

In []: `!pip install clustimage`

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheel-s/public/simple/
Collecting clustimage
  Downloading clustimage-1.5.14-py3-none-any.whl (37 kB)
Collecting umap-learn
  Downloading umap-learn-0.5.3.tar.gz (88 kB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 88.2/88.2 kB 5.5 MB/s eta 0:00:00
    Preparing metadata (setup.py) ... done
Collecting ismember
  Downloading ismember-1.0.2-py3-none-any.whl (7.5 kB)
Requirement already satisfied: scikit-learn in /usr/local/lib/python3.9/dist-packages (from clustimage) (1.2.2)
Collecting distfit
  Downloading distfit-1.6.10-py3-none-any.whl (40 kB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 40.4/40.4 kB 4.5 MB/s eta 0:00:00
Requirement already satisfied: scipy in /usr/local/lib/python3.9/dist-packages (from clustimage) (1.10.1)
Requirement already satisfied: requests in /usr/local/lib/python3.9/dist-packages (from clustimage) (2.27.1)
Requirement already satisfied: matplotlib in /usr/local/lib/python3.9/dist-packages (from clustimage) (3.7.1)
Collecting colourmap
  Downloading colourmap-1.1.11-py3-none-any.whl (8.1 kB)
Requirement already satisfied: pandas in /usr/local/lib/python3.9/dist-packages (from clustimage) (1.5.3)
Requirement already satisfied: scikit-image in /usr/local/lib/python3.9/dist-packages (from clustimage) (0.19.3)
Collecting scatterd>=1.1.2
  Downloading scatterd-1.3.1-py3-none-any.whl (11 kB)
Requirement already satisfied: tqdm in /usr/local/lib/python3.9/dist-packages (from clustimage) (4.65.0)
Requirement already satisfied: numpy in /usr/local/lib/python3.9/dist-packages (from clustimage) (1.22.4)
Requirement already satisfied: opencv-python in /usr/local/lib/python3.9/dist-packages (from clustimage) (4.7.0.72)
Collecting clusteval>=2.1.5
  Downloading clusteval-2.2.1-py3-none-any.whl (42 kB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 42.4/42.4 kB 5.1 MB/s eta 0:00:00
Collecting pypickle
  Downloading pypickle-1.1.0-py3-none-any.whl (5.1 kB)
Collecting pca
  Downloading pca-2.0.0-py3-none-any.whl (33 kB)
Collecting imagehash
  Downloading ImageHash-4.3.1-py2.py3-none-any.whl (296 kB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━ 296.5/296.5 kB 19.5 MB/s eta 0:00:00
Requirement already satisfied: seaborn in /usr/local/lib/python3.9/dist-packages (from clusteval>=2.1.5->clustimage) (0.12.2)
Requirement already satisfied: statsmodels in /usr/local/lib/python3.9/dist-packages (from distfit->clustimage) (0.13.5)
Requirement already satisfied: packaging in /usr/local/lib/python3.9/dist-packages (from distfit->clustimage) (23.1)
Requirement already satisfied: fonttools>=4.22.0 in /usr/local/lib/python3.9/dist-packages (from matplotlib->clustimage) (4.39.3)
Requirement already satisfied: cycler>=0.10 in /usr/local/lib/python3.9/dist-packages (from matplotlib->clustimage) (0.11.0)
Requirement already satisfied: kiwisolver>=1.0.1 in /usr/local/lib/python3.9/dist-packages (from matplotlib->clustimage) (1.4.4)
Requirement already satisfied: contourpy>=1.0.1 in /usr/local/lib/python3.9/dist-packages (from matplotlib->clustimage) (1.0.7)
Requirement already satisfied: pyparsing>=2.3.1 in /usr/local/lib/python3.9/dist-packages (from matplotlib->clustimage) (3.0.9)
Requirement already satisfied: python-dateutil>=2.7 in /usr/local/lib/python3.9/dist-packages (from matplotlib->clustimage) (2.8.2)
Requirement already satisfied: importlib-resources>=3.2.0 in /usr/local/lib/python
```

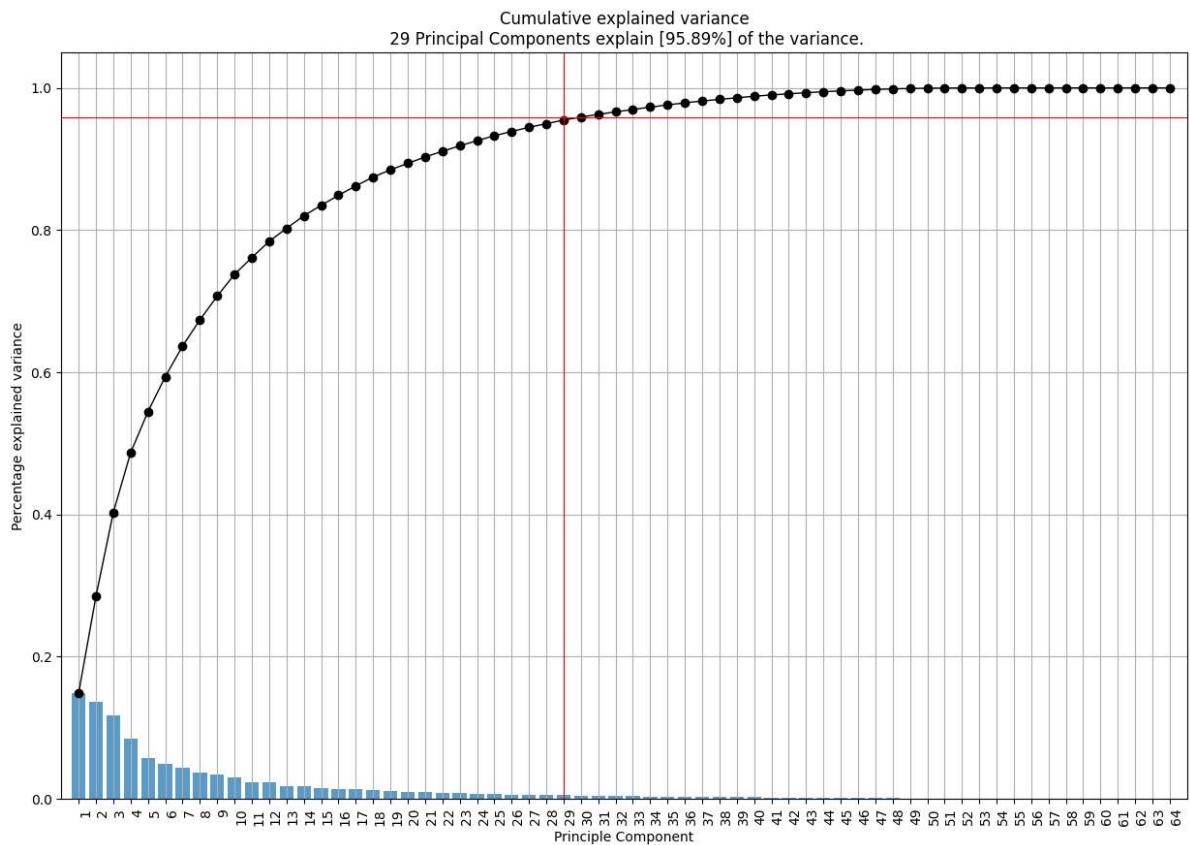
```

3.9/dist-packages (from matplotlib->clustimage) (5.12.0)
Requirement already satisfied: pillow>=6.2.0 in /usr/local/lib/python3.9/dist-packages (from matplotlib->clustimage) (8.4.0)
Requirement already satisfied: PyWavelets in /usr/local/lib/python3.9/dist-packages (from imagehash->clustimage) (1.4.1)
Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.9/dist-packages (from pandas->clustimage) (2022.7.1)
Collecting adjusttext
    Downloading adjustText-0.8-py3-none-any.whl (9.1 kB)
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.9/dist-packages (from requests->clustimage) (3.4)
Requirement already satisfied: charset-normalizer~=2.0.0 in /usr/local/lib/python3.9/dist-packages (from requests->clustimage) (2.0.12)
Requirement already satisfied: urllib3<1.27,>=1.21.1 in /usr/local/lib/python3.9/dist-packages (from requests->clustimage) (1.26.15)
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.9/dist-packages (from requests->clustimage) (2022.12.7)
Requirement already satisfied: tifffile>=2019.7.26 in /usr/local/lib/python3.9/dist-packages (from scikit-image->clustimage) (2023.4.12)
Requirement already satisfied: networkx>=2.2 in /usr/local/lib/python3.9/dist-packages (from scikit-image->clustimage) (3.1)
Requirement already satisfied: imageio>=2.4.1 in /usr/local/lib/python3.9/dist-packages (from scikit-image->clustimage) (2.25.1)
Requirement already satisfied: threadpoolctl>=2.0.0 in /usr/local/lib/python3.9/dist-packages (from scikit-learn->clustimage) (3.1.0)
Requirement already satisfied: joblib>=1.1.1 in /usr/local/lib/python3.9/dist-packages (from scikit-learn->clustimage) (1.2.0)
Requirement already satisfied: numba>=0.49 in /usr/local/lib/python3.9/dist-packages (from umap-learn->clustimage) (0.56.4)
Collecting pynndescent>=0.5
    Downloading pynndescent-0.5.10.tar.gz (1.1 MB)
    1.1/1.1 MB 58.8 MB/s eta 0:00:00
        Preparing metadata (setup.py) ... done
Requirement already satisfied: zipp>=3.1.0 in /usr/local/lib/python3.9/dist-packages (from importlib-resources>=3.2.0->matplotlib->clustimage) (3.15.0)
Requirement already satisfied: setuptools in /usr/local/lib/python3.9/dist-packages (from numba>=0.49->umap-learn->clustimage) (67.7.2)
Requirement already satisfied: llvmlite<0.40,>=0.39.0dev0 in /usr/local/lib/python3.9/dist-packages (from numba>=0.49->umap-learn->clustimage) (0.39.1)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.9/dist-packages (from python-dateutil>=2.7->matplotlib->clustimage) (1.16.0)
Requirement already satisfied: patsy>=0.5.2 in /usr/local/lib/python3.9/dist-packages (from statsmodels->distfit->clustimage) (0.5.3)
Building wheels for collected packages: umap-learn, pynndescent
    Building wheel for umap-learn (setup.py) ... done
    Created wheel for umap-learn: filename=umap_learn-0.5.3-py3-none-any.whl size=82830 sha256=5c919961619a93edfe54efcabae8f8cfbf09950e7b2ccc26910dc14d3ec7d
    Stored in directory: /root/.cache/pip/wheels/f4/3e/1c/596d0a463d17475af648688443fa4846fef624d1390339e7e9
    Building wheel for pynndescent (setup.py) ... done
    Created wheel for pynndescent: filename=pynndescent-0.5.10-py3-none-any.whl size=55640 sha256=2a6a18f166507b15967fde52077b543def3ebc95de75df954a6301643103b385
    Stored in directory: /root/.cache/pip/wheels/12/f9/4d/ec5ad1c823c710fcc4473669fdcffc8891f4bc398c841af22e
Successfully built umap-learn pynndescent
Installing collected packages: pickle, ismember, imagehash, pynndescent, colourmap, adjusttext, umap-learn, scatterd, distfit, pca, clusteval, clustimage
Successfully installed adjusttext-0.8 clusteval-2.2.1 clustimage-1.5.14 colourmap-1.1.11 distfit-1.6.10 imagehash-4.3.1 ismember-1.0.2 pca-2.0.0 pynndescent-0.5.10 pickle-1.1.0 scatterd-1.3.1 umap-learn-0.5.3

```

In []: `from clustimage import Clustimage`

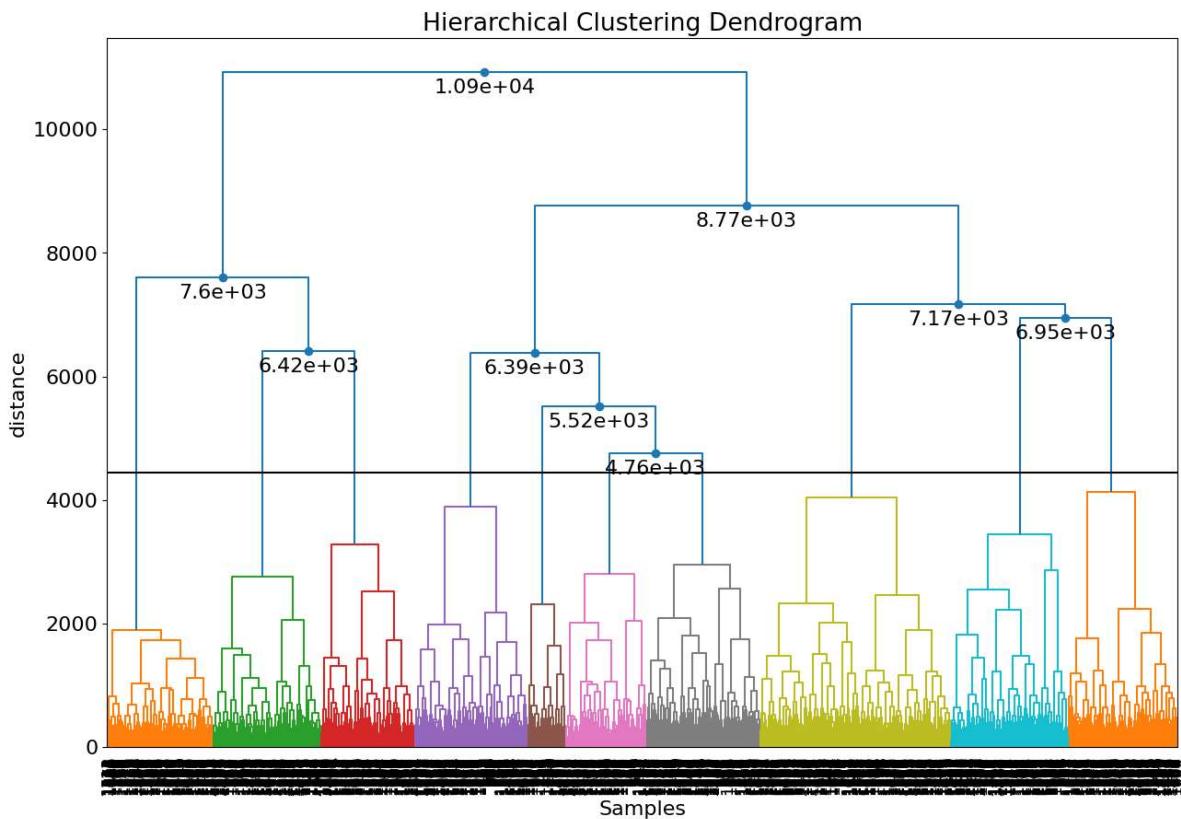
In []: `model.pca.plot()`



Out[]: (`<Figure size 1500x1000 with 1 Axes>`,
`<Axes: title={'center': 'Cumulative explained variance\nn 29 Principal Components explain [95.89%] of the variance.'}, xlabel='Principle Component', ylabel='Percent age explained variance'>`)
`<Figure size 640x480 with 0 Axes>`

In []: `cl.dendrogram()`

[clusteval] >Plotting the dendrogram with optimized settings: metric=euclidean, linkage=ward, max_d=4445.983. Be patient now..
[clusteval] >Compute cluster labels.

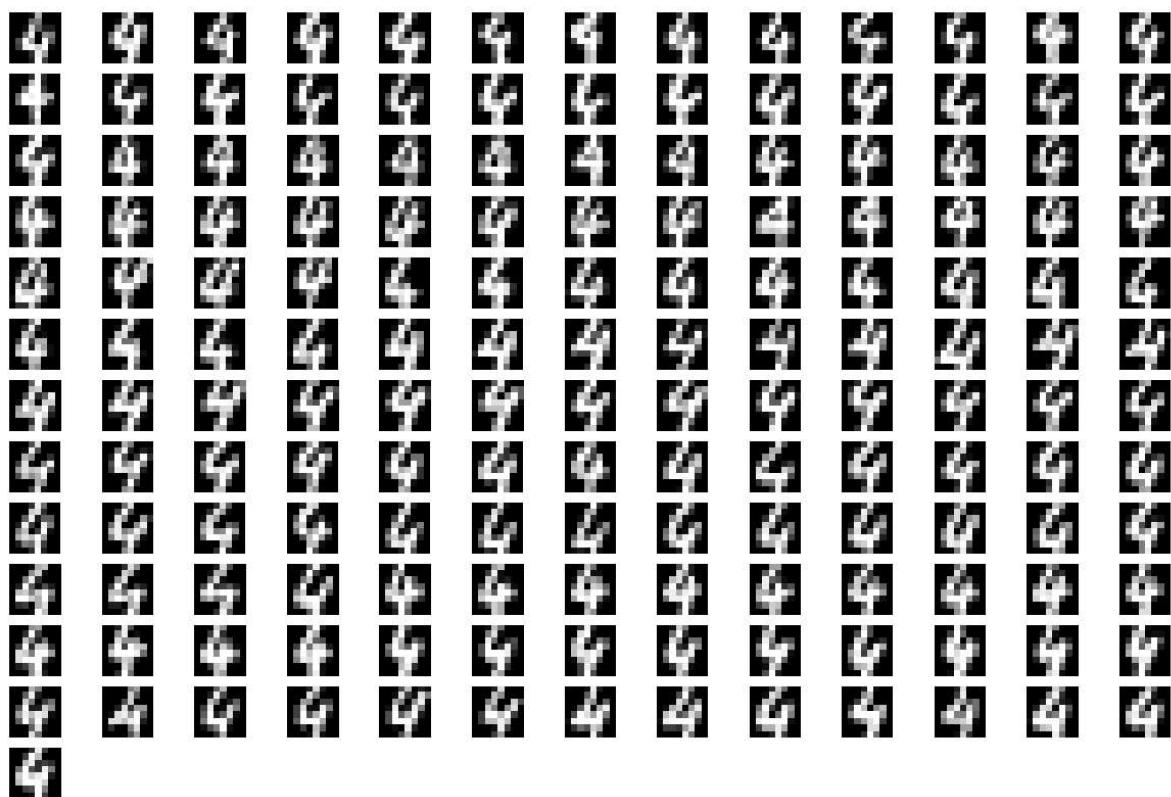


```
In [ ]: cl.plot(cmap='binary', labels=[1,2])
```

Images in cluster 1



Images in cluster 2



In []: