Lecture 22: Applications of Dictionaries; Plotting with Matplotlib

Practice with Dictionaries

Consider CSV data of the form:

```
alabama,10,20,30
alaska,32,43,56
.
.
.
Wyoming,2,0,78
```

Write a function `to_data` that takes a filename and returns a dictionary `data` where each key is a state name and each value is a list of integers.

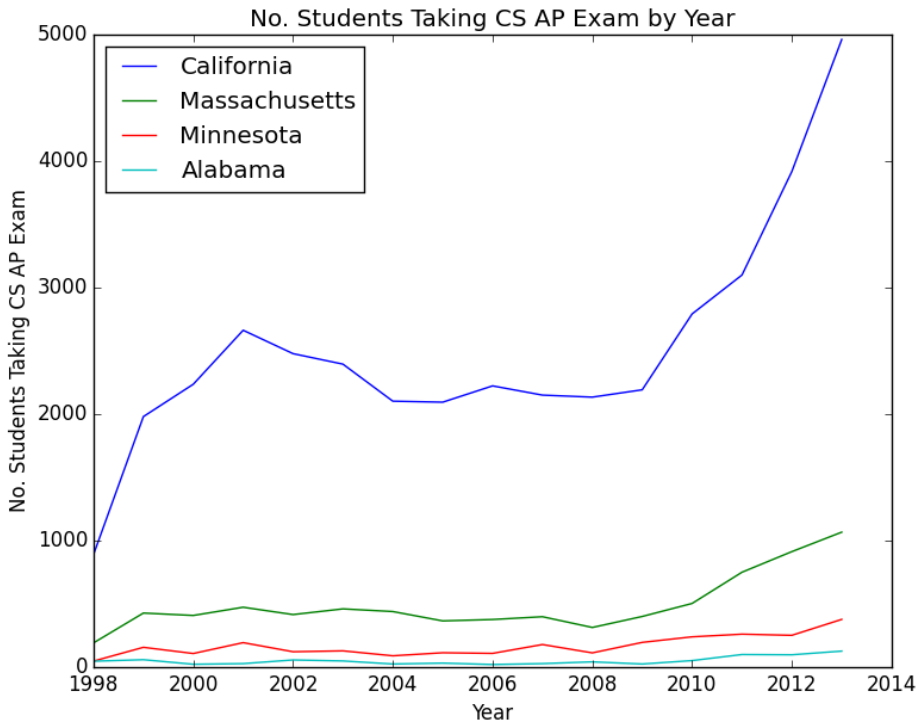
```
>>> data["Minnesota"]
[47, 156, 107, 193, 121, 128]
>>> data["Iowa"]
[15, 36, 52, 57, 62, 45]
```

Practice with Dictionaries

```
1  import csv
2
3  def data_from_file(filename):
4      with open(filename) as fin:
5          return {state: [int(x) for x in nums]
6                  for state, *nums in csv.reader(fin)}
```

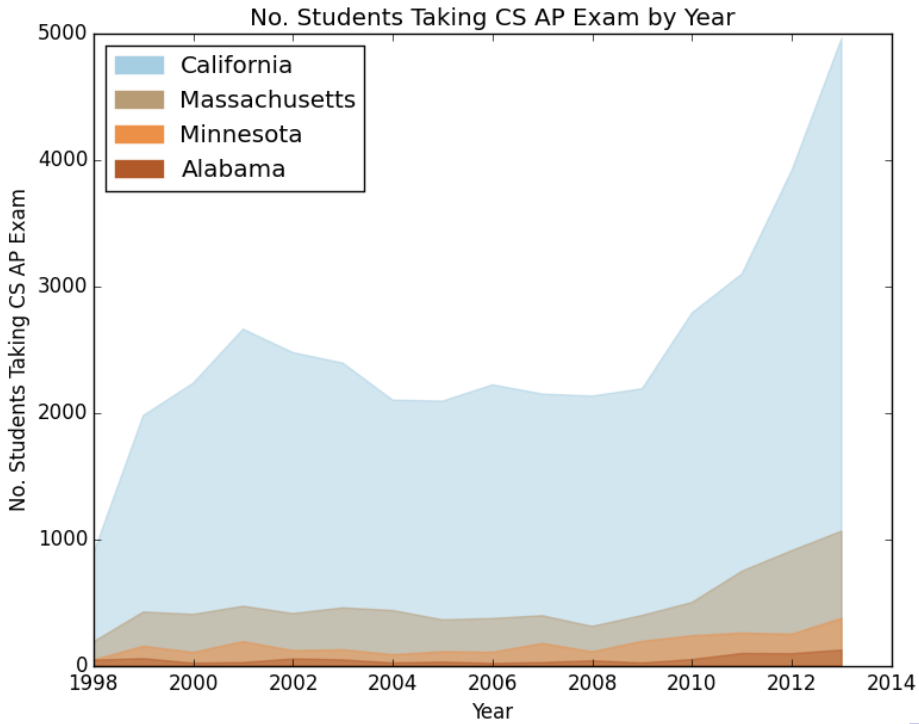
Simple Line Plots

```
1  def plot1(data, states, years):
2      for state in states:
3          plt.plot(years, data[state], label=state)
4      plt.legend(loc="best")
5      plt.xlabel("Year")
6      plt.ylabel("No. Students Taking CS AP Exam")
7      plt.title("No. Students Taking CS AP Exam by Year")
8      plt.savefig("out.png")
```



Filled Plots

```
1  def plot2(data, states, years):
2      colors = plt.cm.Paired(np.linspace(0,1,len(states)))
3      patches = []
4      for state,c in zip(states,colors):
5          plt.fill_between(years, data[state], color=c, alpha=0.5)
6          patches.append(mpatches.Patch(color=c, label=state))
7      plt.legend(handles=patches, loc="upper left")
8      plt.xlabel("Year")
9      plt.ylabel("No. Students Taking CS AP Exam")
10     plt.title("No. Students Taking CS AP Exam by Year")
11     plt.savefig("out2.png")
```



Subplots

```
1  def plot3(data, states, years):
2      colors = plt.cm.Set1(np.linspace(0,1,len(states)))
3      for i, state, c in zip(count(), states, colors):
4          ax = plt.subplot2grid((len(states),1),(i,0))
5          ax.fill_between(years, data[state], color=c)
6          ax.set_ylabel("Count")
7          for tick in ax.yaxis.get_major_ticks():
8              tick.label.set_fontsize(8)
9
10     plt.tight_layout()
11     plt.xlabel("Year")
12     plt.savefig("out3.png")
```