Issue #7869:

Take text objects into account in legend auto positioning
Branch with fix: https://github.com/RiazCharania/matplotlib/tree/issue_7869

Description:

For this bug fix, the changes have been implemented in the branch, called issue_7869. The issue is that when the legends are rendered into a graph, they overlap with text objects. To fix this issue, some additional changes have been made in the methods that are responsible for determining the best location to place the legend. This involves adding an additional check for text objects to ensure that the legend does not overlap them.

Issues encountered:

One of the issues that were encountered when fixing this issue is that it required an understanding of what the structures involved are. There was some confusion about what the methods are and what methods would achieve what we intended, for example, count_contains and count_overlaps methods in the _find_best_position method. There was also some confusion about how to retrieve the text location information in order to do the comparisons with the legend's location. However, the issue was resolved through efficient communication with the other team members and through collaboration, the team was able to find the methods that would work and solve the issue.

During the writing of the unit tests, there were some issues when running the test cases through pytest. For team members that were not using Windows systems, they were not able to run the test suite as there was an environmental issue that caused the test suite to not work. The team discovered that the test suite does not have issues when being run in a Windows environment, so the unit tests were written and run on a Windows environment to ensure that they can be run successfully.

Impact of the change:

The impact of this change would not heavily affect other structures of the program. It involves an addition of additional checks but does not change the structure of any of the elements of the graph. The functionality of the methods _find_best_position and _auto_legend_data will operate differently if other parts of the program call it as it will now also check for the presence of the text objects. However, since this change is located in legend.py, it is unlikely that other structures of the program will be accessing these methods. It seems that only the legend will be using these methods and since the legend needs to not overlap text objects, the change achieves the desired result without impacting the functionality of other components.

Modified files (relative to root directory):

- ./lib/matplotlib/legend.py
  - auto_legend_data
    - There is the addition of retrieving information from the text objects from the graph. It gets their bbox objects so they can be compared in order to get the best placement for the legend.
    - In addition to returning bboxes, lines, offsets, it also returns the text objects as well.
  - _find_best_position
    - An additional check has been added to count the overlaps between the legend and the text objects. This ensures that the check does account for the text objects and prevents the overlap from occurring.
- ./lib/matplotlib/tests/test_legend.py
  - unit tests were added

Unit Tests:

1. If you haven't already, follow the instructions in the Deliverable 2 README
2. cd to directory dir
3. Checkout and build branch issue_7869 by running
   a. cd matplotlib
   b. git checkout issue_7869
   c. python setup.py build
4. Run the unit test
   a. python3 -m pytest lib/matplotlib/tests/test_legend.py::test_overlap_no_texts
   b. python3 -m pytest lib/matplotlib/tests/test_legend.py::test_overlap_one_text
   c. python3 -m pytest lib/matplotlib/tests/test_legend.py::test_overlap_two_texts