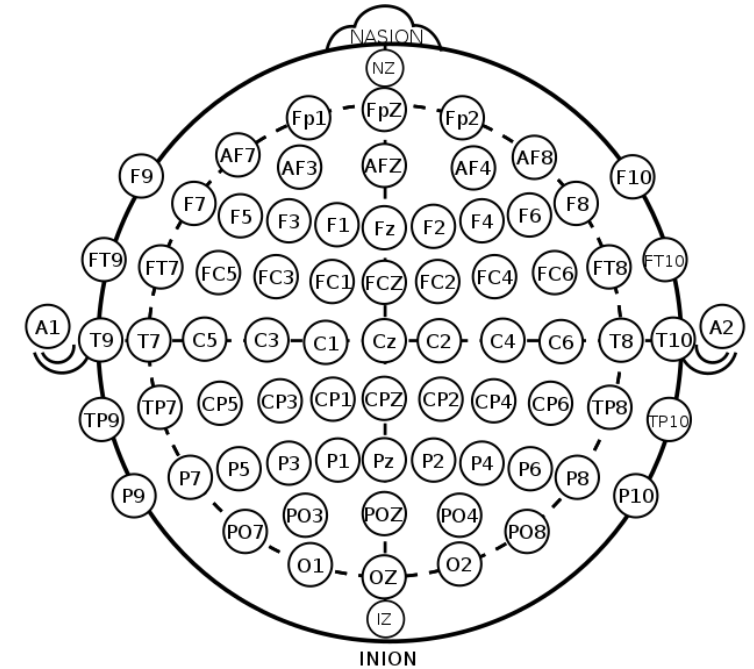
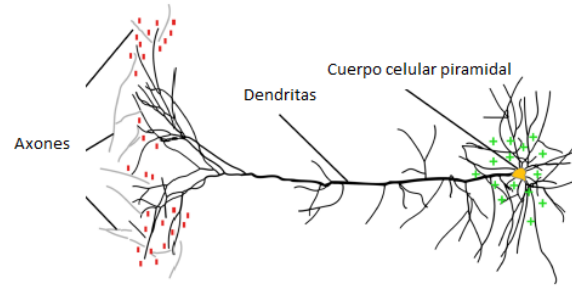
mean
standard deviation
difference of maximum and minimum of the preprocessed data

Labels: {concentration, meditation}

3. Cerebro, emociones



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Nivel fisiológico de activación del cerebro:

Valencia "Valencia positiva, alegría , Valencia negativa, ira, miedo"

Arousal "Arousal alto, excitación intensa, Arousal bajo sueño profundo"

4. Preproceso de los datos



Banda	Rango de frecuencias	Referencia
Delta	[1-4] Hz	Niedermeyer & da Silva, 2012
Theta	[4-8] Hz	Niedermeyer & da Silva, 2012
Alpha	[8-12] Hz	Hans Berger, 1929
Beta	[12-25] Hz	Niedermeyer & da Silva, 2012
Gamma	> 25 Hz	Dimigen, 2009

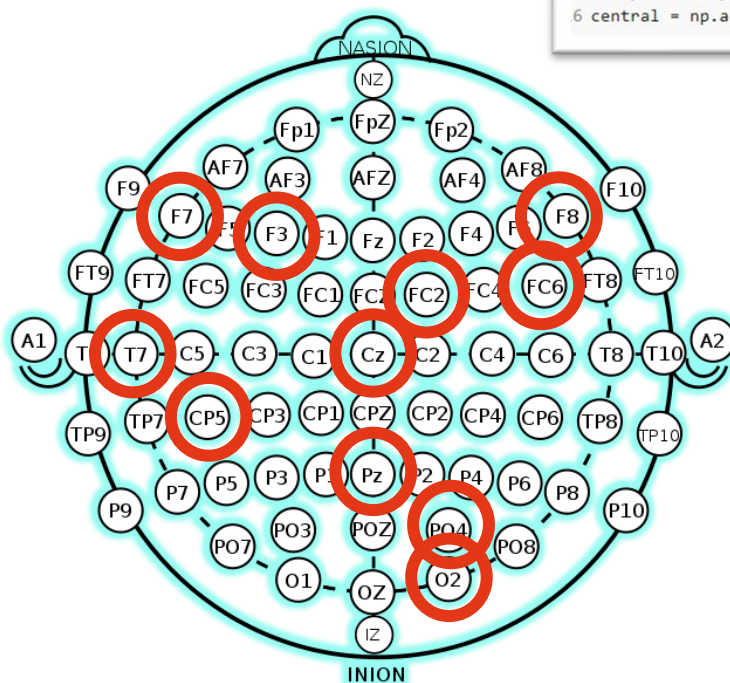
5. Random Forest



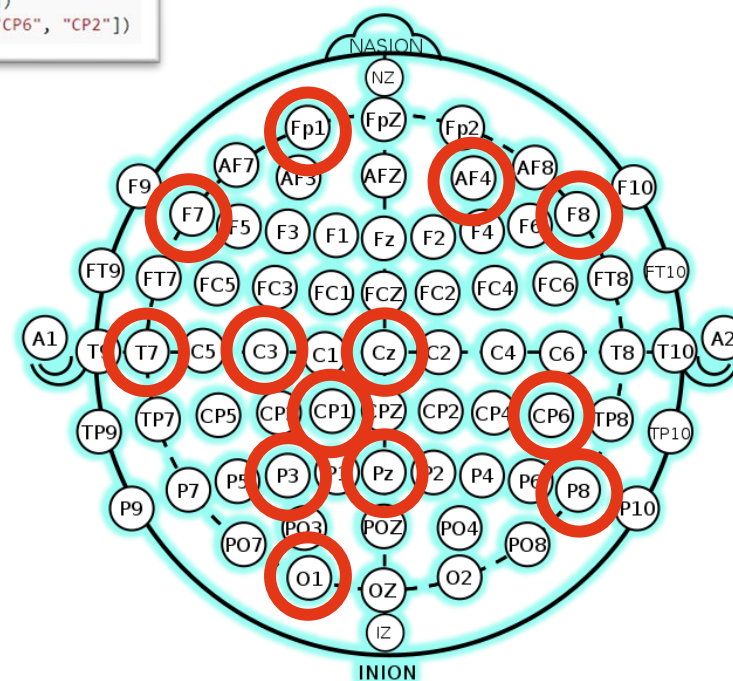
Electrodos más discriminativos:

```
1 left = np.array(["Fp1", "AF3", "F7", "FC5", "T7"])
2 right = np.array(["Fp2", "AF4", "F8", "FC6", "T8"])
3 frontal = np.array(["F3", "FC1", "Fz", "F4", "FC2"])
4 parietal = np.array(["P3", "P7", "Pz", "P4", "P8"])
5 occipital = np.array(["O1", "Oz", "O2", "PO3", "PO4"])
6 central = np.array(["CP5", "CP1", "Cz", "C4", "C3", "CP6", "CP2"])
```

Valence



Arousal

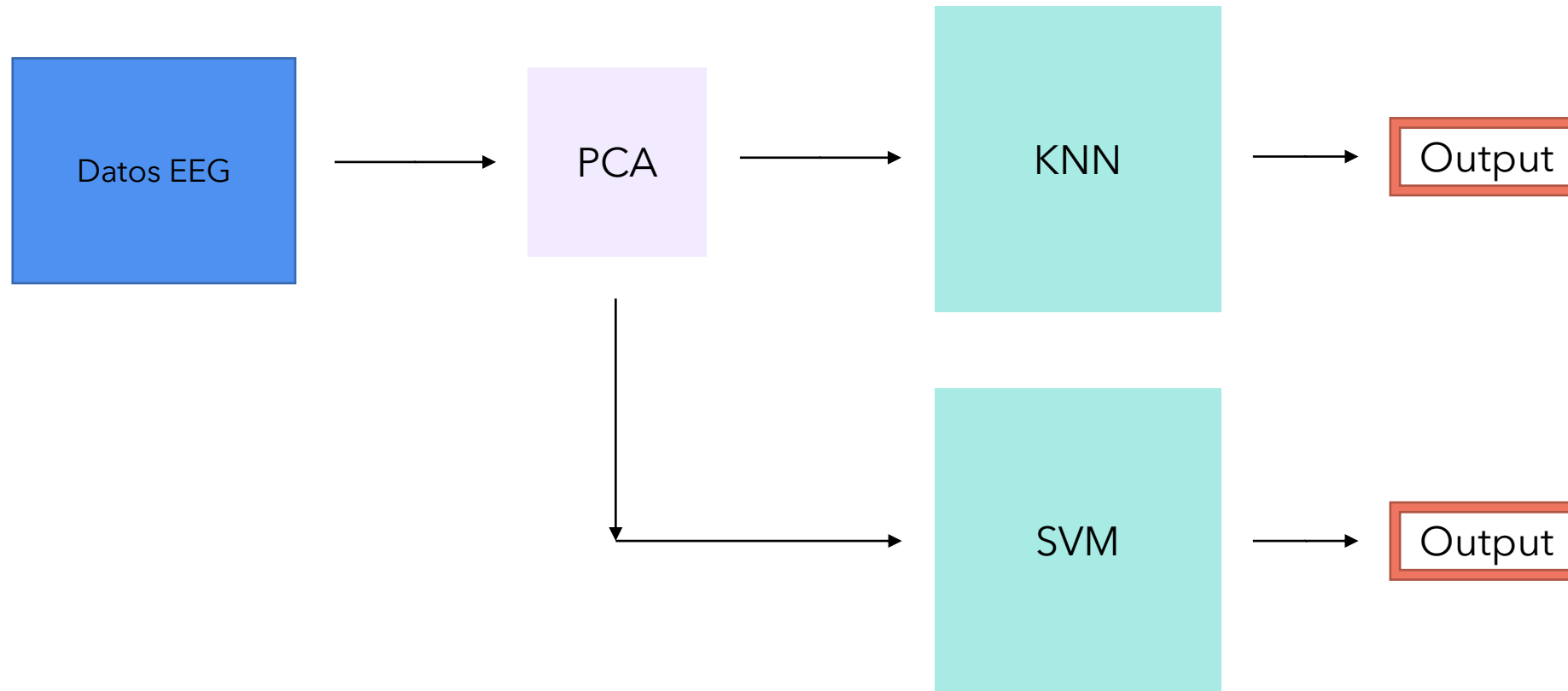


5.1 Resultados

Valence
0.65625

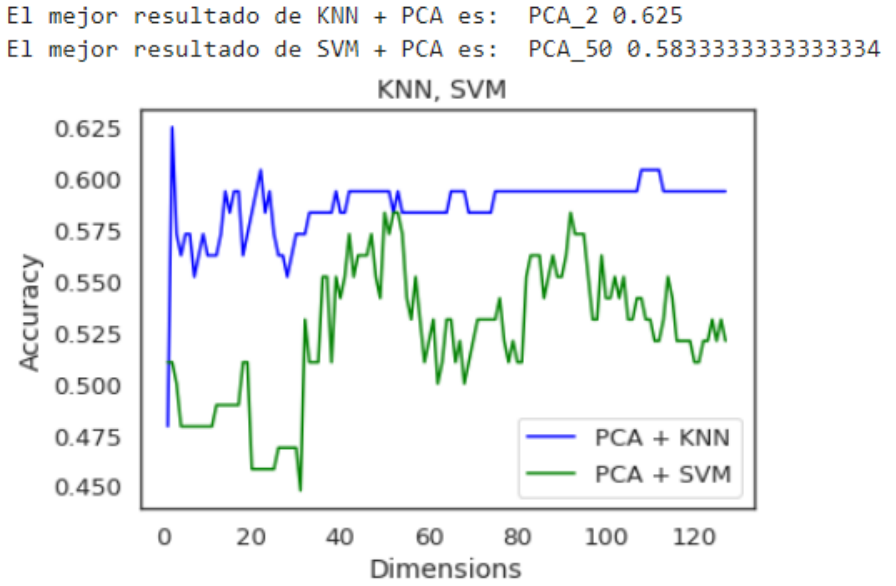
Arousal
0.625

6. KNN, SVM, PCA



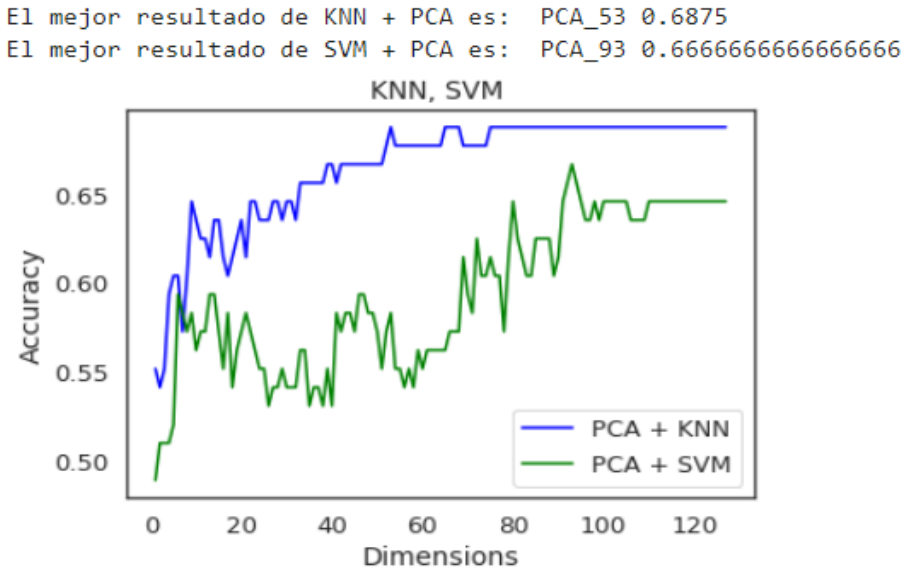
6.1 Resultados

Valence



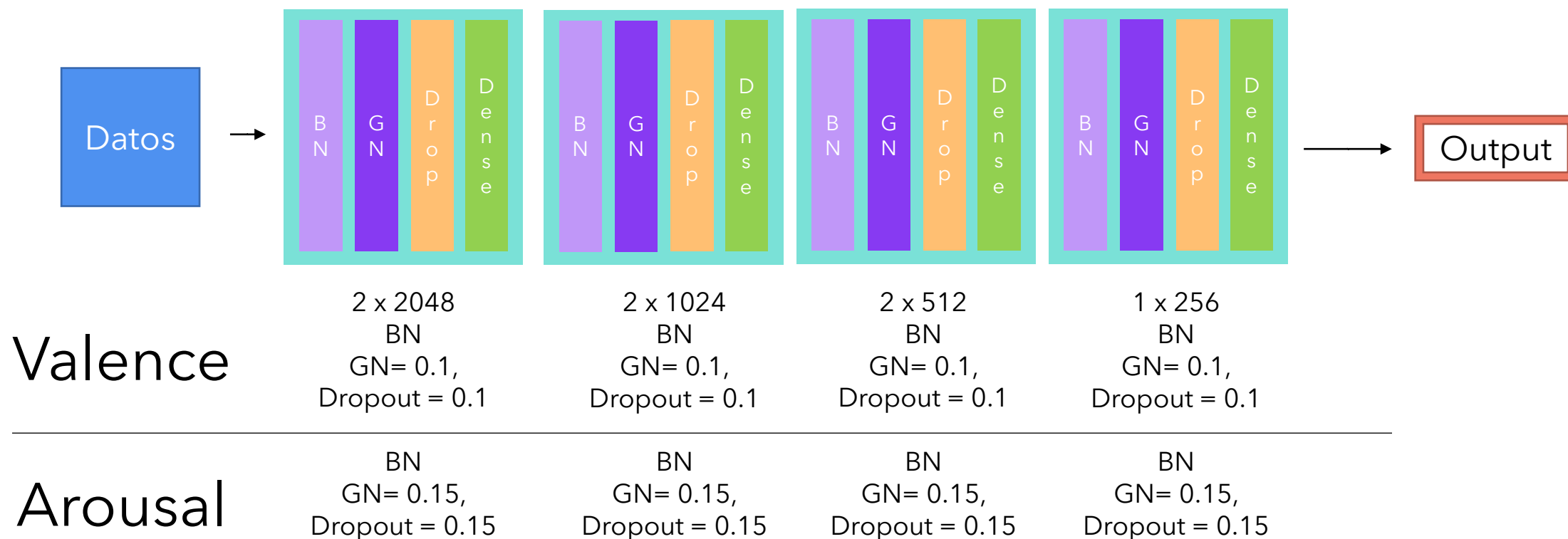
KNN 0.625
SVM 0.583

Arousal



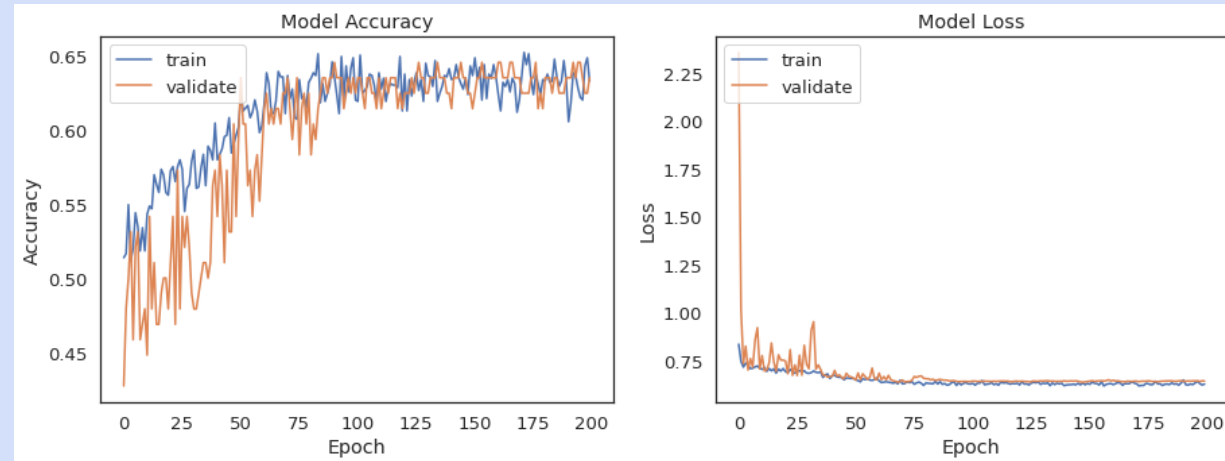
KNN 0.6875
SVM 0.6666

7. Fully Connected



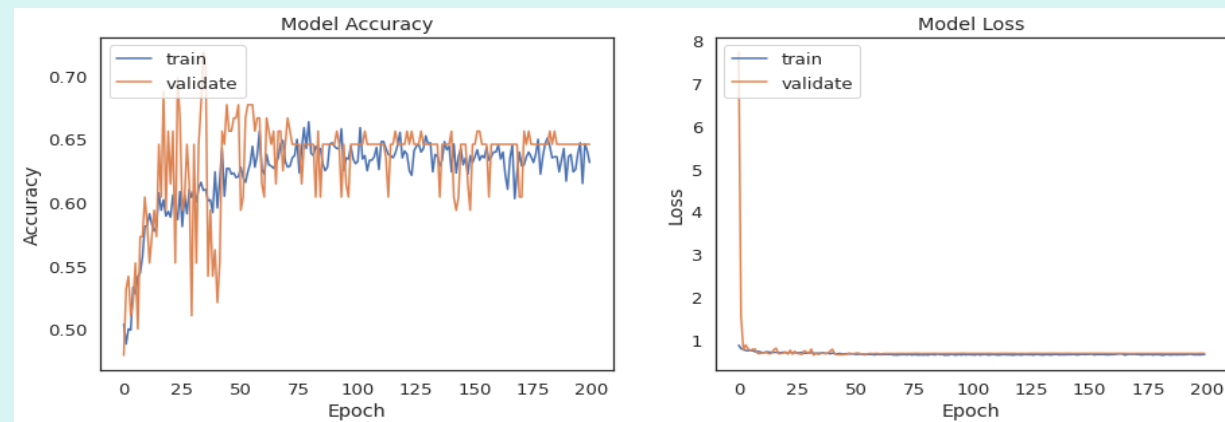
7.1 Resultados

Valence



FC 0.5937

Arousal



FC 0.6041

8. Conclusiones

Random Forest

- Permite ver las características más significativas
- RF Mejor método clásico para clasificar la "Valencia" (0.656)

KNN, SVM, PCA

- KNN Mejor método clásico para clasificar la "Arousal" (0.68)
- Se pueden conseguir mejores resultados reduciendo la dimensionalidad

Fully Connected

- Peores resultados que los métodos clásicos
- Valencia, Arousal diferentes parámetros
 - Solución, utilizar otras características más significativas para mejorar resultados

Gracias

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