DIGI111
Algoritmer og programmering

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File I/O

- open(filename, mode) mode: **r**ead, **w**rite, **a**ppend

```
with open("some.txt","r") as f:
    all_in_one = f.read()
```

```
with open("another.txt","r") as f:
    list_of_lines = f.readlines()
```

```
with open("third.txt","r") as f:
    for line in f:
        one_line = line
```

File I/O

- open(filename, mode) mode: **r**ead, **w**rite, **a**ppend

```
out = "Hello, how are you?"
with open(“hello.txt”,”w”) as f:
    f.write(out)
    f.write('\n')
```

```
in = ‘inputdata.txt’
out = ‘reverse.txt’

with open(in,’r’) as fi, open(out,’w’) as fo:
    for line in fi:
        outline = line[::-1] # reverse
        fo.write(outline)
```

import og modules

```
# helpers.py

def spam(x):
    s = 'spam'
    return f'{s}, {s}, {s}, {x} and {s}.'

N_A = 6.02214e+23
```

```
# work1.py

import helpers

a = helpers.N_A
b = helpers.spam('eggs')
```

```
# work2.py

import helpers as h

a = h.N_A
b = h.spam('eggs')
```

```
# work3.py

from helpers import N_A, spam

a = N_A
b = spam('eggs')
```

```
# work4.py

from helpers import N_A as L, spam as foo

a = L
b = foo('eggs')
```

import og modules

```
# helpers.py

def spam(x):
    s = 'spam'
    return f'{s}, {s}, {s}, {x} and {s}.'

N_A = 6.02214e+23
```

```
import helpers
import math

a = helpers.N_A
b = helpers.spam('eggs')
c = 27
d = math.sin(math.pi)
e = a + c + d
```

(lokalt)	helpers	math
a	N_A	sin()
b	spam()	pi
c		cos()
d		sqrt()
e		…
		…
		…

<- ***namespace***

```
from helpers import N_A
from math import sin,pi

a = N_A
c = 27
d = sin(pi)
e = a + c + d
```

(lokalt)		
N_A		
sin	**ikke tilgjengelig**	
pi		
a		
c		
d		
e		

Standard Library

Stor utvalg:

* Regular expressions, `difflib`, `textwrap`
* `datetime`, `calendar`
* synchronized queue
* `copy`
* `math`, `decimal`, `fractions`, `random`
* `os.path`, `stat`, `tempfile`, `shutil`
* `pickle`, `sqlite3`, `zlib`, `bz2`, `tarfile`, `csv`
* Markup, internet protocols, multimedia, debugging, ...

https://docs.python.org/3/library

math

```
import math
```

- floor, ceil
- exp, log, log2, log10
- pow, sqrt
- sin, cos, tan
- pi, e

fractions

```
from fractions import Fraction
Fraction(16, -10)
Fraction(123)
Fraction()
Fraction('3/7')
Fraction(' -3/7 ')
Fraction('1.414213 \t\n')
Fraction('-.125')
Fraction('7e-6')
Fraction(2.25)
Fraction(1.1)
```

```
x = Fraction(3,4) + Fraction(1,6)
x
x.numerator
x.denominator
```

```
from math import pi
Fraction(pi)
Fraction(pi).limit_denominator(100)
Fraction(pi).limit_denominator(50)
```

datetime

```
from datetime import date
today = date.today()
my_birthday = date(today.year, 6, 24)

if my_birthday < today:
    my_birthday = my_birthday.replace(year=today.year + 1)

time_to_birthday = abs(my_birthday - today)
print(time_to_birthday)
```

```
from datetime import datetime
now = datetime.now()
exam = datetime(2020, 5, 28, 9, 0, 0)
print(exam - now)
```

calendar

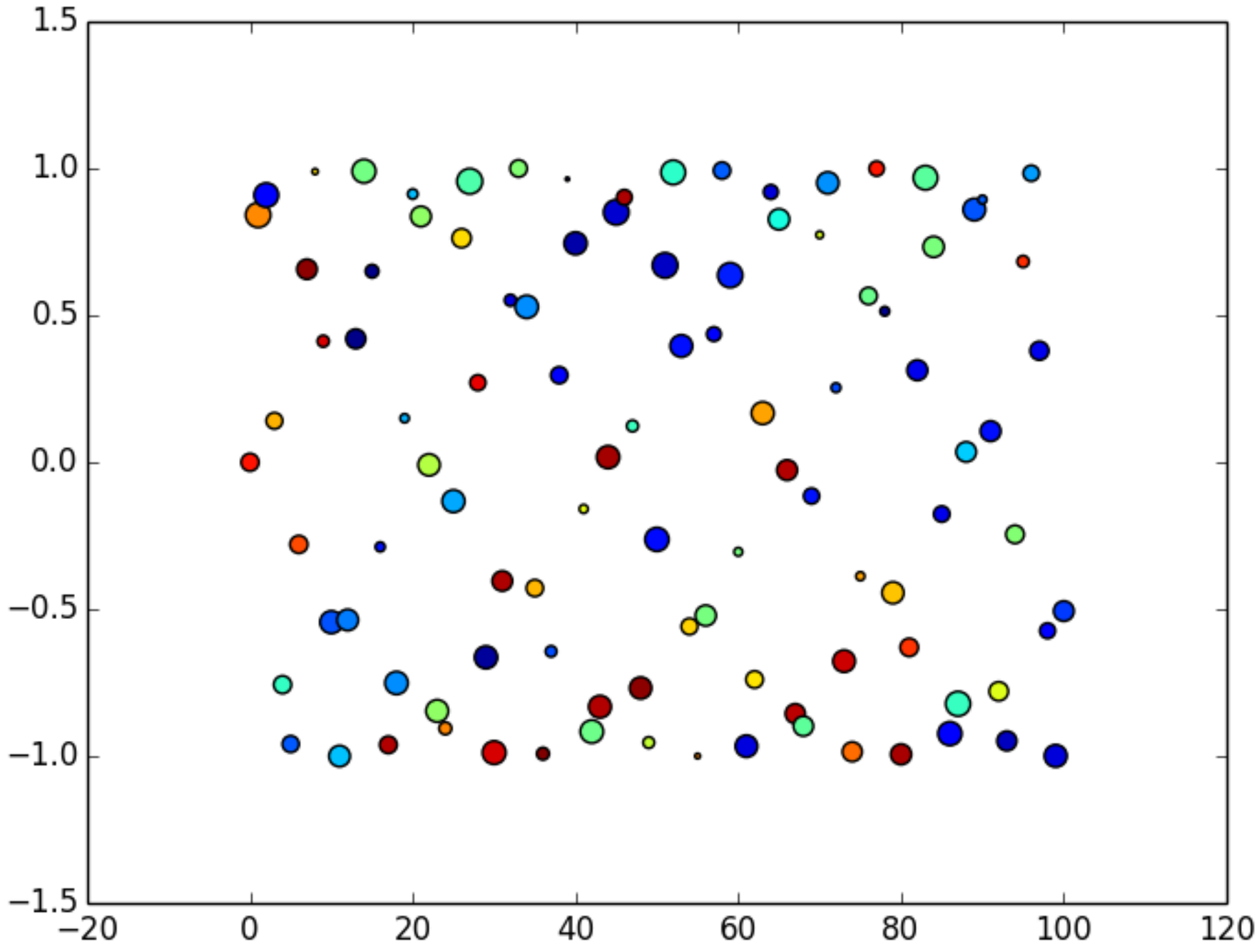
```
import calendar
calendar.prmonth(2020,02)
```

random

```
import random
# random.seed(123456) # reproduserbare resultater

random.randint(1,6) #  1 <= N <= 6

random.choice('abcdef')
random.choice([11, 7.2, 'foo'])
random.choices('abcdefghi', k=100)

random.sample('abcdefghi', k=3)
```

```
random.random() # [0.0, 1.0)
random.uniform(12.0, 20.0) #  12.0 <= N <= 20.0

random.gauss(mu=40.0,sigma=12.0)
```

matplotlib



matplotlib

https://matplotlib.org/

- eksternt bibliotek, ikke en del av standard-Python
- installer med f.eks.

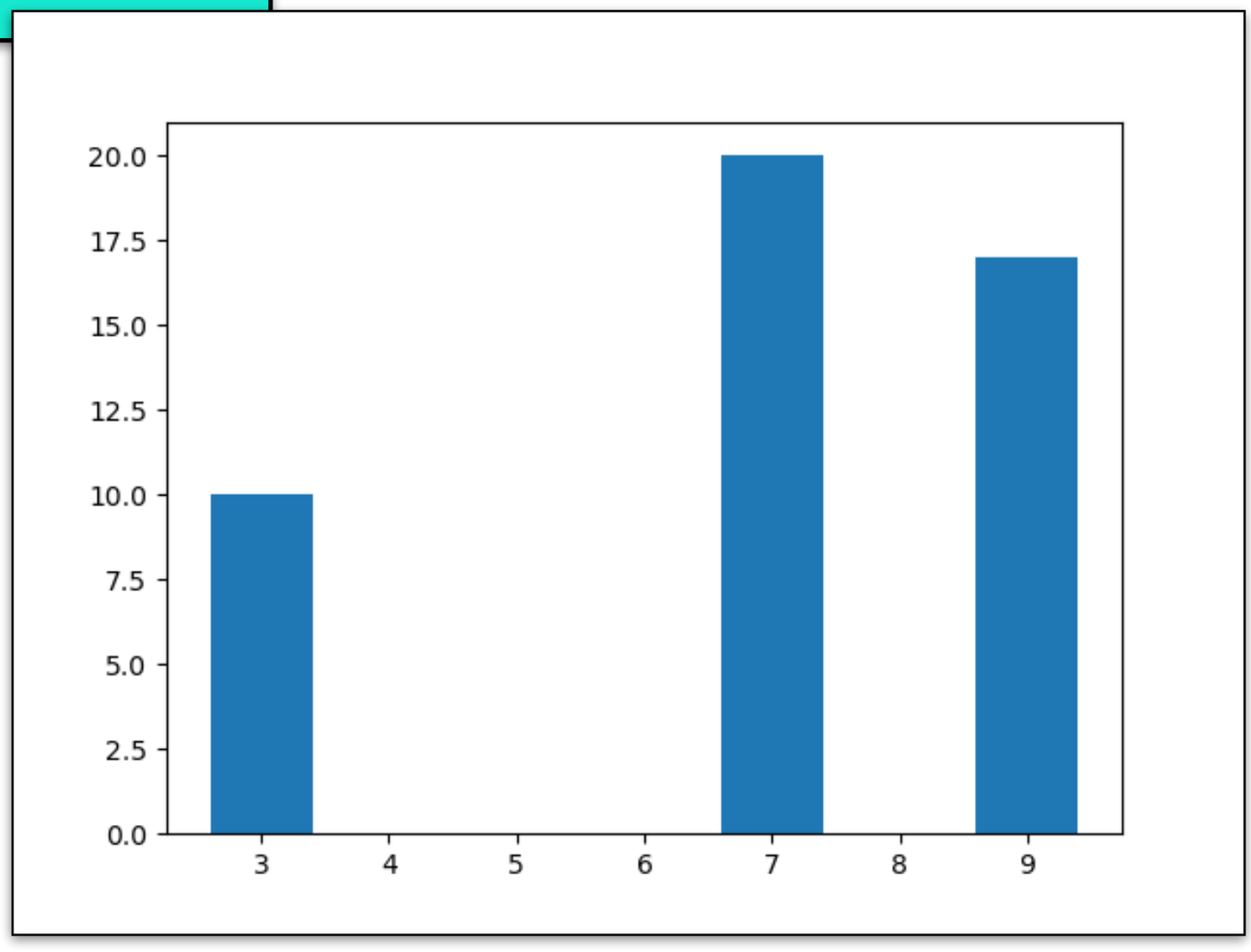
```
$ python -m pip install --user matplotlib
```

- eller kjør *install.py* fra mitt.uib i VSCode

```
import matplotlib.pyplot as plt
```

matplotlib bar chart

```
import matplotlib.pyplot as plt

plt.bar([3, 7, 9], [10, 20, 17])
plt.show()
```



matplotlib.pyplot

https://matplotlib.org/tutorials/introductory/pyplot.html

```
import matplotlib.pyplot as plt
```

- bar()
- plot()
- title(), xlabel(), ylabel()
- label=… plt.legend()
- axis(), xlim(), ylim()
- subplot()
- show(), savefig()

matplotlib gallery

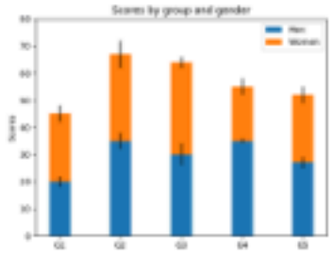
https://matplotlib.org/gallery/index.html

Gallery

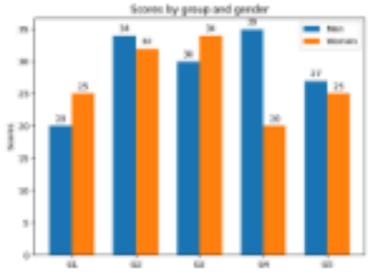
This gallery contains examples of the many things you can do with Matplotlib. Click on any image to see the full image and source code.

For longer tutorials, see our tutorials page. You can also find external resources and a FAQ in our user guide.

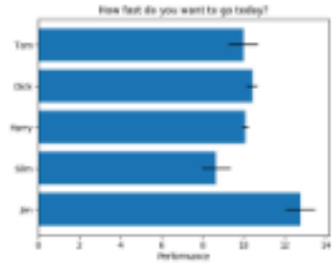
Lines, bars and markers



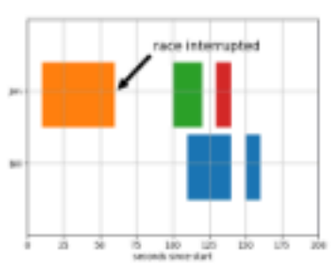
Stacked Bar Graph



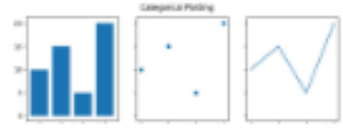
Grouped bar chart with labels

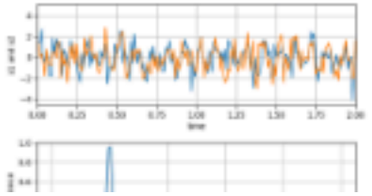


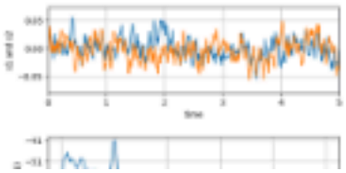
Horizontal bar chart

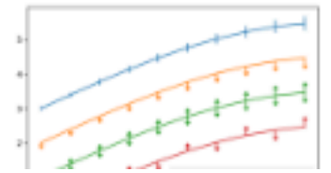


Broken Barh









Noen ideer:

- Skriv et turtle-programm som leser en fil
  ```
  left 20
  forward 30
  ...
  ```
  og tegner bildet

- Sammenligne fordelingen av bokstaver mellom tekster fra to ulike språk

- Se på Matplotlib-Gallery og gjør noe mer med akvakultur.csv

- Bruk alice.txt med https://www.nltk.org/book/ch05.html
  for å finne alle adjektiver (tag 'JJ')