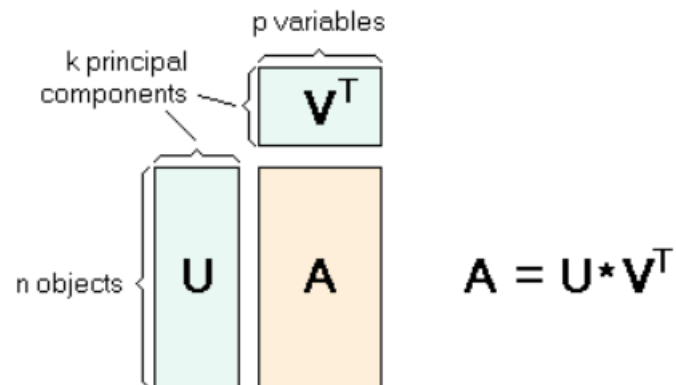


## Comparison of loading and score matrix in Python and R Programming

If we look at PCA more formally, it turns out that the PCA is based on a decomposition of the data matrix **X** into two matrices **V** and **U**:



The two matrices **V** and **U** are orthogonal. The matrix **V** is usually called the **loadings** matrix, and the matrix **U** is called the **scores** matrix. The loadings can be understood as the weights for each original variable when calculating the principal component. The matrix **U** contains the original data in a rotated coordinate system.

For the comparison result from r and python are figure bellow.

### Python

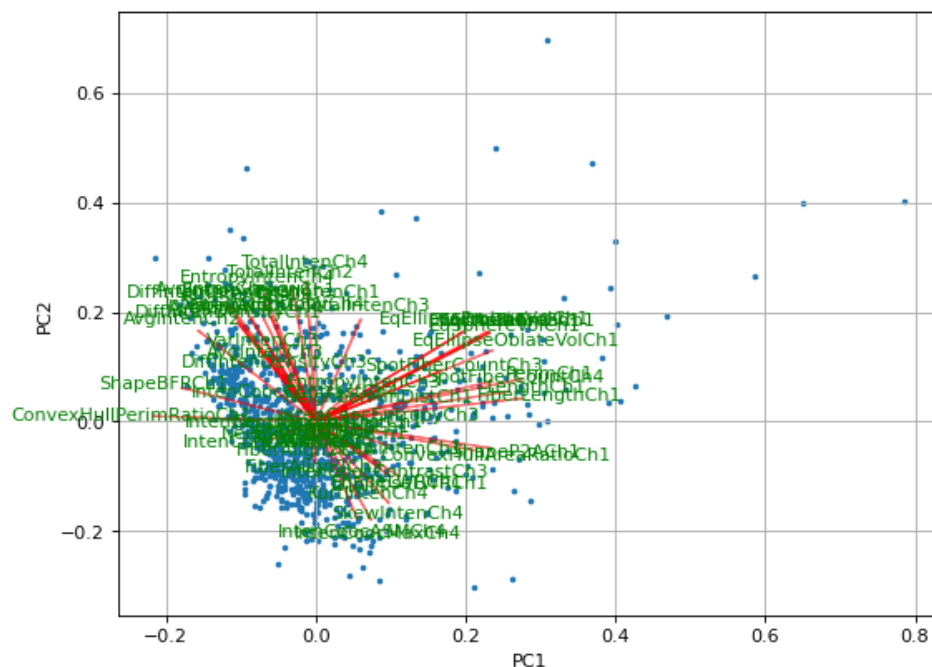
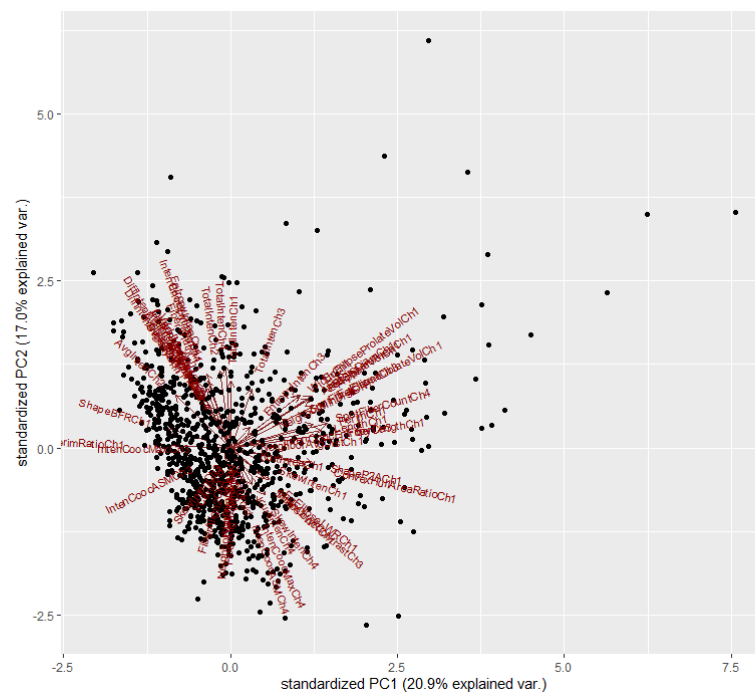


Fig.2 biplot result from python programming

## R



**Fig.3 biplot result from r programming**

The result from python and r is similar from loading and score matrix also we can see that both PC1 and PC2 are have similar result in r has result PC1 is equal to 20.9% and for PC2 is equal to 17.0% and if we can see from the python result bellow, and has similar result with the r programming language

```
pca variance ratio with 5 PCs: [0.20912359 0.170133 0.11886892 0.07715243 0.04957698 0.04120792
0.03363483 0.03277557 0.02862219 0.02532248]
```