Python for Data Mining Part 2

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Python as a Programming Language

- **Python is a high level general purpose programming language with many dominant areas including data analysis, data mining and artificial intelligence.**
- **Python Enhancement Proposal 8 (PEP 8) provides a guidance on how to write Python code to enhance readability and maintain consistency across projects.**

Common modules and their usage

- NumPy: Provides an n-dimensional array (ndarray) data structure and a wide range of mathematical operations for numerical computations.
- matplotlib.pyplot: Offers high-quality data visualization capabilities for creating various types of plots and customizing their appearance.
- pandas: Introduces Series and DataFrame data structures, which facilitate data manipulation operations and provide methods for data analysis and visualization.

Pandas Data Structures

- **Series: A 1-dimensional homogeneous array with an immutable size.**
- **Data Frames: A general 2-dimensional labelled, size-mutable tabular structure with potentially heterogeneously typed columns.**
- **Panel: General 3-dimensional labelled size-mutable array.**

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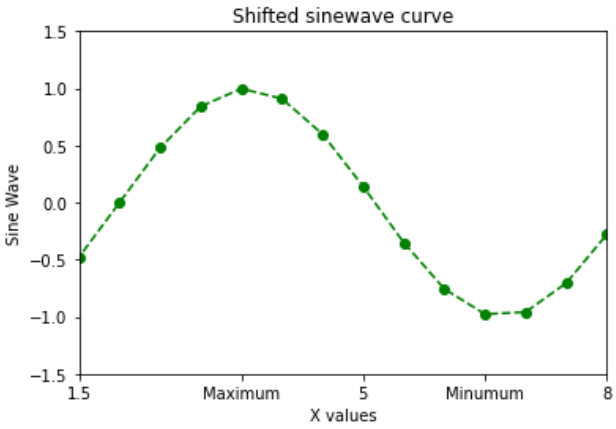
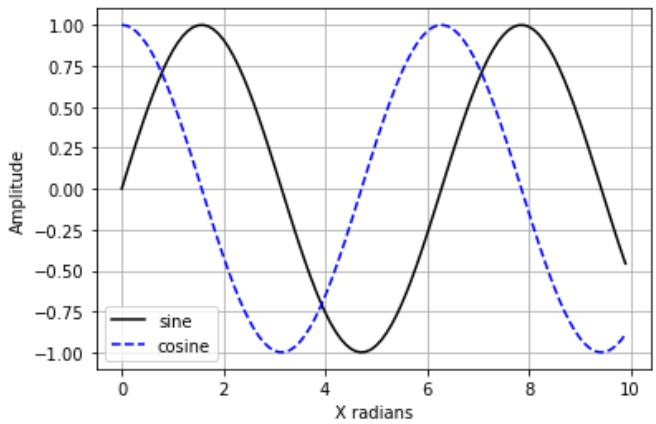
Matplotlib.pyplot plotting examples:

```
#Example 1
fig=plt.figure()
ax=fig.add_subplot(1,1,1)
x=np.arange(0,10,0.5)
y=np.sin(x-2)
ax.plot(x,y,'go--')
print( ax.get_xlim() ) #(-0.47500000000000003, 9.975)
ax.set_xlim(1.5,8)
ax.set_xticks([1.5,3.5,5,6.5,8])
ax.set_xticklabels([1.5,"Maximum","5","Minumum",8])
ax.set_ylim(-1.5,1.5)
ax.set_xlabel("X values")
ax.set_ylabel("Sine Wave")
ax.set_title("Shifted sinewave curve")

#Example 2
fig=plt.figure();ax=fig.add_subplot(1,1,1)
x=np.arange(0,10,0.1);y1=np.sin(x);y2=np.cos(x)
ax.plot(x,y1,'k',label="sine")
ax.plot(x,y2,'b--',label="cosine")
ax.grid()
ax.legend()
ax.set_xlabel("X radians"); ax.set_ylabel("Amplitude")
```



Example 1 Figure



Example 2 Figure

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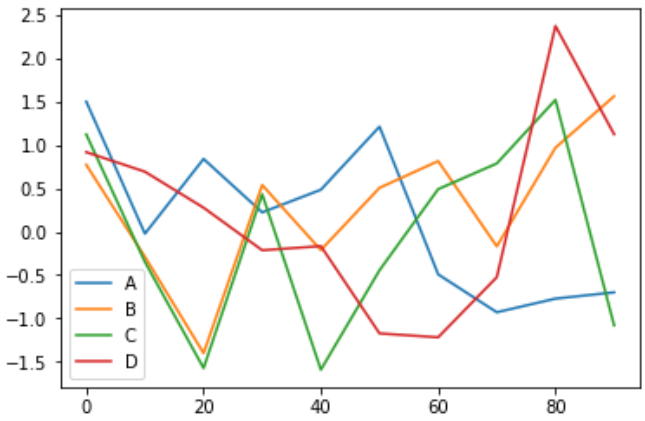
pandas plotting examples:

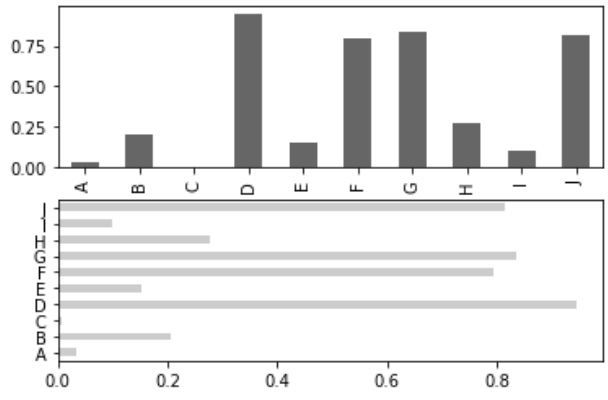
#Example 3 line plot:

```
df=pd.DataFrame(np.random.randn(10,4),columns=['A','B','C',
        'D'],index=np.arange(0,100,10))
#Generate 10x4 random matrix (4 columns each consists of
#10 row points) and label them
df.plot()

#Example 4 bar plot:
s=pd.Series(np.random.rand(10),index=list('ABCDEFGHIJ'))
#Series
fig=plt.figure()
ax1=fig.add_subplot(2,1,1)
ax2=fig.add_subplot(2,1,2)
s.plot.bar(ax=ax1,color='k',alpha=0.6) # pass axes and any
desired options, e.g., alpha
                                       # is the
transparency of the color
s.plot.barh(ax=ax2,color='k',alpha=0.2)
```



Example 3 Figure



Example 4 Figure