

Töluleg Greining

Verkefni 6

Bjarki Geir Benediktsson, Haukur Óskar Þorgeirsson, Matthías Páll Gissurarson
Kennari: Máni Maríus Viðarsson

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1 Dæmi 4.1.2

Til að leysa dæmið var eftirfarandi fall skrifað:

```
1 function lambda = veldaadferd(A,x,m)
2     i = 0;
3     x %Prentum ut x^(0), til að sjá rununa.
4     while i < m
5         y = A*x;
6         %Finnum inf-normid med minnsta indexid.
7         x = y/y(find(abs(y)==norm(y,Inf),1));
8         i = i+1;
9     end
10    %Viljum finna eigingildid líka, til þess er aðferdin
11    lambda = y(find(abs(y)==norm(y,Inf),1));
12 end
```

Það var keyrt með eftirfarandi forriti:

```
1 A = [3 2 -2; -3 -1 3; 1 2 0];
2 x0 = [1;0;0];
3 veldaadferd(A,x0,5)
```

og þá fékkst:

```
1 x =
2
3     1
4     0
5     0
6
7
8 x =
9
10    1.000000000000000
11   -1.000000000000000
12    0.333333333333333
13
14
15 x =
16
17   -0.333333333333333
18    1.000000000000000
19    1.000000000000000
20
21
```

```

22 x =
23
24 -0.3333333333333333
25 1.0000000000000000
26 0.5555555555555555
27
28
29 x =
30
31 -0.0666666666666667
32 1.0000000000000000
33 1.0000000000000000
34
35
36 x =
37
38 -0.09090909090909091
39 1.0000000000000000
40 0.878787878787879
41
42
43 ans =
44
45 2.2000000000000000

```

2 Dæmi 4.2.2

Til að leysa dæmið var eftirfarandi fall skrifað:

```

1 function lambda = andhverfveldaadferd(A,q,x,eps)
2 [L,U] = lu(A-q*eye(size(A)));
3 y = U\ (L\x);
4 n =y (find(abs(y)==norm(y,Inf),1));
5 x = y/n
6 lambda = 1/n + q
7 while 1
8     y = U\ (L\x);
9     n =y (find(abs(y)==norm(y,Inf),1));
10    %Finnun inf-normid med minnsta indexid.
11    x = y/n
12    oldlambda = lambda;
13    lambda = 1/n + q
14    if abs(lambda-oldlambda) <= eps
15        break
16    end
17 end
18 end

```

Það var keyrt með eftirfarandi forriti:

```

1 A = [1 -0.4 -0.4; -0.4 1 0.4; -0.6 0.4 1];
2 q = 0.7;
3 eps = 5*10^(-5);
4 x = [1;1;1];
5 andhverfveldaadferd(A,q,x,eps);

```

og þá fékkst:

```

1 x =
2
3 0.652173913043478
4 1.000000000000000

```

```

5      -0.304347826086956
6
7
8      lambda =
9
10     0.617391304347826
11
12
13     x =
14
15     0.305605786618445
16     1.000000000000000
17     -0.641952983725136
18
19
20     lambda =
21
22     0.620976491862568
23
24
25     x =
26
27     0.168185301881972
28     1.000000000000000
29     -0.805501149621051
30
31
32     lambda =
33
34     0.610525419398791
35
36
37     x =
38
39     0.096604272112621
40     1.000000000000000
41     -0.888076876149124
42
43
44     lambda =
45
46     0.606127540695302
47
48
49     x =
50
51     0.057018443508657
52     1.000000000000000
53     -0.933956917975276
54
55
56     lambda =
57
58     0.603609855406427
59
60
61     x =
62
63     0.034155497386451
64     1.000000000000000
65     -0.960437088423519
66
67
68     lambda =
69
70     0.602162965676012
71
72

```

```

73 x =
74
75     0.020639314779446
76     1.000000000000000
77     -0.976093240759551
78
79
80 lambda =
81
82     0.601306977784401
83
84
85 x =
86
87     0.012536637402039
88     1.000000000000000
89     -0.985478656233020
90
91
92 lambda =
93
94     0.600793882545976
95
96
97 x =
98
99     0.007638756058631
100     1.000000000000000
101     -0.991151934282220
102
103
104 lambda =
105
106     0.600483723863659
107
108
109 x =
110
111     0.004663218047324
112     1.000000000000000
113     -0.994598536725055
114
115
116 lambda =
117
118     0.600295298091049
119
120
121 x =
122
123     0.002850024905242
124     1.000000000000000
125     -0.996698780826492
126
127
128 lambda =
129
130     0.600180477707306
131
132
133 x =
134
135     0.001743076547512
136     1.000000000000000
137     -0.997980972829204
138
139
140 lambda =

```

```
141
142     0.600110380249313
143
144
145 x =
146
147     0.001066523657276
148     1.000000000000000
149     -0.998764632428033
150
151
152 lambda =
153
154     0.600067537565876
```