

Unsupervised Learning

3 min

[Unsupervised Learning](#) is a type of machine learning where the program learns the inherent structure of the data based on unlabeled examples.

Clustering is a common unsupervised machine learning approach that finds patterns and structures in unlabeled data by grouping them into clusters.

Some examples:

- Social networks clustering topics in their news feed
- Consumer sites clustering users for recommendations
- Search engines to group similar objects in one cluster

For a quick preview, here's an example of unsupervised learning.

A social media platform wants to separate their users into categories based on what kind of content they engage with. They have collected three pieces of data from a sample of users:

- Number of hours per week spent reading posts
- Number of hours per week spent watching videos
- Number of hours per week spent in virtual reality

The company is using an [algorithm](#) called k-means clustering to sort users into three different groups.

Instructions

1. Checkpoint 1 Passed

1.

Press run to see the clusters!

script.py

```
import numpy as np
import pandas as pd
from sklearn.cluster import KMeans
import codecademylib3
from plot import plot_clusters

# Load the data
media_usage = pd.read_csv('media_usage.csv')

# Create the model
kmeans = KMeans(n_clusters=3)
```

```
# Fit the model to the data

kmeans.fit(media_usage)

labels = kmeans.predict(media_usage)

# Plot the clusters

plot_clusters(media_usage, labels)
```

index.html

```
<html><head><style>html {
  box-sizing: border-box;
}

*, *:before, *:after {
  box-sizing: inherit;
}

body {
  text-align: center;
}

/*
 * Table stuff
 */

.table-container {
  width: max-content;
  min-width: 100%;
  padding: 0.5rem;
```

```
margin-top: 2rem;  
}
```

```
.scroll-container {  
  overflow-y: auto;  
  overflow-x: none;  
  max-height: 14rem;  
  border: 1px solid #3E3E40;  
}
```

```
table {  
  font-family: monospace;  
  white-space: nowrap;  
  padding: 0.625rem;  
  width: 100%;  
  overflow-x: none;  
}
```

```
th,  
td {  
  text-align: left;  
  padding: 0.25rem;  
  background-color: transparent;  
}
```

```
tr {  
  height: 1.875rem;  
  font-size: 0.8125rem;  
}
```

```
tr:nth-child(odd) {  
  background-color: #E9EAEA;
```

```
}
```

```
tr:nth-child(even),
```

```
th {
```

```
    background-color: #FFFFFF;
```

```
}
```

```
/*
```

```
 * Chart stuff
```

```
*/
```

```
svg {
```

```
    margin-top: 2rem;
```

```
    margin-bottom: 2rem;
```

```
    max-width: 100%;
```

```
}
```

```
</style></head><body><?xml version="1.0" encoding="utf-8" standalone="no"?>
```

```
<!DOCTYPE svg PUBLIC "-//W3C//DTD SVG 1.1//EN"
```

```
    "http://www.w3.org/Graphics/SVG/1.1/DTD/svg11.dtd">
```

```
<!-- Created with matplotlib (http://matplotlib.org/) -->
```

```
<svg height="432pt" version="1.1" viewBox="0 0 576 432" width="576pt"
```

```
xmlns="http://www.w3.org/2000/svg" xmlns:xlink="http://www.w3.org/1999/xlink">
```

```
<defs>
```

```
    <style type="text/css">
```

```
    *{stroke-linecap:butt;stroke-linejoin:round;}</style>
```

```
</style>
```

```
</defs>
```

```
<g id="figure_1">
```

```
    <g id="patch_1">
```

```
        <path d="M 0 432
```

```
L 576 432
```

```
L 576 0
```

```
L 0 0
```

z

" style="fill:#ffffff;"/>

</g>

<g id="patch_2">

<path d="M 72 384.48

L 518.4 384.48

L 518.4 51.84

L 72 51.84

z

" style="fill:#ffffff;"/>

</g>

<g id="pane3d_1">

<g id="patch_3">

<path d="M 287.015692 227.554981

L 472.864567 286.687937

L 481.990662 124.974778

L 286.302003 71.91152

" style="fill:#f2f2f2;opacity:0.5;stroke:#f2f2f2;stroke-linejoin:miter;"/>

</g>

</g>

<g id="pane3d_2">

<g id="patch_4">

<path d="M 287.015692 227.554981

L 127.730203 298.794752

L 118.398743 135.875949

L 286.302003 71.91152

" style="fill:#e6e6e6;opacity:0.5;stroke:#e6e6e6;stroke-linejoin:miter;"/>

</g>

</g>

<g id="pane3d_3">

<g id="patch_5">

<path d="M 287.015692 227.554981

L 127.730203 298.794752

L 317.326413 366.465269

L 472.864567 286.687937

" style="fill:#ecec;opacity:0.5;stroke:#ecec;stroke-linejoin:miter;"/>

</g>

</g>

<g id="axis3d_1">

<g id="line2d_1">

<path d="M 472.864567 286.687937

L 317.326413 366.465269

" style="fill:none;stroke:#000000;stroke-linecap:square;stroke-width:0.8;"/>

</g>

<g id="text_1">

<!-- Hours reading text -->

<defs>

<path d="M 9.8125 72.90625

L 19.671875 72.90625

L 19.671875 43.015625

L 55.515625 43.015625

L 55.515625 72.90625

L 65.375 72.90625

L 65.375 0

L 55.515625 0

L 55.515625 34.71875

L 19.671875 34.71875

L 19.671875 0

L 9.8125 0

z

" id="DejaVuSans-48"/>

<path d="M 30.609375 48.390625

Q 23.390625 48.390625 19.1875 42.75

Q 14.984375 37.109375 14.984375 27.296875

Q 14.984375 17.484375 19.15625 11.84375

Q 23.34375 6.203125 30.609375 6.203125

Q 37.796875 6.203125 41.984375 11.859375

Q 46.1875 17.53125 46.1875 27.296875

Q 46.1875 37.015625 41.984375 42.703125

Q 37.796875 48.390625 30.609375 48.390625

z

M 30.609375 56

Q 42.328125 56 49.015625 48.375

Q 55.71875 40.765625 55.71875 27.296875

Q 55.71875 13.875 49.015625 6.21875

Q 42.328125 -1.421875 30.609375 -1.421875

Q 18.84375 -1.421875 12.171875 6.21875

Q 5.515625 13.875 5.515625 27.296875

Q 5.515625 40.765625 12.171875 48.375

Q 18.84375 56 30.609375 56

z

" id="DejaVuSans-6f"/>

<path d="M 8.5 21.578125

L 8.5 54.6875

L 17.484375 54.6875

L 17.484375 21.921875

Q 17.484375 14.15625 20.5 10.265625

Q 23.53125 6.390625 29.59375 6.390625

Q 36.859375 6.390625 41.078125 11.03125

Q 45.3125 15.671875 45.3125 23.6875

L 45.3125 54.6875

L 54.296875 54.6875

L 54.296875 0

L 45.3125 0

L 45.3125 8.40625

Q 42.046875 3.421875 37.71875 1

Q 33.40625 -1.421875 27.6875 -1.421875

Q 18.265625 -1.421875 13.375 4.4375

Q 8.5 10.296875 8.5 21.578125

z

M 31.109375 56

z

" id="DejaVuSans-75"/>

<path d="M 41.109375 46.296875

Q 39.59375 47.171875 37.8125 47.578125

Q 36.03125 48 33.890625 48

Q 26.265625 48 22.1875 43.046875

Q 18.109375 38.09375 18.109375 28.8125

L 18.109375 0

L 9.078125 0

L 9.078125 54.6875

L 18.109375 54.6875

L 18.109375 46.1875

Q 20.953125 51.171875 25.484375 53.578125

Q 30.03125 56 36.53125 56

Q 37.453125 56 38.578125 55.875

Q 39.703125 55.765625 41.0625 55.515625

z

" id="DejaVuSans-72"/>

<path d="M 44.28125 53.078125

L 44.28125 44.578125

Q 40.484375 46.53125 36.375 47.5

Q 32.28125 48.484375 27.875 48.484375

Q 21.1875 48.484375 17.84375 46.4375

Q 14.5 44.390625 14.5 40.28125

Q 14.5 37.15625 16.890625 35.375

Q 19.28125 33.59375 26.515625 31.984375

L 29.59375 31.296875

Q 39.15625 29.25 43.1875 25.515625
Q 47.21875 21.78125 47.21875 15.09375
Q 47.21875 7.46875 41.1875 3.015625
Q 35.15625 -1.421875 24.609375 -1.421875
Q 20.21875 -1.421875 15.453125 -0.5625
Q 10.6875 0.296875 5.421875 2
L 5.421875 11.28125
Q 10.40625 8.6875 15.234375 7.390625
Q 20.0625 6.109375 24.8125 6.109375
Q 31.15625 6.109375 34.5625 8.28125
Q 37.984375 10.453125 37.984375 14.40625
Q 37.984375 18.0625 35.515625 20.015625
Q 33.0625 21.96875 24.703125 23.78125
L 21.578125 24.515625
Q 13.234375 26.265625 9.515625 29.90625
Q 5.8125 33.546875 5.8125 39.890625
Q 5.8125 47.609375 11.28125 51.796875
Q 16.75 56 26.8125 56
Q 31.78125 56 36.171875 55.265625
Q 40.578125 54.546875 44.28125 53.078125
z
" id="DejaVuSans-73"/>
 <path id="DejaVuSans-20"/>
 <path d="M 56.203125 29.59375
L 56.203125 25.203125
L 14.890625 25.203125
Q 15.484375 15.921875 20.484375 11.0625
Q 25.484375 6.203125 34.421875 6.203125
Q 39.59375 6.203125 44.453125 7.46875
Q 49.3125 8.734375 54.109375 11.28125
L 54.109375 2.78125
Q 49.265625 0.734375 44.1875 -0.34375

Q 39.109375 -1.421875 33.890625 -1.421875

Q 20.796875 -1.421875 13.15625 6.1875

Q 5.515625 13.8125 5.515625 26.8125

Q 5.515625 40.234375 12.765625 48.109375

Q 20.015625 56 32.328125 56

Q 43.359375 56 49.78125 48.890625

Q 56.203125 41.796875 56.203125 29.59375

z

M 47.21875 32.234375

Q 47.125 39.59375 43.09375 43.984375

Q 39.0625 48.390625 32.421875 48.390625

Q 24.90625 48.390625 20.390625 44.140625

Q 15.875 39.890625 15.1875 32.171875

z

" id="DejaVuSans-65"/>

<path d="M 34.28125 27.484375

Q 23.390625 27.484375 19.1875 25

Q 14.984375 22.515625 14.984375 16.5

Q 14.984375 11.71875 18.140625 8.90625

Q 21.296875 6.109375 26.703125 6.109375

Q 34.1875 6.109375 38.703125 11.40625

Q 43.21875 16.703125 43.21875 25.484375

L 43.21875 27.484375

z

M 52.203125 31.203125

L 52.203125 0

L 43.21875 0

L 43.21875 8.296875

Q 40.140625 3.328125 35.546875 0.953125

Q 30.953125 -1.421875 24.3125 -1.421875

Q 15.921875 -1.421875 10.953125 3.296875

Q 6 8.015625 6 15.921875

Q 6 25.140625 12.171875 29.828125

Q 18.359375 34.515625 30.609375 34.515625

L 43.21875 34.515625

L 43.21875 35.40625

Q 43.21875 41.609375 39.140625 45

Q 35.0625 48.390625 27.6875 48.390625

Q 23 48.390625 18.546875 47.265625

Q 14.109375 46.140625 10.015625 43.890625

L 10.015625 52.203125

Q 14.9375 54.109375 19.578125 55.046875

Q 24.21875 56 28.609375 56

Q 40.484375 56 46.34375 49.84375

Q 52.203125 43.703125 52.203125 31.203125

z

" id="DejaVuSans-61"/>

<path d="M 45.40625 46.390625

L 45.40625 75.984375

L 54.390625 75.984375

L 54.390625 0

L 45.40625 0

L 45.40625 8.203125

Q 42.578125 3.328125 38.25 0.953125

Q 33.9375 -1.421875 27.875 -1.421875

Q 17.96875 -1.421875 11.734375 6.484375

Q 5.515625 14.40625 5.515625 27.296875

Q 5.515625 40.1875 11.734375 48.09375

Q 17.96875 56 27.875 56

Q 33.9375 56 38.25 53.625

Q 42.578125 51.265625 45.40625 46.390625

z

M 14.796875 27.296875

Q 14.796875 17.390625 18.875 11.75

Q 22.953125 6.109375 30.078125 6.109375

Q 37.203125 6.109375 41.296875 11.75

Q 45.40625 17.390625 45.40625 27.296875

Q 45.40625 37.203125 41.296875 42.84375

Q 37.203125 48.484375 30.078125 48.484375

Q 22.953125 48.484375 18.875 42.84375

Q 14.796875 37.203125 14.796875 27.296875

z

" id="DejaVuSans-64"/>

<path d="M 9.421875 54.6875

L 18.40625 54.6875

L 18.40625 0

L 9.421875 0

z

M 9.421875 75.984375

L 18.40625 75.984375

L 18.40625 64.59375

L 9.421875 64.59375

z

" id="DejaVuSans-69"/>

<path d="M 54.890625 33.015625

L 54.890625 0

L 45.90625 0

L 45.90625 32.71875

Q 45.90625 40.484375 42.875 44.328125

Q 39.84375 48.1875 33.796875 48.1875

Q 26.515625 48.1875 22.3125 43.546875

Q 18.109375 38.921875 18.109375 30.90625

L 18.109375 0

L 9.078125 0

L 9.078125 54.6875

L 18.109375 54.6875

L 18.109375 46.1875
Q 21.34375 51.125 25.703125 53.5625
Q 30.078125 56 35.796875 56
Q 45.21875 56 50.046875 50.171875
Q 54.890625 44.34375 54.890625 33.015625
z
" id="DejaVuSans-6e"/>
<path d="M 45.40625 27.984375
Q 45.40625 37.75 41.375 43.109375
Q 37.359375 48.484375 30.078125 48.484375
Q 22.859375 48.484375 18.828125 43.109375
Q 14.796875 37.75 14.796875 27.984375
Q 14.796875 18.265625 18.828125 12.890625
Q 22.859375 7.515625 30.078125 7.515625
Q 37.359375 7.515625 41.375 12.890625
Q 45.40625 18.265625 45.40625 27.984375
z
M 54.390625 6.78125
Q 54.390625 -7.171875 48.1875 -13.984375
Q 42 -20.796875 29.203125 -20.796875
Q 24.46875 -20.796875 20.265625 -20.09375
Q 16.0625 -19.390625 12.109375 -17.921875
L 12.109375 -9.1875
Q 16.0625 -11.328125 19.921875 -12.34375
Q 23.78125 -13.375 27.78125 -13.375
Q 36.625 -13.375 41.015625 -8.765625
Q 45.40625 -4.15625 45.40625 5.171875
L 45.40625 9.625
Q 42.625 4.78125 38.28125 2.390625
Q 33.9375 0 27.875 0
Q 17.828125 0 11.671875 7.65625
Q 5.515625 15.328125 5.515625 27.984375

Q 5.515625 40.671875 11.671875 48.328125

Q 17.828125 56 27.875 56

Q 33.9375 56 38.28125 53.609375

Q 42.625 51.21875 45.40625 46.390625

L 45.40625 54.6875

L 54.390625 54.6875

z

" id="DejaVuSans-67"/>

<path d="M 18.3125 70.21875

L 18.3125 54.6875

L 36.8125 54.6875

L 36.8125 47.703125

L 18.3125 47.703125

L 18.3125 18.015625

Q 18.3125 11.328125 20.140625 9.421875

Q 21.96875 7.515625 27.59375 7.515625

L 36.8125 7.515625

L 36.8125 0

L 27.59375 0

Q 17.1875 0 13.234375 3.875

Q 9.28125 7.765625 9.28125 18.015625

L 9.28125 47.703125

L 2.6875 47.703125

L 2.6875 54.6875

L 9.28125 54.6875

L 9.28125 70.21875

z

" id="DejaVuSans-74"/>

<path d="M 54.890625 54.6875

L 35.109375 28.078125

L 55.90625 0

L 45.3125 0

L 29.390625 21.484375

L 13.484375 0

L 2.875 0

L 24.125 28.609375

L 4.6875 54.6875

L 15.28125 54.6875

L 29.78125 35.203125

L 44.28125 54.6875

z

" id="DejaVuSans-78"/>

</defs>

<g transform="translate(381.219634 376.634644)rotate(-27.153816)scale(0.1 -0.1)">

<use xlink:href="#DejaVuSans-48"/>

<use x="75.195312" xlink:href="#DejaVuSans-6f"/>

<use x="136.376953" xlink:href="#DejaVuSans-75"/>

<use x="199.755859" xlink:href="#DejaVuSans-72"/>

<use x="240.869141" xlink:href="#DejaVuSans-73"/>

<use x="292.96875" xlink:href="#DejaVuSans-20"/>

<use x="324.755859" xlink:href="#DejaVuSans-72"/>

<use x="365.837891" xlink:href="#DejaVuSans-65"/>

<use x="427.361328" xlink:href="#DejaVuSans-61"/>

<use x="488.640625" xlink:href="#DejaVuSans-64"/>

<use x="552.117188" xlink:href="#DejaVuSans-69"/>

<use x="579.900391" xlink:href="#DejaVuSans-6e"/>

<use x="643.279297" xlink:href="#DejaVuSans-67"/>

<use x="706.755859" xlink:href="#DejaVuSans-20"/>

<use x="738.542969" xlink:href="#DejaVuSans-74"/>

<use x="777.751953" xlink:href="#DejaVuSans-65"/>

<use x="839.259766" xlink:href="#DejaVuSans-78"/>

<use x="898.439453" xlink:href="#DejaVuSans-74"/>

</g>

</g>

```

<g id="Line3DCollection_1">
  <path d="M 463.590194 291.444871
L 277.483756 231.8181
L 276.286483 75.727033
" style="fill:none;stroke:#b0b0b0;stroke-width:0.8;"/>
  <path d="M 437.879986 304.631936
L 251.082223 243.626075
L 248.524231 86.303341
" style="fill:none;stroke:#b0b0b0;stroke-width:0.8;"/>
  <path d="M 411.554846 318.134408
L 224.08373 255.701039
L 220.101852 97.131131
" style="fill:none;stroke:#b0b0b0;stroke-width:0.8;"/>
  <path d="M 384.592446 331.963737
L 196.467797 268.05215
L 190.995518 108.21948
" style="fill:none;stroke:#b0b0b0;stroke-width:0.8;"/>
  <path d="M 356.969363 346.131938
L 168.213 280.68899
L 161.18024 119.577909
" style="fill:none;stroke:#b0b0b0;stroke-width:0.8;"/>
  <path d="M 328.661013 360.651621
L 139.296908 293.621591
L 130.629798 131.216406
" style="fill:none;stroke:#b0b0b0;stroke-width:0.8;"/>
</g>
<g id="xtick_1">
  <g id="line2d_2">
    <path d="M 462.018006 290.941156
L 466.738835 292.453666
" style="fill:none;stroke:#000000;stroke-linecap:square;stroke-width:0.8;"/>
  </g>

```



```
<g id="text_2">
  <!-- 0 -->
  <defs>
    <path d="M 31.78125 66.40625
Q 24.171875 66.40625 20.328125 58.90625
Q 16.5 51.421875 16.5 36.375
Q 16.5 21.390625 20.328125 13.890625
Q 24.171875 6.390625 31.78125 6.390625
Q 39.453125 6.390625 43.28125 13.890625
Q 47.125 21.390625 47.125 36.375
Q 47.125 51.421875 43.28125 58.90625
Q 39.453125 66.40625 31.78125 66.40625
z
M 31.78125 74.21875
Q 44.046875 74.21875 50.515625 64.515625
Q 56.984375 54.828125 56.984375 36.375
Q 56.984375 17.96875 50.515625 8.265625
Q 44.046875 -1.421875 31.78125 -1.421875
Q 19.53125 -1.421875 13.0625 8.265625
Q 6.59375 17.96875 6.59375 36.375
Q 6.59375 54.828125 13.0625 64.515625
Q 19.53125 74.21875 31.78125 74.21875
z
" id="DejaVuSans-30"/>
  </defs>
  <g transform="translate(471.090779 311.345586)scale(0.1 -0.1)">
    <use xlink:href="#DejaVuSans-30"/>
  </g>
</g>
<g id="xtick_2">
  <g id="line2d_3">
```

```
<path d="M 436.300969 304.116249
L 441.042352 305.664727
" style="fill:none;stroke:#000000;stroke-linecap:square;stroke-width:0.8;"/>
</g>
<g id="text_3">
  <!-- 2 -->
  <defs>
    <path d="M 19.1875 8.296875
L 53.609375 8.296875
L 53.609375 0
L 7.328125 0
L 7.328125 8.296875
Q 12.9375 14.109375 22.625 23.890625
Q 32.328125 33.6875 34.8125 36.53125
Q 39.546875 41.84375 41.421875 45.53125
Q 43.3125 49.21875 43.3125 52.78125
Q 43.3125 58.59375 39.234375 62.25
Q 35.15625 65.921875 28.609375 65.921875
Q 23.96875 65.921875 18.8125 64.3125
Q 13.671875 62.703125 7.8125 59.421875
L 7.8125 69.390625
Q 13.765625 71.78125 18.9375 73
Q 24.125 74.21875 28.421875 74.21875
Q 39.75 74.21875 46.484375 68.546875
Q 53.21875 62.890625 53.21875 53.421875
Q 53.21875 48.921875 51.53125 44.890625
Q 49.859375 40.875 45.40625 35.40625
Q 44.1875 33.984375 37.640625 27.21875
Q 31.109375 20.453125 19.1875 8.296875
z
" id="DejaVuSans-32"/>
</defs>
```

```

    <g transform="translate(445.498368 324.682431)scale(0.1 -0.1)">
      <use xlink:href="#DejaVuSans-32"/>
    </g>
  </g>
</g>
<g id="xtick_3">
  <g id="line2d_4">
    <path d="M 409.969122 317.606315
L 414.730697 319.192059
" style="fill:none;stroke:#000000;stroke-linecap:square;stroke-width:0.8;"/>
  </g>
  <g id="text_4">
    <!-- 4 -->
  </g>
</g>
<path d="M 37.796875 64.3125
L 12.890625 25.390625
L 37.796875 25.390625
z
M 35.203125 72.90625
L 47.609375 72.90625
L 47.609375 25.390625
L 58.015625 25.390625
L 58.015625 17.1875
L 47.609375 17.1875
L 47.609375 0
L 37.796875 0
L 37.796875 17.1875
L 4.890625 17.1875
L 4.890625 26.703125
z
" id="DejaVuSans-34"/>
</g>
</defs>

```

```

    <g transform="translate(419.293639 338.33837)scale(0.1 -0.1)">
      <use xlink:href="#DejaVuSans-34"/>
    </g>
  </g>
</g>
<g id="xtick_4">
  <g id="line2d_5">
    <path d="M 383.000151 331.422786
L 387.781512 333.047158
" style="fill:none;stroke:#000000;stroke-linecap:square;stroke-width:0.8;"/>
  </g>
  <g id="text_5">
    <!-- 6 -->
  </g>
</g>
<defs>
  <path d="M 33.015625 40.375
Q 26.375 40.375 22.484375 35.828125
Q 18.609375 31.296875 18.609375 23.390625
Q 18.609375 15.53125 22.484375 10.953125
Q 26.375 6.390625 33.015625 6.390625
Q 39.65625 6.390625 43.53125 10.953125
Q 47.40625 15.53125 47.40625 23.390625
Q 47.40625 31.296875 43.53125 35.828125
Q 39.65625 40.375 33.015625 40.375
z
M 52.59375 71.296875
L 52.59375 62.3125
Q 48.875 64.0625 45.09375 64.984375
Q 41.3125 65.921875 37.59375 65.921875
Q 27.828125 65.921875 22.671875 59.328125
Q 17.53125 52.734375 16.796875 39.40625
Q 19.671875 43.65625 24.015625 45.921875
Q 28.375 48.1875 33.59375 48.1875

```

Q 44.578125 48.1875 50.953125 41.515625

Q 57.328125 34.859375 57.328125 23.390625

Q 57.328125 12.15625 50.6875 5.359375

Q 44.046875 -1.421875 33.015625 -1.421875

Q 20.359375 -1.421875 13.671875 8.265625

Q 6.984375 17.96875 6.984375 36.375

Q 6.984375 53.65625 15.1875 63.9375

Q 23.390625 74.21875 37.203125 74.21875

Q 40.921875 74.21875 44.703125 73.484375

Q 48.484375 72.75 52.59375 71.296875

z

" id="DejaVuSans-36"/>

</defs>

<g transform="translate(392.454351 352.324993)scale(0.1 -0.1)">

<use xlink:href="#DejaVuSans-36"/>

</g>

</g>

</g>

<g id="xtick_5">

<g id="line2d_6">

<path d="M 355.370649 345.577654

L 360.171341 347.242083

" style="fill:none;stroke:#000000;stroke-linecap:square;stroke-width:0.8;"/>

</g>

<g id="text_6">

<!-- 8 -->

<defs>

<path d="M 31.78125 34.625

Q 24.75 34.625 20.71875 30.859375

Q 16.703125 27.09375 16.703125 20.515625

Q 16.703125 13.921875 20.71875 10.15625

Q 24.75 6.390625 31.78125 6.390625

Q 38.8125 6.390625 42.859375 10.171875
Q 46.921875 13.96875 46.921875 20.515625
Q 46.921875 27.09375 42.890625 30.859375
Q 38.875 34.625 31.78125 34.625

z

M 21.921875 38.8125
Q 15.578125 40.375 12.03125 44.71875
Q 8.5 49.078125 8.5 55.328125
Q 8.5 64.0625 14.71875 69.140625
Q 20.953125 74.21875 31.78125 74.21875
Q 42.671875 74.21875 48.875 69.140625
Q 55.078125 64.0625 55.078125 55.328125
Q 55.078125 49.078125 51.53125 44.71875
Q 48 40.375 41.703125 38.8125
Q 48.828125 37.15625 52.796875 32.3125
Q 56.78125 27.484375 56.78125 20.515625
Q 56.78125 9.90625 50.3125 4.234375
Q 43.84375 -1.421875 31.78125 -1.421875
Q 19.734375 -1.421875 13.25 4.234375
Q 6.78125 9.90625 6.78125 20.515625
Q 6.78125 27.484375 10.78125 32.3125
Q 14.796875 37.15625 21.921875 38.8125

z

M 18.3125 54.390625
Q 18.3125 48.734375 21.84375 45.5625
Q 25.390625 42.390625 31.78125 42.390625
Q 38.140625 42.390625 41.71875 45.5625
Q 45.3125 48.734375 45.3125 54.390625
Q 45.3125 60.0625 41.71875 63.234375
Q 38.140625 66.40625 31.78125 66.40625
Q 25.390625 66.40625 21.84375 63.234375
Q 18.3125 60.0625 18.3125 54.390625

z

" id="DejaVuSans-38"/>

</defs>

<g transform="translate(364.957172 366.65446)scale(0.1 -0.1)">

<use xlink:href="#DejaVuSans-38"/>

</g>

</g>

</g>

<g id="xtick_6">

<g id="line2d_7">

<path d="M 327.056048 360.083504

L 331.875566 361.78949

" style="fill:none;stroke:#000000;stroke-linecap:square;stroke-width:0.8;"/>

</g>

<g id="text_7">

<!-- 10 -->

<defs>

<path d="M 12.40625 8.296875

L 28.515625 8.296875

L 28.515625 63.921875

L 10.984375 60.40625

L 10.984375 69.390625

L 28.421875 72.90625

L 38.28125 72.90625

L 38.28125 8.296875

L 54.390625 8.296875

L 54.390625 0

L 12.40625 0

z

" id="DejaVuSans-31"/>

</defs>

<g transform="translate(333.596362 381.339533)scale(0.1 -0.1)">

```
<use xlink:href="#DejaVuSans-31"/>
<use x="63.623047" xlink:href="#DejaVuSans-30"/>
</g>
</g>
</g>
</g>
<g id="axis3d_2">
  <g id="line2d_8">
    <path d="M 127.730203 298.794752
L 317.326413 366.465269
" style="fill:none;stroke:#000000;stroke-linecap:square;stroke-width:0.8;"/>
  </g>
  <g id="text_8">
    <!-- Hours watching video -->
  </g>
</g>
<defs>
  <path d="M 4.203125 54.6875
L 13.1875 54.6875
L 24.421875 12.015625
L 35.59375 54.6875
L 46.1875 54.6875
L 57.421875 12.015625
L 68.609375 54.6875
L 77.59375 54.6875
L 63.28125 0
L 52.6875 0
L 40.921875 44.828125
L 29.109375 0
L 18.5 0
z
" id="DejaVuSans-77"/>
  <path d="M 48.78125 52.59375
L 48.78125 44.1875
```


Q 44.96875 46.296875 41.140625 47.34375

Q 37.3125 48.390625 33.40625 48.390625

Q 24.65625 48.390625 19.8125 42.84375

Q 14.984375 37.3125 14.984375 27.296875

Q 14.984375 17.28125 19.8125 11.734375

Q 24.65625 6.203125 33.40625 6.203125

Q 37.3125 6.203125 41.140625 7.25

Q 44.96875 8.296875 48.78125 10.40625

L 48.78125 2.09375

Q 45.015625 0.34375 40.984375 -0.53125

Q 36.96875 -1.421875 32.421875 -1.421875

Q 20.0625 -1.421875 12.78125 6.34375

Q 5.515625 14.109375 5.515625 27.296875

Q 5.515625 40.671875 12.859375 48.328125

Q 20.21875 56 33.015625 56

Q 37.15625 56 41.109375 55.140625

Q 45.0625 54.296875 48.78125 52.59375

z

" id="DejaVuSans-63"/>

<path d="M 54.890625 33.015625

L 54.890625 0

L 45.90625 0

L 45.90625 32.71875

Q 45.90625 40.484375 42.875 44.328125

Q 39.84375 48.1875 33.796875 48.1875

Q 26.515625 48.1875 22.3125 43.546875

Q 18.109375 38.921875 18.109375 30.90625

L 18.109375 0

L 9.078125 0

L 9.078125 75.984375

L 18.109375 75.984375

L 18.109375 46.1875

Q 21.34375 51.125 25.703125 53.5625

Q 30.078125 56 35.796875 56

Q 45.21875 56 50.046875 50.171875

Q 54.890625 44.34375 54.890625 33.015625

z

" id="DejaVuSans-68"/>

<path d="M 2.984375 54.6875

L 12.5 54.6875

L 29.59375 8.796875

L 46.6875 54.6875

L 56.203125 54.6875

L 35.6875 0

L 23.484375 0

z

" id="DejaVuSans-76"/>

</defs>

<g transform="translate(147.441288 345.391545)rotate(-340.357545)scale(0.1 -0.1)">

<use xlink:href="#DejaVuSans-48"/>

<use x="75.195312" xlink:href="#DejaVuSans-6f"/>

<use x="136.376953" xlink:href="#DejaVuSans-75"/>

<use x="199.755859" xlink:href="#DejaVuSans-72"/>

<use x="240.869141" xlink:href="#DejaVuSans-73"/>

<use x="292.96875" xlink:href="#DejaVuSans-20"/>

<use x="324.755859" xlink:href="#DejaVuSans-77"/>

<use x="406.542969" xlink:href="#DejaVuSans-61"/>

<use x="467.822266" xlink:href="#DejaVuSans-74"/>

<use x="507.03125" xlink:href="#DejaVuSans-63"/>

<use x="562.011719" xlink:href="#DejaVuSans-68"/>

<use x="625.390625" xlink:href="#DejaVuSans-69"/>

<use x="653.173828" xlink:href="#DejaVuSans-6e"/>

<use x="716.552734" xlink:href="#DejaVuSans-67"/>

<use x="780.029297" xlink:href="#DejaVuSans-20"/>

```

<use x="811.816406" xlink:href="#DejaVuSans-76"/>
<use x="870.996094" xlink:href="#DejaVuSans-69"/>
<use x="898.779297" xlink:href="#DejaVuSans-64"/>
<use x="962.255859" xlink:href="#DejaVuSans-65"/>
<use x="1023.779297" xlink:href="#DejaVuSans-6f"/>
</g>
</g>
<g id="Line3DCollection_2">
  <path d="M 298.100885 75.110924
L 298.251084 231.129831
L 139.151137 302.871102
" style="fill:none;stroke:#b0b0b0;stroke-width:0.8;"/>
  <path d="M 327.663599 83.127198
L 326.38512 240.081452
L 167.772858 313.086742
" style="fill:none;stroke:#b0b0b0;stroke-width:0.8;"/>
  <path d="M 357.75794 91.28763
L 355.000409 249.186198
L 196.918059 323.489222
" style="fill:none;stroke:#b0b0b0;stroke-width:0.8;"/>
  <path d="M 388.39838 99.596142
L 384.109408 258.44803
L 226.601234 334.083716
" style="fill:none;stroke:#b0b0b0;stroke-width:0.8;"/>
  <path d="M 419.599919 108.056802
L 413.725004 267.87105
L 256.837417 344.875588
" style="fill:none;stroke:#b0b0b0;stroke-width:0.8;"/>
  <path d="M 451.378112 116.673829
L 443.860538 277.459504
L 287.642208 355.870408
" style="fill:none;stroke:#b0b0b0;stroke-width:0.8;"/>

```

```

</g>
<g id="xtick_7">
  <g id="line2d_9">
    <path d="M 140.509703 302.258498
L 136.429569 304.09831
" style="fill:none;stroke:#000000;stroke-linecap:square;stroke-width:0.8;"/>
  </g>
  <g id="text_9">
    <!-- 0 -->
    <g transform="translate(126.800256 323.608767)scale(0.1 -0.1)">
      <use xlink:href="#DejaVuSans-30"/>
    </g>
  </g>
</g>
<g id="xtick_8">
  <g id="line2d_10">
    <path d="M 169.128034 312.462988
L 165.05804 314.336305
" style="fill:none;stroke:#000000;stroke-linecap:square;stroke-width:0.8;"/>
  </g>
  <g id="text_10">
    <!-- 2 -->
    <g transform="translate(155.366236 333.95338)scale(0.1 -0.1)">
      <use xlink:href="#DejaVuSans-32"/>
    </g>
  </g>
</g>
<g id="xtick_9">
  <g id="line2d_11">
    <path d="M 198.269494 322.854011
L 194.210696 324.761757
" style="fill:none;stroke:#000000;stroke-linecap:square;stroke-width:0.8;"/>

```

```
</g>
<g id="text_11">
  <!-- 4 -->
  <g transform="translate(184.455182 344.487375)scale(0.1 -0.1)">
    <use xlink:href="#DejaVuSans-34"/>
  </g>
</g>
</g>
<g id="xtick_10">
  <g id="line2d_12">
    <path d="M 227.948558 333.436729
L 223.902066 335.379861
" style="fill:none;stroke:#000000;stroke-linecap:square;stroke-width:0.8;"/>
  </g>
  <g id="text_12">
    <!-- 6 -->
    <g transform="translate(214.081589 355.216)scale(0.1 -0.1)">
      <use xlink:href="#DejaVuSans-36"/>
    </g>
  </g>
</g>
<g id="xtick_11">
  <g id="line2d_13">
    <path d="M 258.180241 344.216495
L 254.147221 346.196008
" style="fill:none;stroke:#000000;stroke-linecap:square;stroke-width:0.8;"/>
  </g>
  <g id="text_13">
    <!-- 8 -->
    <g transform="translate(244.260489 366.1447)scale(0.1 -0.1)">
      <use xlink:href="#DejaVuSans-38"/>
    </g>
  </g>
</g>
```

```

</g>

</g>

<g id="xtick_12">

  <g id="line2d_14">

    <path d="M 288.980124 355.198865
L 284.9618 357.215789
" style="fill:none;stroke:#000000;stroke-linecap:square;stroke-width:0.8;"/>

  </g>

  <g id="text_14">

    <!-- 10 -->

    <g transform="translate(271.826234 377.279125)scale(0.1 -0.1)">

      <use xlink:href="#DejaVuSans-31"/>

      <use x="63.623047" xlink:href="#DejaVuSans-30"/>

    </g>

  </g>

</g>

</g>

<g id="axis3d_3">

  <g id="line2d_15">

    <path d="M 127.730203 298.794752
L 118.398743 135.875949
" style="fill:none;stroke:#000000;stroke-linecap:square;stroke-width:0.8;"/>

  </g>

  <g id="text_15">

    <!-- Hours in VR -->

    <defs>

      <path d="M 28.609375 0
L 0.78125 72.90625
L 11.078125 72.90625
L 34.1875 11.53125
L 57.328125 72.90625
L 67.578125 72.90625

```

L 39.796875 0

z

" id="DejaVuSans-56"/>

<path d="M 44.390625 34.1875

Q 47.5625 33.109375 50.5625 29.59375

Q 53.5625 26.078125 56.59375 19.921875

L 66.609375 0

L 56 0

L 46.6875 18.703125

Q 43.0625 26.03125 39.671875 28.421875

Q 36.28125 30.8125 30.421875 30.8125

L 19.671875 30.8125

L 19.671875 0

L 9.8125 0

L 9.8125 72.90625

L 32.078125 72.90625

Q 44.578125 72.90625 50.734375 67.671875

Q 56.890625 62.453125 56.890625 51.90625

Q 56.890625 45.015625 53.6875 40.46875

Q 50.484375 35.9375 44.390625 34.1875

z

M 19.671875 64.796875

L 19.671875 38.921875

L 32.078125 38.921875

Q 39.203125 38.921875 42.84375 42.21875

Q 46.484375 45.515625 46.484375 51.90625

Q 46.484375 58.296875 42.84375 61.546875

Q 39.203125 64.796875 32.078125 64.796875

z

" id="DejaVuSans-52"/>

</defs>

<g transform="translate(74.570676 191.835681)rotate(-273.278135)scale(0.1 -0.1)">

```

<use xlink:href="#DejaVuSans-48"/>
<use x="75.195312" xlink:href="#DejaVuSans-6f"/>
<use x="136.376953" xlink:href="#DejaVuSans-75"/>
<use x="199.755859" xlink:href="#DejaVuSans-72"/>
<use x="240.869141" xlink:href="#DejaVuSans-73"/>
<use x="292.96875" xlink:href="#DejaVuSans-20"/>
<use x="324.755859" xlink:href="#DejaVuSans-69"/>
<use x="352.539062" xlink:href="#DejaVuSans-6e"/>
<use x="415.917969" xlink:href="#DejaVuSans-20"/>
<use x="447.705078" xlink:href="#DejaVuSans-56"/>
<use x="516.113281" xlink:href="#DejaVuSans-52"/>
</g>
</g>
<g id="Line3DCollection_3">
  <path d="M 127.164854 288.924273
L 286.972315 218.09507
L 473.417775 276.885167
" style="fill:none;stroke:#b0b0b0;stroke-width:0.8;"/>
  <path d="M 125.831859 265.651384
L 286.870109 195.805696
L 474.72199 253.774649
" style="fill:none;stroke:#b0b0b0;stroke-width:0.8;"/>
  <path d="M 124.47829 242.0193
L 286.766427 173.194509
L 476.046114 230.311359
" style="fill:none;stroke:#b0b0b0;stroke-width:0.8;"/>
  <path d="M 123.103667 218.019641
L 286.661238 150.254488
L 477.390605 206.487157
" style="fill:none;stroke:#b0b0b0;stroke-width:0.8;"/>
  <path d="M 121.707496 193.643765
L 286.554507 126.978407

```


L 478.755938 182.29365

" style="fill:none;stroke:#b0b0b0;stroke-width:0.8;"/>

<path d="M 120.289266 168.882754

L 286.446202 103.358827

L 480.1426 157.722186

" style="fill:none;stroke:#b0b0b0;stroke-width:0.8;"/>

<path d="M 118.84845 143.727408

L 286.336286 79.388088

L 481.551095 132.763837

" style="fill:none;stroke:#b0b0b0;stroke-width:0.8;"/>

</g>

<g id="xtick_13">

<g id="line2d_16">

<path d="M 128.52943 288.319472

L 124.431248 290.135851

" style="fill:none;stroke:#000000;stroke-linecap:square;stroke-width:0.8;"/>

</g>

<g id="text_16">

<!-- 0 -->

<g transform="translate(104.129347 297.213037)scale(0.1 -0.1)">

<use xlink:href="#DejaVuSans-30"/>

</g>

</g>

</g>

<g id="xtick_14">

<g id="line2d_17">

<path d="M 127.207608 265.054692

L 123.075834 266.84673

" style="fill:none;stroke:#000000;stroke-linecap:square;stroke-width:0.8;"/>

</g>

<g id="text_17">

<!-- 2 -->

```

    <g transform="translate(102.643381 273.930897)scale(0.1 -0.1)">
      <use xlink:href="#DejaVuSans-32"/>
    </g>
  </g>
</g>
<g id="xtick_15">
  <g id="line2d_18">
    <path d="M 125.865397 241.431042
L 121.699478 243.197767
" style="fill:none;stroke:#000000;stroke-linecap:square;stroke-width:0.8;"/>
  </g>
  <g id="text_18">
    <!-- 4 -->
    <g transform="translate(101.134467 250.289193)scale(0.1 -0.1)">
      <use xlink:href="#DejaVuSans-34"/>
    </g>
  </g>
</g>
<g id="xtick_16">
  <g id="line2d_19">
    <path d="M 124.50232 217.440152
L 120.30169 219.180557
" style="fill:none;stroke:#000000;stroke-linecap:square;stroke-width:0.8;"/>
  </g>
  <g id="text_19">
    <!-- 6 -->
    <g transform="translate(99.602067 226.279532)scale(0.1 -0.1)">
      <use xlink:href="#DejaVuSans-36"/>
    </g>
  </g>
</g>
<g id="xtick_17">

```

```

<g id="line2d_20">
  <path d="M 123.117888 193.073392
L 118.881965 194.786431
" style="fill:none;stroke:#000000;stroke-linecap:square;stroke-width:0.8;"/>
</g>
<g id="text_20">
  <!-- 8 -->
  <g transform="translate(98.045631 201.893255)scale(0.1 -0.1)">
    <use xlink:href="#DejaVuSans-38"/>
  </g>
</g>
</g>
<g id="xtick_18">
  <g id="line2d_21">
    <path d="M 121.711594 168.321859
L 117.439784 170.006446
" style="fill:none;stroke:#000000;stroke-linecap:square;stroke-width:0.8;"/>
  </g>
  <g id="text_21">
    <!-- 10 -->
    <g transform="translate(93.283337 177.121431)scale(0.1 -0.1)">
      <use xlink:href="#DejaVuSans-31"/>
      <use x="63.623047" xlink:href="#DejaVuSans-30"/>
    </g>
  </g>
</g>
<g id="xtick_19">
  <g id="line2d_22">
    <path d="M 120.282917 143.176367
L 115.974609 144.831375
" style="fill:none;stroke:#000000;stroke-linecap:square;stroke-width:0.8;"/>
  </g>

```

```

<g id="text_22">
  <!-- 12 -->
  <g transform="translate(91.677098 151.954844)scale(0.1 -0.1)">
    <use xlink:href="#DejaVuSans-31"/>
    <use x="63.623047" xlink:href="#DejaVuSans-32"/>
  </g>
</g>
</g>
</g>
</g>
<g id="axes_1">
  <g id="Path3DCollection_1">
    <defs>
      <path d="M 0 2.236068
C 0.593012 2.236068 1.161816 2.000462 1.581139 1.581139
C 2.000462 1.161816 2.236068 0.593012 2.236068 0
C 2.236068 -0.593012 2.000462 -1.161816 1.581139 -1.581139
C 1.161816 -2.000462 0.593012 -2.236068 0 -2.236068
C -0.593012 -2.236068 -1.161816 -2.000462 -1.581139 -1.581139
C -2.000462 -1.161816 -2.236068 -0.593012 -2.236068 0
C -2.236068 0.593012 -2.000462 1.161816 -1.581139 1.581139
C -1.161816 2.000462 -0.593012 2.236068 0 2.236068
z
" id="C0_0_43c7648cc8"/>
    </defs>
    <g clip-path="url(#pbd889da540)">
      <use style="fill:#fde725;fill-opacity:0.638894;stroke:#fde725;stroke-opacity:0.638894;"
x="209.405331" xlink:href="#C0_0_43c7648cc8" y="234.174496"/>
    </g>
    <g clip-path="url(#pbd889da540)">
      <use style="fill:#fde725;fill-opacity:0.45381;stroke:#fde725;stroke-opacity:0.45381;" x="230.087621"
xlink:href="#C0_0_43c7648cc8" y="230.656305"/>
    </g>
    <g clip-path="url(#pbd889da540)">

```

```
<use style="fill:#fde725;fill-opacity:0.418728;stroke:#fde725;stroke-opacity:0.418728;"
x="233.347348" xlink:href="#C0_0_43c7648cc8" y="236.506949"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#fde725;fill-opacity:0.814619;stroke:#fde725;stroke-opacity:0.814619;"
x="207.140461" xlink:href="#C0_0_43c7648cc8" y="217.684378"/>

  </g>

  <g clip-path="url(#pbd889da540)">

    <use style="fill:#fde725;fill-opacity:0.689344;stroke:#fde725;stroke-opacity:0.689344;"
x="179.871795" xlink:href="#C0_0_43c7648cc8" y="289.387743"/>

    </g>

    <g clip-path="url(#pbd889da540)">

      <use style="fill:#fde725;fill-opacity:0.696161;stroke:#fde725;stroke-opacity:0.696161;"
x="236.278918" xlink:href="#C0_0_43c7648cc8" y="186.664673"/>

      </g>

      <g clip-path="url(#pbd889da540)">

        <use style="fill:#fde725;fill-opacity:0.567827;stroke:#fde725;stroke-opacity:0.567827;"
x="221.676174" xlink:href="#C0_0_43c7648cc8" y="224.758779"/>

        </g>

        <g clip-path="url(#pbd889da540)">

          <use style="fill:#fde725;fill-opacity:0.628037;stroke:#fde725;stroke-opacity:0.628037;"
x="219.663588" xlink:href="#C0_0_43c7648cc8" y="224.272649"/>

          </g>

          <g clip-path="url(#pbd889da540)">

            <use style="fill:#fde725;fill-opacity:0.562775;stroke:#fde725;stroke-opacity:0.562775;"
x="232.488694" xlink:href="#C0_0_43c7648cc8" y="216.686423"/>

            </g>

            <g clip-path="url(#pbd889da540)">

              <use style="fill:#fde725;fill-opacity:0.60448;stroke:#fde725;stroke-opacity:0.60448;" x="233.649113"
xlink:href="#C0_0_43c7648cc8" y="200.852443"/>

              </g>

              <g clip-path="url(#pbd889da540)">

                <use style="fill:#fde725;fill-opacity:0.576803;stroke:#fde725;stroke-opacity:0.576803;"
x="244.272992" xlink:href="#C0_0_43c7648cc8" y="183.601145"/>

                </g>
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<g clip-path="url(#pbd889da540)">

  <use style="fill:#fde725;fill-opacity:0.578888;stroke:#fde725;stroke-opacity:0.578888;"
x="220.316072" xlink:href="#C0_0_43c7648cc8" y="239.89898"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#21918c;fill-opacity:0.408467;stroke:#21918c;stroke-opacity:0.408467;"
x="263.591332" xlink:href="#C0_0_43c7648cc8" y="187.891422"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#fde725;fill-opacity:0.703668;stroke:#fde725;stroke-opacity:0.703668;"
x="228.985014" xlink:href="#C0_0_43c7648cc8" y="176.847965"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#fde725;fill-opacity:0.72232;stroke:#fde725;stroke-opacity:0.72232;" x="197.662505"
xlink:href="#C0_0_43c7648cc8" y="244.976193"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#fde725;fill-opacity:0.47222;stroke:#fde725;stroke-opacity:0.47222;" x="242.963426"
xlink:href="#C0_0_43c7648cc8" y="192.836732"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#fde725;fill-opacity:0.503784;stroke:#fde725;stroke-opacity:0.503784;"
x="233.764268" xlink:href="#C0_0_43c7648cc8" y="218.815546"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#fde725;fill-opacity:0.563399;stroke:#fde725;stroke-opacity:0.563399;"
x="217.030998" xlink:href="#C0_0_43c7648cc8" y="253.218586"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#fde725;fill-opacity:0.610968;stroke:#fde725;stroke-opacity:0.610968;"
x="205.920873" xlink:href="#C0_0_43c7648cc8" y="240.354676"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#fde725;fill-opacity:0.527938;stroke:#fde725;stroke-opacity:0.527938;"
x="226.174254" xlink:href="#C0_0_43c7648cc8" y="239.116899"/>

</g>
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</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#440154;fill-opacity:0.484702;stroke:#440154;stroke-opacity:0.484702;"
x="391.407384" xlink:href="#C0_0_43c7648cc8" y="266.42741"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#440154;fill-opacity:0.451712;stroke:#440154;stroke-opacity:0.451712;"
x="314.143951" xlink:href="#C0_0_43c7648cc8" y="260.914153"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#440154;fill-opacity:0.495278;stroke:#440154;stroke-opacity:0.495278;"
x="350.347289" xlink:href="#C0_0_43c7648cc8" y="262.113998"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#440154;fill-opacity:0.428788;stroke:#440154;stroke-opacity:0.428788;"
x="369.719162" xlink:href="#C0_0_43c7648cc8" y="257.083232"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#fde725;fill-opacity:0.707788;stroke:#fde725;stroke-opacity:0.707788;"
x="244.799931" xlink:href="#C0_0_43c7648cc8" y="222.928808"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#440154;fill-opacity:0.613696;stroke:#440154;stroke-opacity:0.613696;"
x="323.539574" xlink:href="#C0_0_43c7648cc8" y="239.363199"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#440154;fill-opacity:0.384678;stroke:#440154;stroke-opacity:0.384678;"
x="331.829312" xlink:href="#C0_0_43c7648cc8" y="249.711478"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#440154;fill-opacity:0.568012;stroke:#440154;stroke-opacity:0.568012;"
x="286.661847" xlink:href="#C0_0_43c7648cc8" y="280.349967"/>

</g>

<g clip-path="url(#pbd889da540)">
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<use style="fill:#fde725;fill-opacity:0.345613;stroke:#fde725;stroke-opacity:0.345613;"
x="254.707923" xlink:href="#C0_0_43c7648cc8" y="234.913908"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#fde725;fill-opacity:0.629585;stroke:#fde725;stroke-opacity:0.629585;"
x="284.914092" xlink:href="#C0_0_43c7648cc8" y="233.62683"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#440154;fill-opacity:0.571972;stroke:#440154;stroke-opacity:0.571972;"
x="298.335479" xlink:href="#C0_0_43c7648cc8" y="281.01186"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#440154;fill-opacity:0.43658;stroke:#440154;stroke-opacity:0.43658;"
x="305.354073" xlink:href="#C0_0_43c7648cc8" y="238.44188"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#fde725;fill-opacity:0.400167;stroke:#fde725;stroke-opacity:0.400167;"
x="239.86128" xlink:href="#C0_0_43c7648cc8" y="234.164355"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#440154;fill-opacity:0.623565;stroke:#440154;stroke-opacity:0.623565;"
x="383.448116" xlink:href="#C0_0_43c7648cc8" y="289.633969"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#440154;fill-opacity:0.531255;stroke:#440154;stroke-opacity:0.531255;"
x="354.870946" xlink:href="#C0_0_43c7648cc8" y="274.207211"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#440154;fill-opacity:0.691936;stroke:#440154;stroke-opacity:0.691936;"
x="405.126451" xlink:href="#C0_0_43c7648cc8" y="301.059979"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#440154;fill-opacity:0.712408;stroke:#440154;stroke-opacity:0.712408;"
x="398.189413" xlink:href="#C0_0_43c7648cc8" y="254.76433"/>

</g>
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<g clip-path="url(#pbd889da540)">

  <use style="fill:#440154;fill-opacity:0.459988;stroke:#440154;stroke-opacity:0.459988;"
x="370.982308" xlink:href="#C0_0_43c7648cc8" y="262.297244"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#440154;fill-opacity:0.59867;stroke:#440154;stroke-opacity:0.59867;"
x="346.690855" xlink:href="#C0_0_43c7648cc8" y="285.473472"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#440154;fill-opacity:0.671106;stroke:#440154;stroke-opacity:0.671106;"
x="393.967657" xlink:href="#C0_0_43c7648cc8" y="263.573364"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#440154;fill-opacity:0.44445;stroke:#440154;stroke-opacity:0.44445;"
x="316.665224" xlink:href="#C0_0_43c7648cc8" y="258.448308"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#440154;fill-opacity:0.3;stroke:#440154;stroke-opacity:0.3;" x="318.066253"
xlink:href="#C0_0_43c7648cc8" y="235.560318"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#440154;fill-opacity:0.528715;stroke:#440154;stroke-opacity:0.528715;"
x="273.793856" xlink:href="#C0_0_43c7648cc8" y="273.782793"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#fde725;fill-opacity:0.54784;stroke:#fde725;stroke-opacity:0.54784;" x="230.459644"
xlink:href="#C0_0_43c7648cc8" y="252.376527"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#440154;fill-opacity:0.432708;stroke:#440154;stroke-opacity:0.432708;"
x="265.171027" xlink:href="#C0_0_43c7648cc8" y="257.020343"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#fde725;stroke:#fde725;" x="244.161678" xlink:href="#C0_0_43c7648cc8"
y="241.674509"/>

</g>
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</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#440154;fill-opacity:0.323276;stroke:#440154;stroke-opacity:0.323276;"
x="331.320677" xlink:href="#C0_0_43c7648cc8" y="239.450227"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#440154;fill-opacity:0.54104;stroke:#440154;stroke-opacity:0.54104;"
x="330.346914" xlink:href="#C0_0_43c7648cc8" y="237.277587"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#440154;fill-opacity:0.370723;stroke:#440154;stroke-opacity:0.370723;"
x="280.784158" xlink:href="#C0_0_43c7648cc8" y="247.379432"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#440154;fill-opacity:0.362691;stroke:#440154;stroke-opacity:0.362691;"
x="262.25005" xlink:href="#C0_0_43c7648cc8" y="246.037082"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#21918c;fill-opacity:0.691136;stroke:#21918c;stroke-opacity:0.691136;"
x="226.437548" xlink:href="#C0_0_43c7648cc8" y="113.364888"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#21918c;fill-opacity:0.492524;stroke:#21918c;stroke-opacity:0.492524;"
x="297.935384" xlink:href="#C0_0_43c7648cc8" y="143.768718"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#21918c;fill-opacity:0.590732;stroke:#21918c;stroke-opacity:0.590732;"
x="266.762812" xlink:href="#C0_0_43c7648cc8" y="126.884715"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#21918c;fill-opacity:0.643839;stroke:#21918c;stroke-opacity:0.643839;"
x="254.979691" xlink:href="#C0_0_43c7648cc8" y="128.173528"/>

</g>

<g clip-path="url(#pbd889da540)">
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<use style="fill:#21918c;fill-opacity:0.465085;stroke:#21918c;stroke-opacity:0.465085;"
x="326.629066" xlink:href="#C0_0_43c7648cc8" y="163.946236"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#21918c;fill-opacity:0.592899;stroke:#21918c;stroke-opacity:0.592899;"
x="289.84389" xlink:href="#C0_0_43c7648cc8" y="149.142632"/>

  </g>

  <g clip-path="url(#pbd889da540)">

    <use style="fill:#440154;fill-opacity:0.425708;stroke:#440154;stroke-opacity:0.425708;"
x="346.372384" xlink:href="#C0_0_43c7648cc8" y="207.972549"/>

    </g>

    <g clip-path="url(#pbd889da540)">

      <use style="fill:#21918c;fill-opacity:0.560224;stroke:#21918c;stroke-opacity:0.560224;"
x="284.292793" xlink:href="#C0_0_43c7648cc8" y="133.683101"/>

      </g>

      <g clip-path="url(#pbd889da540)">

        <use style="fill:#21918c;fill-opacity:0.509618;stroke:#21918c;stroke-opacity:0.509618;"
x="363.512662" xlink:href="#C0_0_43c7648cc8" y="188.20159"/>

        </g>

        <g clip-path="url(#pbd889da540)">

          <use style="fill:#21918c;fill-opacity:0.487809;stroke:#21918c;stroke-opacity:0.487809;"
x="333.438745" xlink:href="#C0_0_43c7648cc8" y="161.302719"/>

          </g>

          <g clip-path="url(#pbd889da540)">

            <use style="fill:#21918c;fill-opacity:0.474432;stroke:#21918c;stroke-opacity:0.474432;"
x="327.035727" xlink:href="#C0_0_43c7648cc8" y="159.864933"/>

            </g>

            <g clip-path="url(#pbd889da540)">

              <use style="fill:#21918c;fill-opacity:0.581219;stroke:#21918c;stroke-opacity:0.581219;"
x="258.535966" xlink:href="#C0_0_43c7648cc8" y="126.340961"/>

              </g>

              <g clip-path="url(#pbd889da540)">

                <use style="fill:#21918c;fill-opacity:0.475638;stroke:#21918c;stroke-opacity:0.475638;"
x="332.530756" xlink:href="#C0_0_43c7648cc8" y="166.144291"/>

                </g>
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<g clip-path="url(#pbd889da540)">

  <use style="fill:#21918c;fill-opacity:0.503105;stroke:#21918c;stroke-opacity:0.503105;"
x="272.256018" xlink:href="#C0_0_43c7648cc8" y="125.45756"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#21918c;fill-opacity:0.486357;stroke:#21918c;stroke-opacity:0.486357;"
x="350.819971" xlink:href="#C0_0_43c7648cc8" y="183.751583"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#21918c;fill-opacity:0.517575;stroke:#21918c;stroke-opacity:0.517575;"
x="363.426781" xlink:href="#C0_0_43c7648cc8" y="184.186865"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#21918c;fill-opacity:0.412646;stroke:#21918c;stroke-opacity:0.412646;"
x="288.354025" xlink:href="#C0_0_43c7648cc8" y="141.833173"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#21918c;fill-opacity:0.47781;stroke:#21918c;stroke-opacity:0.47781;" x="334.237626"
xlink:href="#C0_0_43c7648cc8" y="167.211989"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#21918c;fill-opacity:0.399034;stroke:#21918c;stroke-opacity:0.399034;"
x="288.831542" xlink:href="#C0_0_43c7648cc8" y="149.114572"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#21918c;fill-opacity:0.447848;stroke:#21918c;stroke-opacity:0.447848;"
x="312.936677" xlink:href="#C0_0_43c7648cc8" y="155.28814"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#21918c;fill-opacity:0.492431;stroke:#21918c;stroke-opacity:0.492431;"
x="277.697968" xlink:href="#C0_0_43c7648cc8" y="121.097989"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#21918c;fill-opacity:0.586562;stroke:#21918c;stroke-opacity:0.586562;"
x="262.296568" xlink:href="#C0_0_43c7648cc8" y="101.659774"/>

</g>
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</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#21918c;fill-opacity:0.461555;stroke:#21918c;stroke-opacity:0.461555;"
x="286.643182" xlink:href="#C0_0_43c7648cc8" y="138.353601"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#21918c;fill-opacity:0.543495;stroke:#21918c;stroke-opacity:0.543495;"
x="312.557784" xlink:href="#C0_0_43c7648cc8" y="153.361018"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#21918c;fill-opacity:0.58103;stroke:#21918c;stroke-opacity:0.58103;" x="365.483882"
xlink:href="#C0_0_43c7648cc8" y="183.838436"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#21918c;fill-opacity:0.502387;stroke:#21918c;stroke-opacity:0.502387;"
x="338.664667" xlink:href="#C0_0_43c7648cc8" y="172.412804"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#21918c;fill-opacity:0.535138;stroke:#21918c;stroke-opacity:0.535138;"
x="265.827468" xlink:href="#C0_0_43c7648cc8" y="137.507741"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#21918c;fill-opacity:0.544152;stroke:#21918c;stroke-opacity:0.544152;"
x="330.072386" xlink:href="#C0_0_43c7648cc8" y="159.333344"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#21918c;fill-opacity:0.537406;stroke:#21918c;stroke-opacity:0.537406;"
x="331.006576" xlink:href="#C0_0_43c7648cc8" y="168.529467"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#21918c;fill-opacity:0.486159;stroke:#21918c;stroke-opacity:0.486159;"
x="292.488462" xlink:href="#C0_0_43c7648cc8" y="138.947705"/>

</g>

<g clip-path="url(#pbd889da540)">
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<use style="fill:#21918c;fill-opacity:0.667238;stroke:#21918c;stroke-opacity:0.667238,"
x="282.015236" xlink:href="#C0_0_43c7648cc8" y="145.889033"/>

</g>

<g clip-path="url(#pbd889da540)">

  <use style="fill:#21918c;fill-opacity:0.599481;stroke:#21918c;stroke-opacity:0.599481,"
x="310.649296" xlink:href="#C0_0_43c7648cc8" y="160.76514"/>

  </g>

  <g clip-path="url(#pbd889da540)">

    <use style="fill:#21918c;fill-opacity:0.560664;stroke:#21918c;stroke-opacity:0.560664,"
x="313.202456" xlink:href="#C0_0_43c7648cc8" y="156.003932"/>

    </g>

    <g clip-path="url(#pbd889da540)">

      <use style="fill:#21918c;fill-opacity:0.52938;stroke:#21918c;stroke-opacity:0.52938," x="308.952546"
xlink:href="#C0_0_43c7648cc8" y="141.763243"/>

      </g>

      <g clip-path="url(#pbd889da540)">

        <use style="fill:#21918c;fill-opacity:0.483797;stroke:#21918c;stroke-opacity:0.483797,"
x="316.254352" xlink:href="#C0_0_43c7648cc8" y="153.750768"/>

        </g>

        <g clip-path="url(#pbd889da540)">

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x="284.335426" xlink:href="#C0_0_43c7648cc8" y="124.030029"/>

          </g>

          <g clip-path="url(#pbd889da540)">

            <use style="fill:#21918c;fill-opacity:0.65884;stroke:#21918c;stroke-opacity:0.65884," x="354.092639"
xlink:href="#C0_0_43c7648cc8" y="188.617899"/>

            </g>

            <g clip-path="url(#pbd889da540)">

              <use style="fill:#21918c;fill-opacity:0.483882;stroke:#21918c;stroke-opacity:0.483882,"
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              </g>

              <g clip-path="url(#pbd889da540)">

                <use style="fill:#21918c;fill-opacity:0.540693;stroke:#21918c;stroke-opacity:0.540693,"
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                </g>
```

```
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</g>

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  <use style="fill:#21918c;fill-opacity:0.548941;stroke:#21918c;stroke-opacity:0.548941;"
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</g>

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</g>

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  <use style="fill:#21918c;fill-opacity:0.572451;stroke:#21918c;stroke-opacity:0.572451;"
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</g>

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</g>

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</g>

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</g>

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</g>

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</g>
```

```

</g>
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</g>
</g>
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</defs>
</svg>
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```

media_usage.csv

Hours reading text,Hours watching video,Hours in VR

```

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```


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plot.py

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

```
from mpl_toolkits.mplot3d import Axes3D
```

```
def plot_clusters(media_usage, labels):
```

```
    """
```

This function plots the clusters for this exercise. This function is in a different file so that script.py is easier to read.

```
    """
```

```
    fig = plt.figure(figsize=(8, 6))
```

```
    ax = fig.add_subplot(111, projection='3d')
```

```
    xs = media_usage['Hours reading text']
```

```
    ys = media_usage['Hours watching video']
```

```
    zs = media_usage['Hours in VR']
```

```
    ax.scatter(xs, ys, zs, c=labels)
```

```
    ax.set_xlabel('Hours reading text')
```

```
    ax.set_ylabel('Hours watching video')
```

```
    ax.set_zlabel('Hours in VR')
```

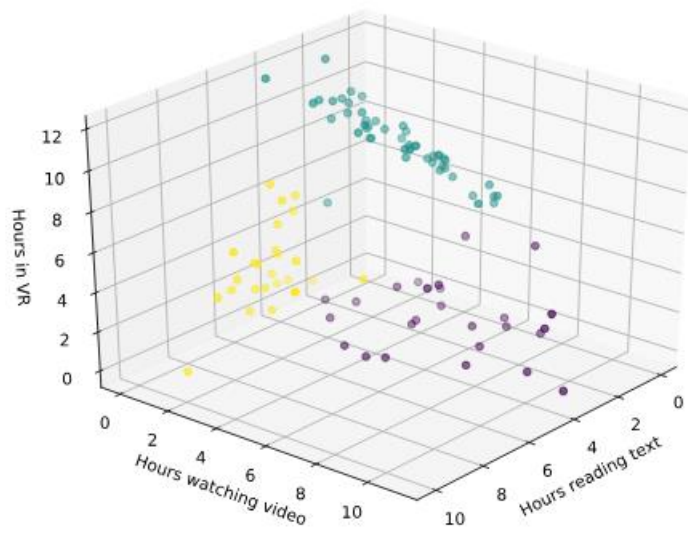
```
    # Set the perspective so the clusters are easier to see
```

```
    ax.azim = 40
```

```
    ax.elev = 30
```

```
    plt.show()
```

```
    return
```



Explain error