

Code

Inverse:

```
1. Created on Sat Jul 23 22:08:09 2016
2. Inverse Problem
3. @author: yasee_000
4. """
5. import math
6. #import numpy as np

7. db = {}
8. dc = {}
9. values=[]
10. d={}
11. f = open("anaconda.txt","r")
12. data = f.read()
13. spl = data.splitlines()
14. i = 0
15. while i < len(spl):
16.     for i in spl:
17.         values = i.split('\t')
18.         sta = values.pop(0)
19.         values = map(float,values)
20.         d[sta]=[values.pop(0),values.pop(0),values.pop(0)]
21.         d2 = {sta:(values.pop(0))-(values.pop(0)/60)-(values.pop(0)/3600)}
22.         update1 = db.update(d2)
23.         d3 = {sta:(values.pop(0))+(values.pop(0)/60)+(values.pop(0)/3600)}
24.         update2 = dc.update(d3)

25. f.close()
```

```

26. f2=open('boa.txt','w')
27. f3=open('viper.txt','w')
28. f2.write("staTo -StaFrm"+"\\t"+"DD"+"\\t"+"MM"+"\\t"+"SS"+"\\t"+"DD"+"\\t"+"MM"+"\\t"+"SS"+"\\t"+"S"+"\\t"+"\\t"+"DD"+"\\t"+"MM"+"\\t"+"SS"+"\\t"+"DD"+"\\t"+"MM"+"\\t"+"SS"+"\\n")
29. f3.write("staTo -StaFrm"+"\\t"+"lat1"+"\\t"+"\\t"+"long1"+"\\t"+"\\t"+"S"+"\\t"+"\\t"+"forward azi"+"\\t"+"reverse azi"+"\\n")
30. a = 6378137
31. b = 6356752.314
32. f = 1/298.257224
33. e2 = ((a**2)-(b**2))/(a**2)
34. e2x = ((a**2)-(b**2))/(b**2)
35. n = 0.0001679220

36. v = db.items()
37. w =dc.items()

38. for i in range(len(v)):
39.     for k in range(len(v)):
40.         dlat = math.radians(v[i][1]-v[k][1])
41.         dlong = math.radians(w[i][1]-w[k][1])

42. dD = int(v[k][1])
43. mM = int((v[k][1] - dD)*60)
44. sS = round((((v[k][1] - dD)*60)-mM)*60,4)
45. latTo = str(dD)+'\\t'+str(-1*mM)+'\\t'+str(-1*sS)
46. latto =v[k][1]

47. dI = int(w[k][1])
48. mI = int((w[k][1] - dI)*60)
49. sI = round((((w[k][1] - dI)*60)-mI)*60,4)
50. longTo = str(dI)+'\\t'+str(mI)+'\\t'+str(sI)

```

```

51. longto = w[k][1]

52. nameLat = v[i][0]+'-'+v[k][0]
53. nameLong = w[i][0]+'-'+w[k][0]
54. nameFrm = v[k][0]
55. nameTo = v[i][0]

56. mLat = math.radians((v[i][1]+v[k][1])/2.0)
57. mLong = math.radians((w[i][1]+w[k][1])/2.0)

58. if nameLat == nameLong and dlat!=0 and dlong!=0:
59.     M = (a*(1-e2))/math.pow((1-(e2*math.pow(math.sin(mLat),2))),3.0/2.)
60.     N = (a)/math.sqrt(1-e2*(math.sin(mLat))**2)
61.     Tau = math.tan(mLat)
62.     eta = e2*(math.cos(mLat))**2

63.     ScosA = M*dlat+(M/24.)*dlat*(((3*eta-3*eta*math.pow(Tau,2)+3*math.pow(eta,2))*(math.pow(dlat,2)/(1+eta))-
        ((2+3*math.pow(Tau,2)+2*eta)*math.pow(dlong,2)*math.pow(math.cos(mLat),2))))
64.     SsinA = N*math.cos(mLat)*dlong+(((N*math.cos(mLat))/24.)*dlong)*(((1+eta-9*eta*math.pow(Tau,2))*((math.pow(dlat,2)/(1+eta))-
        math.pow(Tau,2)*math.pow(dlong,2)*math.pow(math.cos(mLat),2)))
65.     S = math.sqrt(ScosA**2+SsinA**2)
66.     Deg = math.atan(SsinA/ScosA)

67.     dA = (S/N)*(Tau*math.sin(Deg))+((S**3)/(24*N**3))*Tau*((2+(Tau**2)+2*eta)*(math.sin(Deg)**3)+(2+7*eta+9*eta*(Tau**2)+5*(eta**2)*math.sin(Deg)*(math.cos(Deg)**2)))
68.     DegF = (Deg-(0.5*dA))
69.     DegB = (Deg+(0.5*dA))

70. x = math.pi

```

```

71. if SsinA>0 and ScosA<0:
    a. DegF = math.degrees(DegF +2*x)
    b. DegB = math.degrees(DegB +x)
72. elif SsinA<0 and ScosA<0:
    a. DegF =math.degrees(DegF)
    b. DegB =math.degrees(DegB+x)
73. elif SsinA<0 and ScosA>0:
    a. DegF = math.degrees(DegF +x)
    b. DegB = math.degrees(DegB +2*x)
74. else:
    a. DegF =math.degrees(DegF+x)
    b. DegB = math.degrees(DegB)

75. DD = int(DegF)
76. MM = int((DegF - DD)*60)
77. SS = round((((DegF - DD)*60)-MM)*60,2)

78. Dd = int(DegB)
79. Mm = int((DegB - Dd)*60)
80. Ss = round((((DegB - Dd)*60)-Mm)*60,2)
81. Azi = str(DD)+'\t'+str(MM)+'\t'+str(SS)+'\t'+str(Dd)+'\t'+str(Mm)+'\t'+str(Ss)

82. f2.write(nameLat+'\t'+latTo+'\t'+longTo+'\t'+str(S)+'\t'+Azi+'\n')
83. f3.write(nameLat+'\t'+str(math.radians(latto))+'\t'+str(math.radians(longto))+'\t'+str(S)+'\t'+str(math.radians(DegF))+'\t'+str(math.radians(DegB))+'\n')
84. f2.close

```