

April 12, 2022

## 1 VV5 flokkun veðurgagn með kmeans reikniriti

### 1.1 1.

```
[ ]: import numpy as np
      from scipy.cluster.vq import kmeans, vq, whiten

      url = 'http://cs.hi.is/python/hiti-urkoma.txt'

      ar,hiti,urkoma = np.loadtxt(url).T

      np.random.seed(42069)

      X = np.c_[hiti,urkoma]
      X = whiten(X)
      k = 4

      (cb, d) = kmeans(X,k)

      print('Miðpunktar:\n',cb)
      print('Heildarfjöldi ára: ',len(ar))
      print('Fjöldi ára í flokk:',len(ar)/k)
```

```
Miðpunktar:
[[4.15941886 4.24963666]
 [6.83769634 4.27809624]
 [5.37452998 3.61690936]
 [6.01324224 5.80171902]]
Heildarfjöldi ára: 70
Fjöldi ára í flokk: 17.5
```

### 1.2 2.

```
[ ]: import matplotlib.pyplot as plt

      def qcmap(n):
          # Fjölgun scatter-lita upp í allt að 20
```

```

# Bætið viðfangi 'cmap=qcmap(n)' við plt.scatter kall
import matplotlib.colors as clr

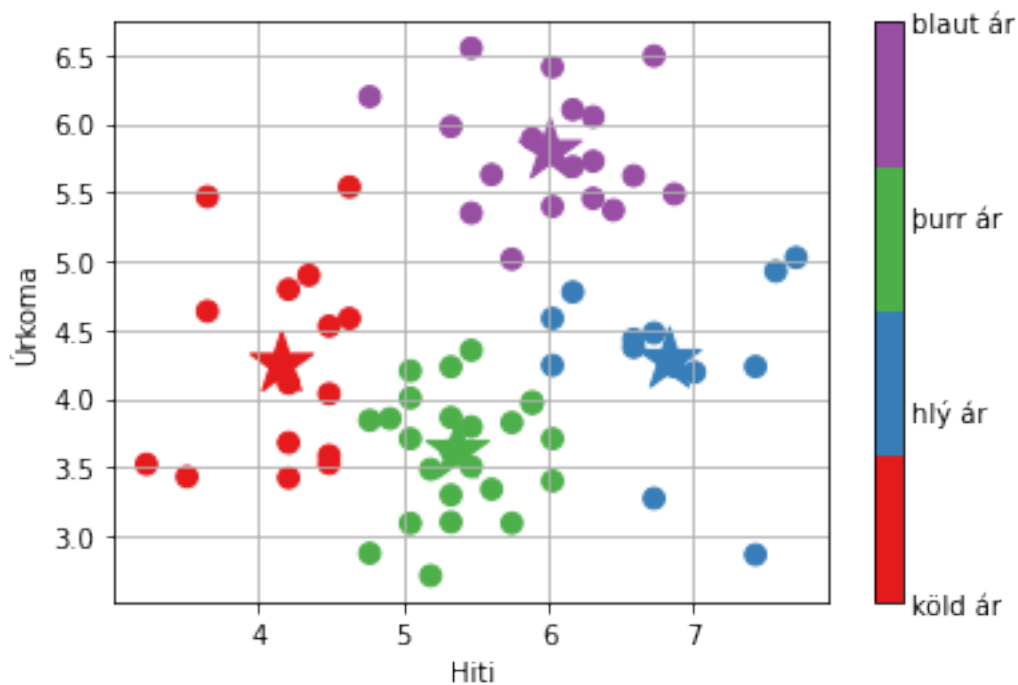
use_cmap = "Set1" if n <= 9 else "tab20"
cmap = plt.get_cmap(use_cmap)(range(n))
if n > 5:
    cmap[5] = [0.95, 0.75, 0, 1] # dekkja gula litinn
return clr.LinearSegmentedColormap.from_list("", cmap, n)

(code, dvec) = vq(X, cb)
(x, y) = X.T
(mx, my) = cb.T
plt.set_cmap('rainbow')
plt.grid(True)
plt.xlabel('Hiti')
plt.ylabel('Úrkoma')
plt.scatter(x, y, s=60, c=code, cmap=qcmap(4))
lbl = ['köld ár', 'hlý ár', 'þurr ár', 'blaut ár']
cb = plt.colorbar(ticks=range(4))
cb.set_ticklabels(lbl)
cb.ax.tick_params(size=0)

plt.scatter(mx, my, s=600, c=[0, 1, 2, 3], marker="*", cmap=qcmap(4))

plt.show()

```



```

[ ]: import numpy as np
from scipy.cluster.vq import kmeans, vq, whiten

url = "http://cs.hi.is/python/hiti-urkoma.txt"

ar, hiti, urkoma = np.loadtxt(url).T

np.random.seed(42069)

X = np.c_[hiti, urkoma]
X = whiten(X)
k = 10

(cb, d) = kmeans(X, k)

def qcmap(n):
    # Fjölgun scatter-lita upp í allt að 20
    # Bætið viðfangi 'cmap=qcmap(n)' við plt.scatter kall
    import matplotlib.colors as clr
    use_cmap = "Set1" if n <= 9 else "tab20"
    cmap = plt.get_cmap(use_cmap)(range(n))
    if n > 5:
        cmap[5] = [0.95, 0.75, 0, 1] # dekkja gula litinn
    return clr.LinearSegmentedColormap.from_list("", cmap, n)

(code, dvec) = vq(X, cb)
(x, y) = X.T
(mx, my) = cb.T
plt.set_cmap("tab10")
plt.grid(True)
plt.scatter(x, y, s=60, c=code, cmap=qcmap(10))
plt.scatter(
    mx,
    my,
    s=600,
    c=[
        0,
        1,
        2,
        3,
        4,
        5,
        6,

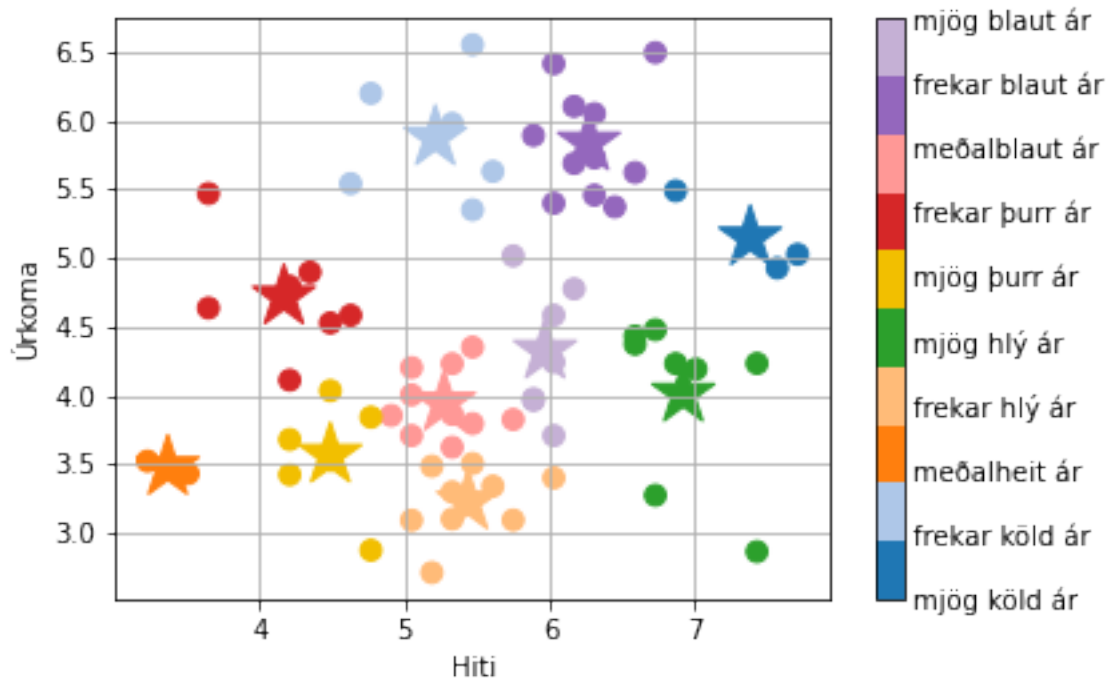
```

```

        7,
        8,
        9,
    ],
    marker="*",
    cmap=qcmap(10),
)
plt.xlabel("Hiti")
plt.ylabel("Úrkoma")
lbl = [
    "mjög köld ár",
    "frekar köld ár",
    "meðalheit ár",
    "frekar hlý ár",
    "mjög hlý ár",
    "mjög þurr ár",
    "frekar þurr ár",
    "meðalblaut ár",
    "frekar blaut ár",
    "mjög blaut ár",
]
cb = plt.colorbar(ticks=range(10))
cb.set_ticklabels(lbl)
cb.ax.tick_params(size=0)

plt.show()

```



## 2 VV6 Hlutapróf 2 vorið 2021

### 2.1 A.

#### 2.1.1 1.

```
[ ]: import numdifftools as nd

def f(i):
    x = i[0]
    y = i[1]
    return ((x**2)*y)+(2*x*(y**2))-(3*x*y)+4

def stigull(x):
    return nd.Gradient(f)(x)

stigullP = stigull([1,1])
print("Stigull fyrir P er", stigullP)
```

Stigull fyrir P er [1. 2.]

#### 2.1.2 2. 3.

```
[ ]: def stefna(p,u):
    return p[0]*u[0]+p[1]*u[1]

u = [-1, -1]
p = stigull([1,1])
print(p)
stefna(p,u)
```

[1. 2.]

```
[ ]: -2.9999999999999999
```