UNIVERSITETET I BERGEN

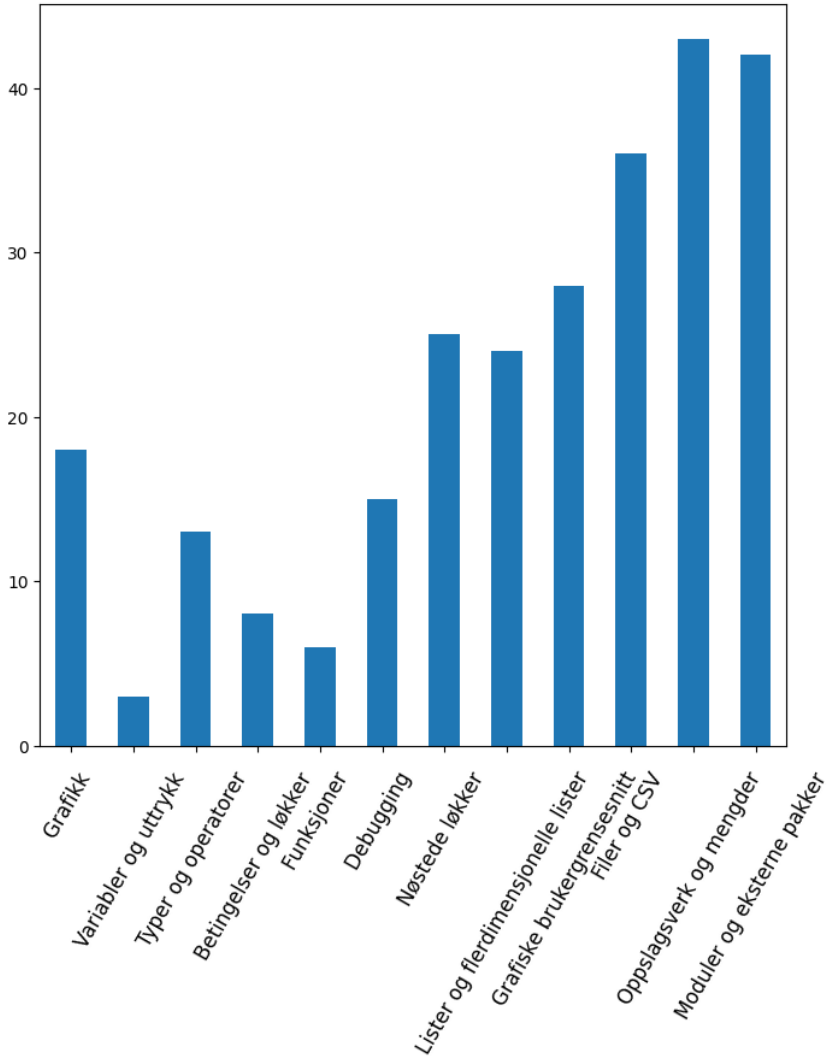
GJENNOMGANG

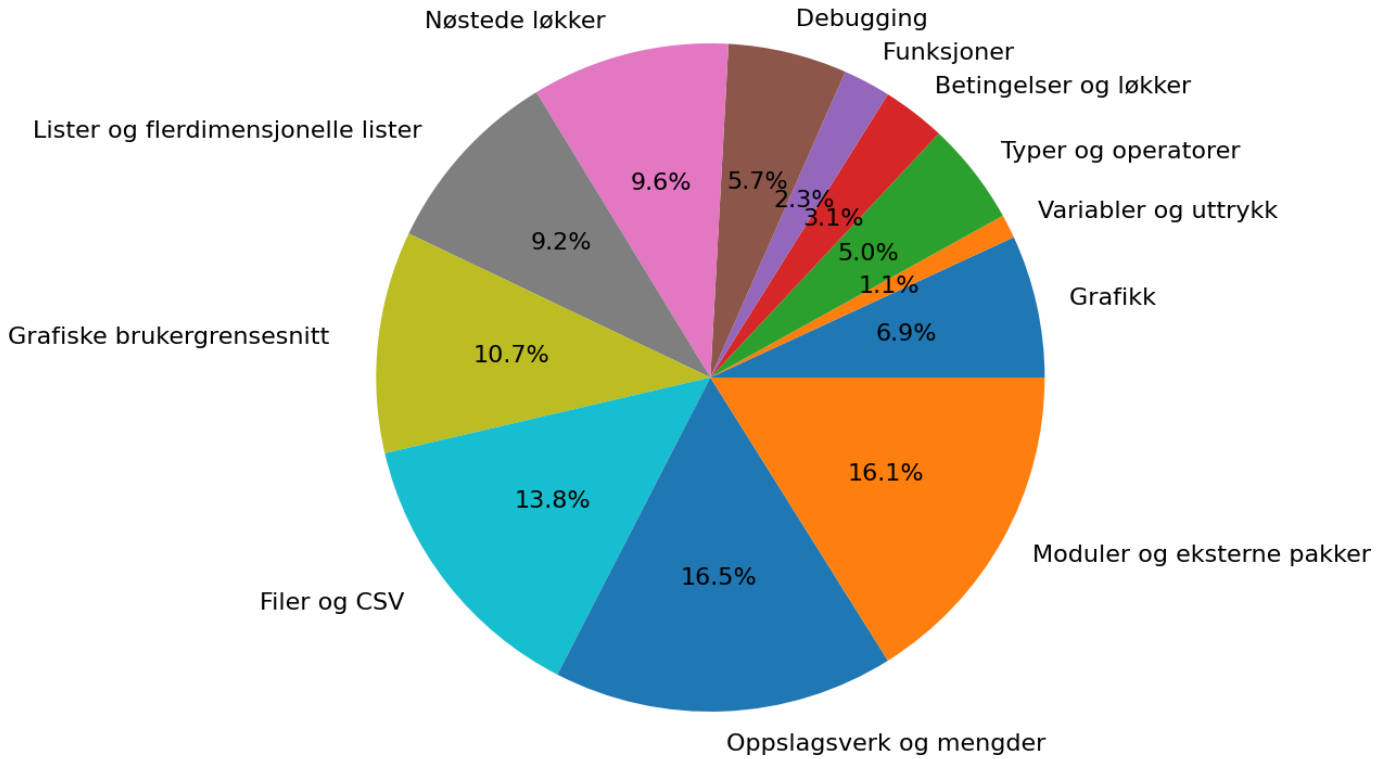
INF100

VÅR 2024

Jakob Sverre Alexandersen

Agenda


40
30
20
10
0
Grafikk
Variabler og uttrykk
Typer og operatorer
Betingelser og løkker
Funksjoner
Debugging
Nøstede løkker
Lister og flerdimensjonelle lister
Grafiske brukergrensesnitt
Filer og CSV
Oppslagsverk og mengder
Moduler og eksterne pakker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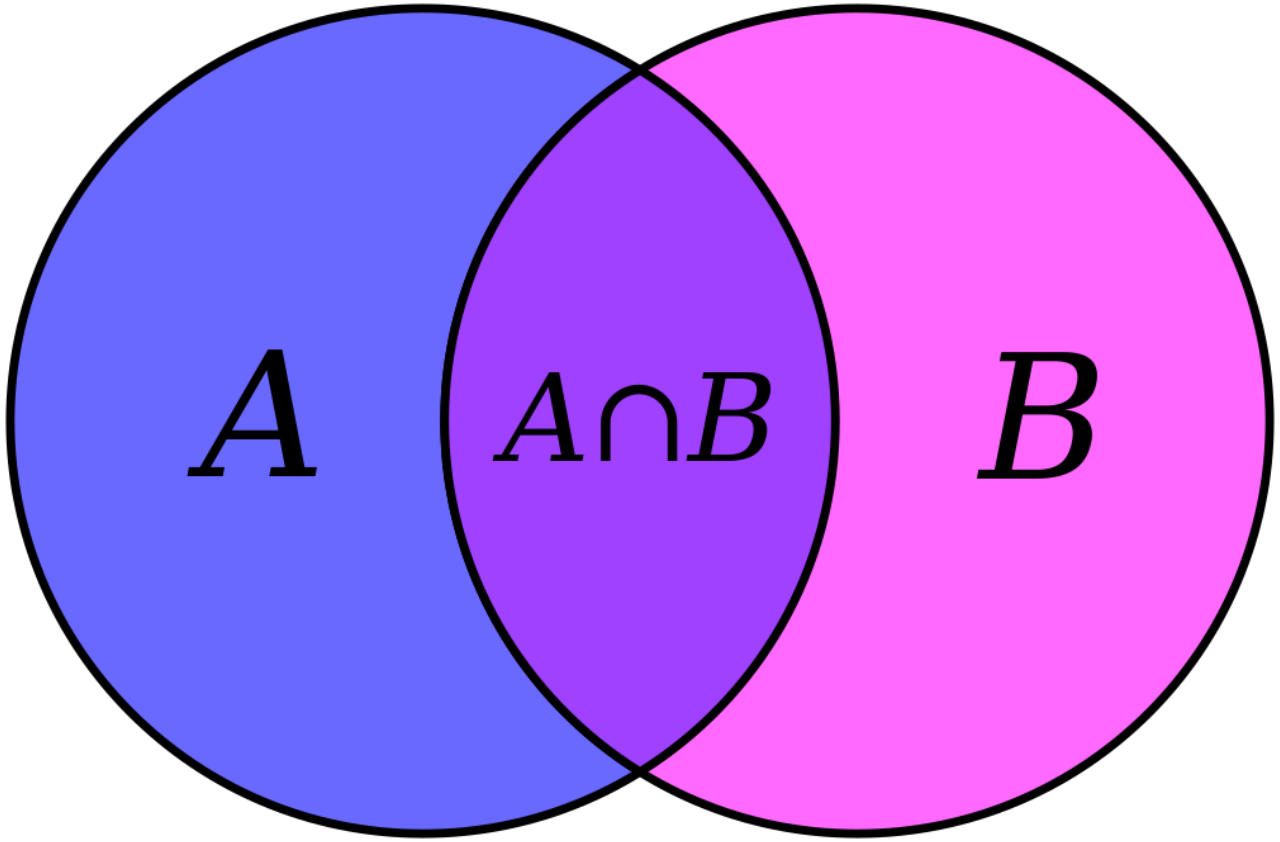
Oppslagsverk og mengder
9.6%
5.7%
2.3%
3.1%
5.0%
1.1%
6.9%
9.2%
10.7%
16.1%
13.8%
16.5%

Mengder (sets) 👥



Mengder (sets)

- Ingen duplikater!
- Rask(ere enn lister)
- Uordnet rekkefølge

```python
def count_overlap_fast(path1, path2):
    with open(path1, 'r') as f:
        path1 = f.read().splitlines()
    with open(path2, 'r') as f:
        path2 = f.read().splitlines()

    return len(set(path1) & set(path2))

```

Ca. 390 ms

```python
def count_overlap_slow(path1, path2):
    with open(path1, 'r') as f:
        path1 = f.read().splitlines()
    with open(path2, 'r') as f:
        path2 = f.read().splitlines()

    count = 0
    for line in path1:
        if line in path2:
            count += 1
    return count
```

Aner ikke, jeg avbrøyt koden etter den hadde kjørt i 45 sek

Forts.

```
a = {1, 2, 3}
b = {3, 4, 5}

print(a & b)                        #printer {3}
print(a.intersection(b))            #printer {3}
print(a | b)                        #printer {1, 2, 3, 4, 5}
print(a.union(b))                   #printer {1, 2, 3, 4, 5}
print(a ^ b)                        #printer {1, 2, 4, 5}
print(a.symmetric_difference(b))    #printer {1, 2, 4, 5}
print(a - b)                        #printer {1, 2}
print(a.difference(b))              #printer {1, 2}
print(b - a)                        #printer {4, 5}

```

Oppslagsverk 📖

- Keys
- Values
- Items

```python
my_dict = {'key': 'value', 43: 'foo'}
print(my_dict['key'])           #printer 'value'
print(my_dict.keys())           #printer ['key', 43]
print(my_dict.values())         #printer ['value', 'foo']
```

```python
country_map = {
    'Oslo': 'Østlandet',
    'Bergen': 'Vestlandet',
    'Drammen': 'Østlandet',
    'Stavanger': 'Vestlandet',
    'Kristiansand': 'Sørlandet',
}

for city, location in country_map.items():
    print(f'{city} is in {location}')

#output:
# Oslo is in Østlandet
# Bergen is in Vestlandet
# Drammen is in Østlandet
# Stavanger is in Vestlandet
# Kristiansand is in Sørlandet

```

Forts.

- Ingen duplikate keys i dict()!
  - Duplikate values er lov☺
- Dict i en dict?

```
1  double_dict = {'dette': {'er': {'en': {'nested' : 'dictionary!'}}}}
2  print(double_dict['dette']['er'])       #printer '{'en': {'nested': 'dictionary!'}}'
```

  - Har dere sett noe som minner om dette?

Moduler 🧩

- CSV
- Json / Requests
- Matplotlib
- UiB graphics
- Time / Datetime
- Math

Requests / Json 🌐

```python
import json
import requests

url = 'https://api.met.no/weatherapi/locationforecast/2.0/compact?lat=69.6489&lon=18.95508'
headers = {'User-Agent': 'inf100.ii.uib.no jaale0655'}
response = requests.get(url, headers=headers)
data = response.json()

print(data.keys())
print(data['properties'].keys())
print(data['properties']['timeseries'][0])      #klokken 06L → 07L
print(data['properties']['timeseries'][1])      #klokken 07L → 08L
print(data['properties']['timeseries'][2])      #klokken 08L → 09L
print(data['properties']['timeseries'][3])      #klokken 09L → 10L

```

```
{
    "type": "Feature",
    "geometry": {
        "type": "Point",
        "coordinates": [
            18.9551,
            69.6489,
            7
        ]
    },
    "properties": {
        "meta": {
            "updated_at": "2024-04-10T05:47:44Z",
            "units": {
                "air_pressure_at_sea_level": "hPa",
                "air_temperature": "celsius",
                "cloud_area_fraction": "%",
                "precipitation_amount": "mm",
                "relative_humidity": "%",
                "wind_from_direction": "degrees",
                "wind_speed": "m/s"
            }
        }}} ...
```

- json.loads(argument) for å konvertere fra json til dict

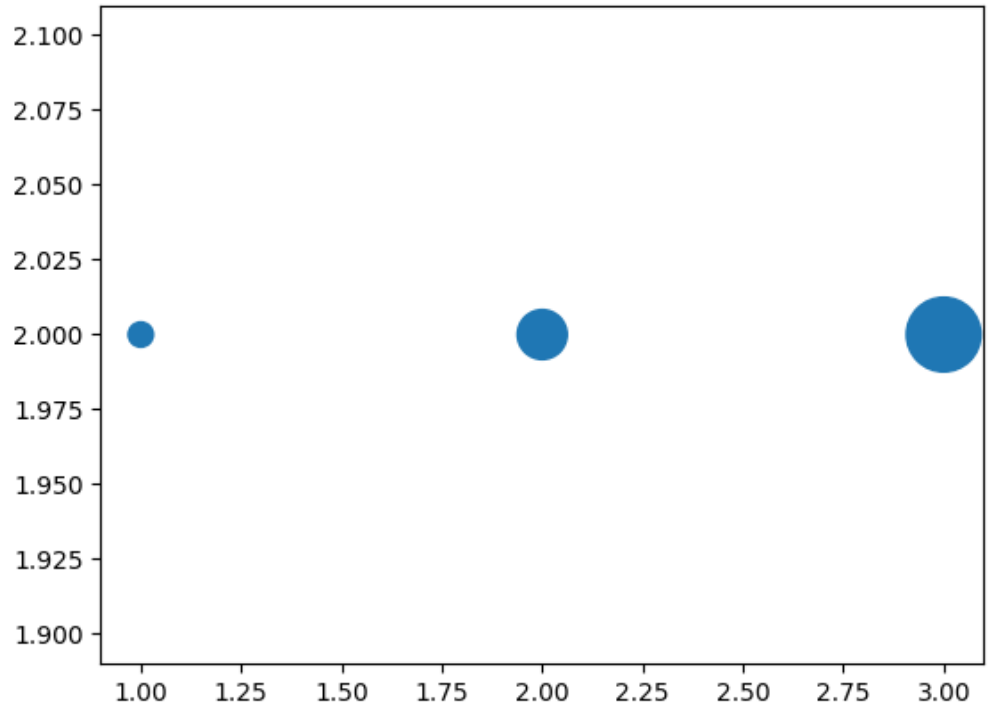
```python
weather = data['properties']['timeseries'][3]
data_dict = weather['data']['instant']['details']

pressure = data_dict['air_pressure_at_sea_level']
temperature = data_dict['air_temperature']
cloud_cover = data_dict['cloud_area_fraction']
humidity = data_dict['relative_humidity']
wind_directon = data_dict['wind_from_direction']
wind_speed = data_dict['wind_speed']

print(f'Temperature: {temperature}°C')
print(f'Pressure: {pressure} hPa')
print(f'Cloud cover: {cloud_cover}%')
print(f'Humidity: {humidity}%')
print(f'Wind direction: {wind_directon}°')
print(f'Wind speed: {wind_speed} m/s')
```

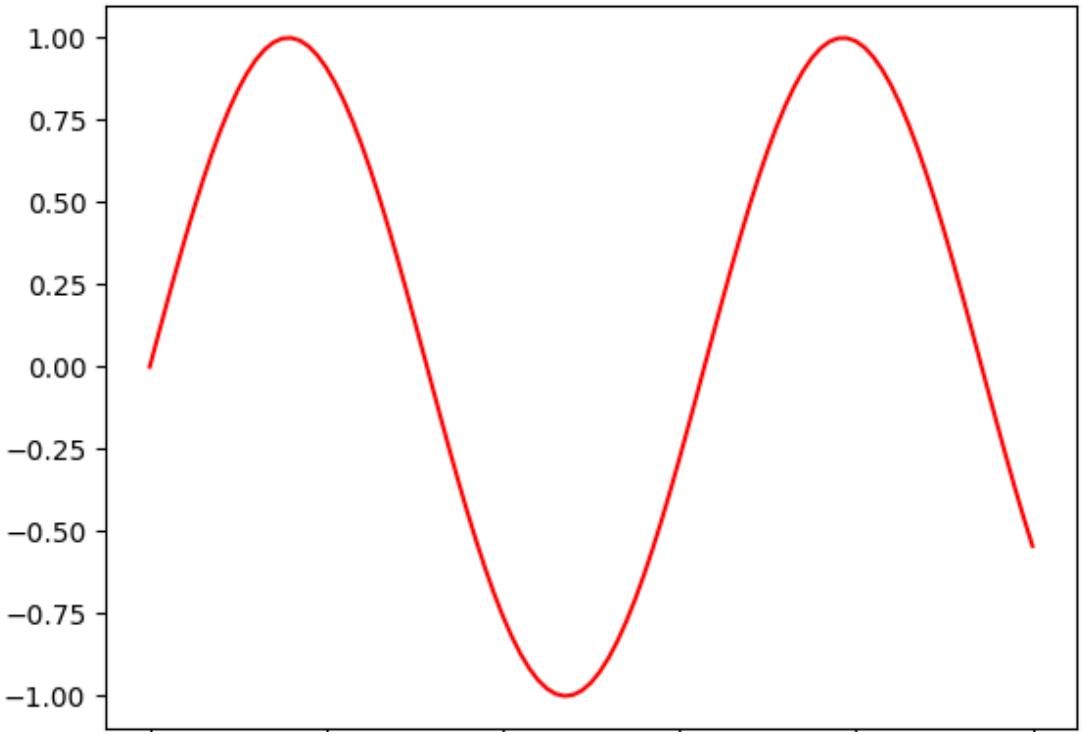
```
Temperature: 6.0°C
Pressure: 994.2 hPa Cloud
cover: 100.0% Humidity:
68.1%
Wind direction: 37.3°
Wind speed: 2.1 m/s
```

Matplotlib 📈

- Brukes for å blant annet plotte div. ting

```python
import matplotlib.pyplot as plt

x = [1, 2, 3]
y = [2, 2, 2]
size = [10**2, 20**2, 30**2]

plt.scatter(x, y, s=size)
plt.show()
```



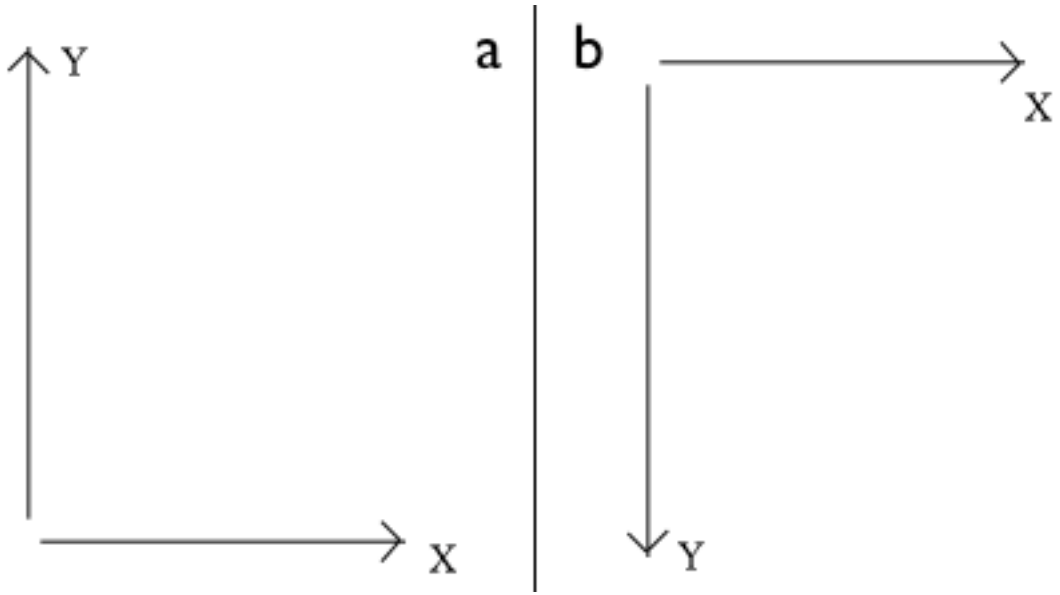



```python
from math import sin

xs = [n / 10 for n in range(101)]
ys = [sin(x) for x in xs]

plt.plot(xs, ys, 'r')
plt.show()
```

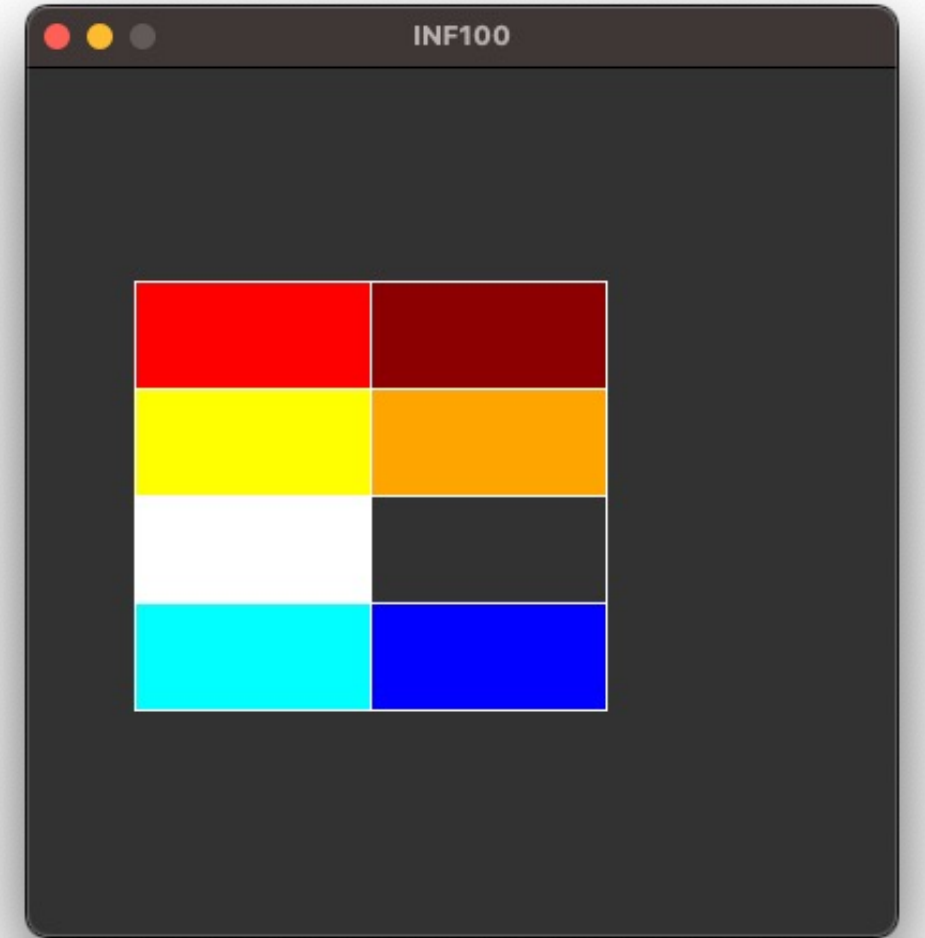
Graphics og nested for-loops ✍️

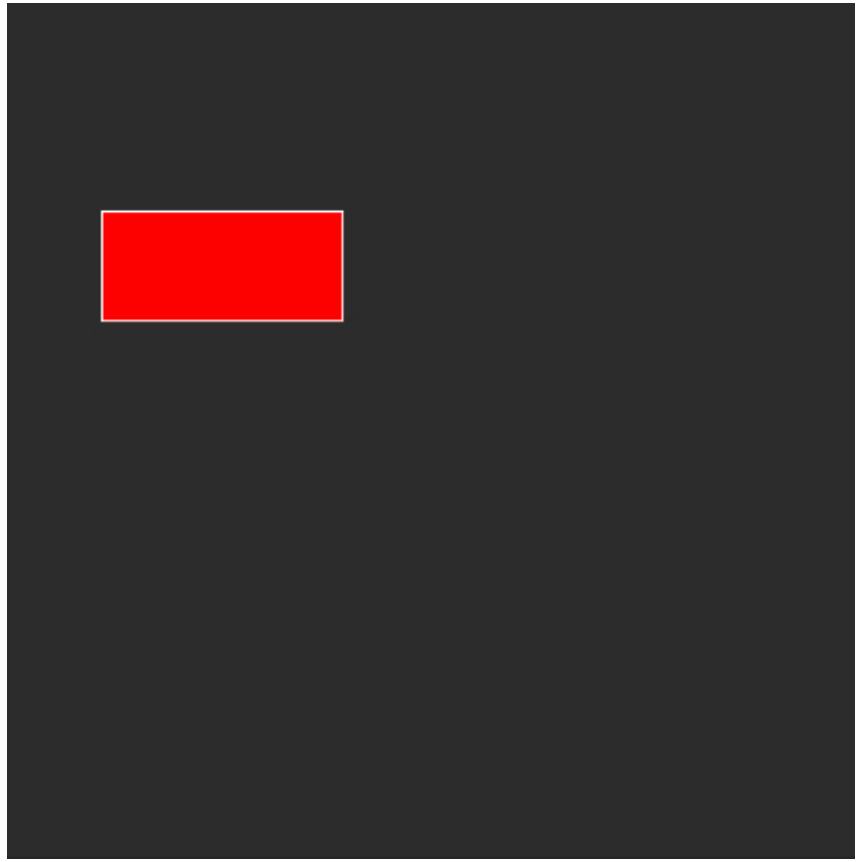
- Forenklet versjon av tkinter

- Invertert y-akse



```python
from uib_inf100_graphics.simple import canvas, display

def draw_grid(canvas, x1, y1, x2, y2, colors):

    rows = len(colors)
    cols = len(colors[0])

    cell_w = (x2 - x1) / rows
    cell_h = (y2 - y1) / cols

    for row in range(rows):
        for col in range(cols):
            cell_l = x1 + col * cell_w
            cell_t = y1 + row * cell_h
            cell_b = cell_t + cell_h
            cell_r = cell_l + cell_w

            color = colors[row][col]

            canvas.create_rectangle(cell_l, cell_t, cell_r, cell_b, fill=color)
```


INF100



Math / Datetime 

```python
import math
print(math.pi)                  # 3.141592653589793
print(math.ceil(math.pi))       # 4
```

```python
from datetime import date, timedelta, datetime

today = date.today()
print(f'I dag er {today}')                              # Dagens dato er 2024-04-11

ten_days_ago = (today - timedelta(days = 10))
print(f'For ti dager siden var datoen {ten_days_ago}')  # For ti dager siden var datoen 2024-04-01
```

Filer 📂

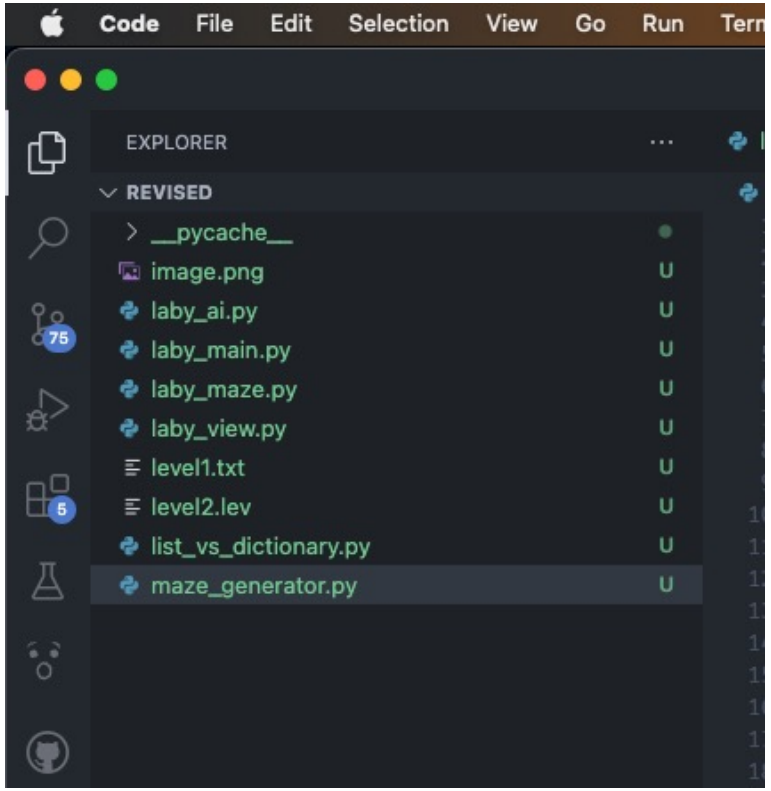
- Lese og skrive
  - readlines()

```python
def opener(path, destination):
    with open(path, 'r', encoding='utf-8') as f:
        file = f.read().splitlines()

    res = []

    for line in file:
        if 'C' in line:
            res.append(line)

    with open(destination, 'w', encoding='utf-8') as w:
        for i in res:
            w.write(i)

    return None

opener('sample1.txt', 'dest.txt')
```

```
Før (sample1.txt):
————————————
CGAA
TATT
CTTT
GAGG
————————————

Etter (dest.txt):
————————————
CGAA
CTTT

————————————
```

Viktig å tenke på🧠

- Åpne hele mappen i VSCode, ikke bare filen
  - Cmd + O (mac), ctrl + O (windows)

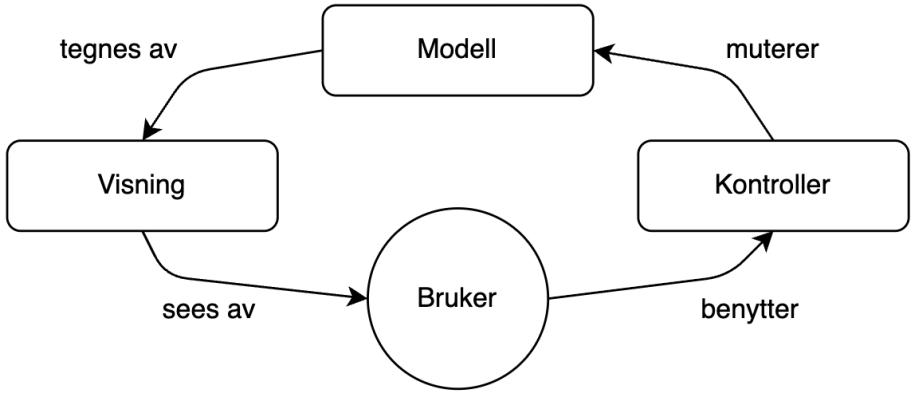



```python
import os
print(f'Current working directory: {os.getcwd()}')
```

```
Current working directory: /Users/jakobalexandersen/inf100/q-learning/revised
jakobalexandersen@Jakobs-Laptop revised %
```

Grafiske brukergrensesnitt 🕹️

- MVC-prinsippet
  - Model-View-Controller

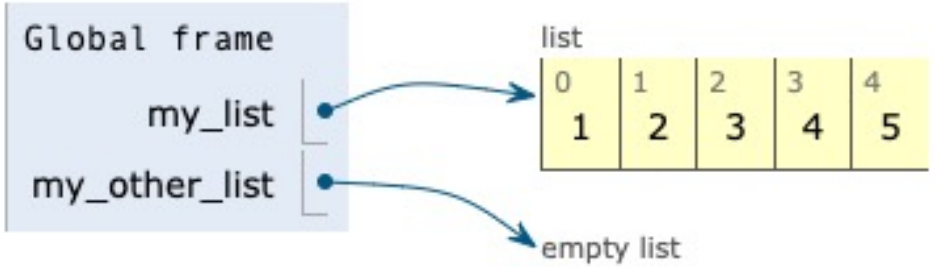


- app_started(app):
  - Modellen som sender ting til visningen
- redraw_all(app, canvas):
  - (View) Tegner selve applikasjonen
- key_pressed(app, event):
  - Kontrolleren; tar input fra bruker og sender videre til modellen

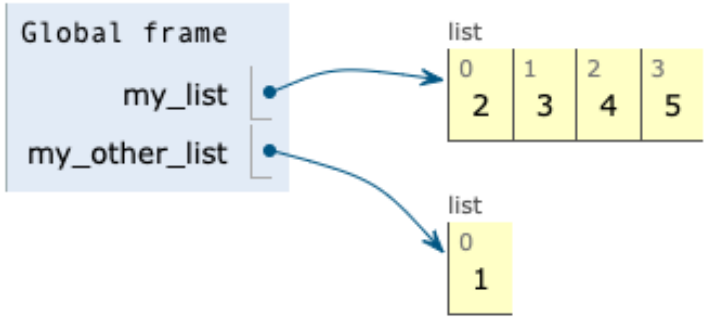
```python
from uib_inf100_graphics.event_app import run_app

def app_started(app):
    # Modellen
    app.counter = 0


def key_pressed(app, event):
    if event.key == 'Space':
        app.counter += 1

def redraw_all(app, canvas):
    # Visningen
    canvas.create_text(app.width // 2, app.height // 2,
                       text=f'Du har trykket space {app.counter} ganger',
                       font = 'Arial 12 bold'
                       )

run_app(width=300, height=100)
```

Lister 📋

```python
my_list = [1, 2, 3, 4, 5]
my_other_list = []

for i in my_list:
    my_other_list.append(i)

print(my_other_list)
```




```python
my_list = [1, 2, 3, 4, 5]
my_other_list = []

my_other_list.append(my_list.pop(0))
```



List comprehension / listeinklusjon 📋😎

```python
#tung måte
a = []
for i in range(11):
    a.append(i)                          # a = [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10]

#lett måte
b = [x for x in range(11)]               # b = [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10]

c = [x for x in range(11) if x % 2 == 0]    #c = [0, 2, 4, 6, 8, 10]
```

Div liste-funksjoner

- .split(*element)
  - ‘Hva skjer?’.split(‘ ‘) → [‘Hva’, ‘skjer?’]
- .join(*liste)
  - ‘ ‘.join([‘Hva’, ‘skjer?’]) → ‘Hva skjer?’
- .extend(*liste)
  - [1, 2, 3].extend([4, 5, 6]) → [1, 2, 3, 4, 5, 6]
- .insert(*indeks, *element)
  - [1, 2, 3].insert(1, 1.5) → [1, 1.5, 2, 3]
- .sort(*order)
  - [2, 1, 3].sort() → [1, 2, 3]
  - Reverse = False by default

Men hva med .sorted()???????
.sort() muterer en liste
.sorted() lager en ny liste
b = a.sorted()

Flerdimensjonelle lister 📋📋

- 'En liste av lister'

```python
my_list = [[1, 2, 3, 4],
           [5, 6, 7, 8],
           [1, 1, 1, 1]]

for i in my_list:
    print(i)
```

```
[1, 2, 3, 4]
[5, 6, 7, 8]
[1, 1, 1, 1]
```

```python
for item in my_list:
    for i in item:
        print(i)
```

```
1
2
3
4
5
6
7
8
1
1
```

Slicing (og litt indeksering) 

```
1  a = [1, 2, 3, 4, 5]
2  a[1:3]                    # [2, 3]
3  a[-1]                     # 5
4  a[1:]                     # [2, 3, 4, 5]
5  a[:3]                     # [1, 2, 3]
```

- Det samme gjelder for strings

Strings 

- .upper() / .lower()
  - ‘MatPlOtLiB eR vanSkeLiG’.lower() → ‘matplotlib er vanskelig’
  - ‘MatPlOtLiB eR vanSkeLiG’.upper() + ‘!!!’ → ‘MATPLOTLIB ER VANSKELIG!!!’
- .strip()
  - ‘\n Jeg elsker mellomrom. \n.strip() → ‘Jeg elsker mellomrom.’
- .replace(*replace, *with)
  - ‘Jeg elsker mellomrom.’.replace(‘mellomrom’, ‘Python’) → ‘Jeg elsker Python.’

Funksjoner ↪️

- Gjenbrukbare
- Pleier å returnere noe
  - Om ikke → returnerer None

```python
def is_even(num: int) -> bool:
    return num % 2 == 0

print(is_even(4))
```

- Parameter
- Argument

Feilhåndtering (try/except) ❌

- Brukes når man kan forvente visse feil

```python
def divider(a: int, b: int) -> float:
    try:
        return a / b
    except ZeroDivisionError:
        return 'Deling på null er tull!'
```

- Hindrer programmet i å stoppe
- Tips: kjør programmet med feilen uten try/except og se hvilken error du får

Tips til eksamen 🎓

- Øv MASSE
- Gjør alle lab-oppgavene
- Se på tidligere eksamener
  - Denne er viktig