Looping_UD

October 28, 2019

1 Looping through all the letters in Up_to_Down direction

1.1 Importing notebooks

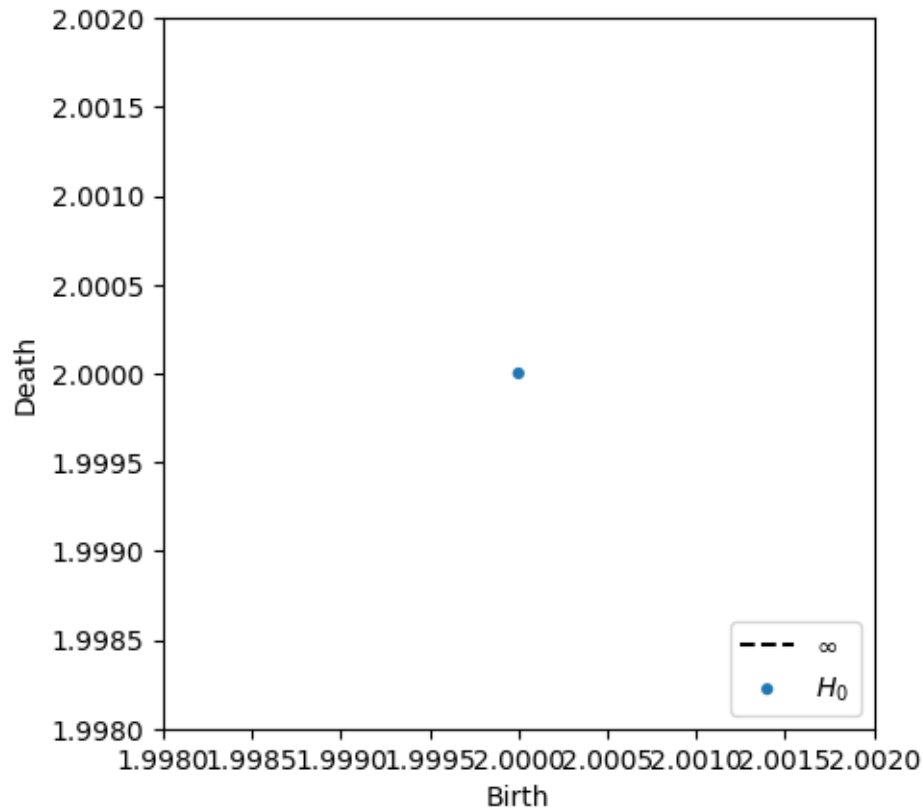```
[2]: import numpy as np
     import matplotlib.pyplot as plt
     import scipy
     from scipy import ndimage
     import PIL
     from persim import plot_diagrams
     from ripser import ripser, lower_star_img
     import csv
```

```
[5]: dgmUD = lower_star_img(letter)
     print(dgm.shape)
     print(dgm)
     plot_diagrams(dgm)

     plt.show()
```

```
(1, 2)
[[ 2. inf]]
```

```
[6]:  # Up-to-down scanning through loops
      letters = genfromtxt('letters.csv', delimiter=',') # Upload the file

      dgmUD = [None]*26 #Initialize an empty list
      for i in range(26):
          letter_one_line=letters[i,:]

          # initialize matrix of size 10x10 with all values 100
          letter=np.full((10, 10), 100)

          # convert one line letter to 10x10 matrix replacing zeros with 100
          for k in range(1,101):
              if letter_one_line[k]==1.0:
                  row=int((k-1)%10)
                  column=(k-1)/10
                  letter[row,column]=10-k%10
          dgmUD[i] = lower_star_img(letter)
```

```
[7]:  # Print A-Z diagrams
      print(dgmUD[0:25])
```

```
[array([[ 2., inf]]), array([[ 3.,  4.],
```

```
         [ 2., inf]]), array([[ 2.,  7.],
         [ 2., inf]]), array([[ 1., inf]]), array([[ 2.,  7.],
         [ 2.,  7.],
         [ 2., inf]]), array([[ 3.,  7.],
         [ 3., inf]]), array([[ 3.,  7.],
         [ 3., inf]]), array([[ 3., inf]]), array([[ 4.,  5.],
         [ 4., inf]]), array([[ 4., inf]]), array([[ 3.,  6.],
         [ 3., inf]]), array([[ 3., inf]]), array([[ 2., inf]]), array([[ 3.,
  inf]]), array([[ 2., inf]]), array([[ 2., inf]]), array([[ 2., inf]]), array([[
  3.,  5.],
         [ 3., inf]]), array([[ 2.,  7.],
         [ 2., inf]]), array([[ 2., inf]]), array([[ 2., inf]]), array([[ 2.,
  inf]]), array([[ 1., inf]]), array([[ 3.,  5.],
         [ 3., inf]]), array([[ 3., inf]])]
```

[8]:
```python
# Print A diagram
print(dgmUD[0])
```

```
[[ 2. inf]]
```

[9]:
```python
# Print Z diagram
print(dgmUD[25])
```

```
[[ 2.  6.]
 [ 2. inf]]
```