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1 /*** A. LANGUASCO & A. ZACCAGNINI ***/
2 /*** Implementation of Pintz-Ruzsa's method paper ***/
3 /*** (as described in their paper paper on Acta Arith. 109,(2003)) ***/
4
5 -----
6 -----
7 Results PRmethod-KB:
8 -----
9 4/5 on a quad core pc
10 -----
11
12 [languasc@labsrv0 ~]$ nice /usr/local/Gruppi/PariGP/bin/gp2c-run -pmy_ -g -W PRmethod-KB.gp
13 PRmethod-KB.gp.c: In function `my_PintzRuzsa':
14 PRmethod-KB.gp.c:107: warning: unused variable `my_j'
15 PRmethod-KB.gp.c:107: warning: unused variable `my_l'
16 PRmethod-KB.gp.c:107: warning: unused variable `my_i'
17 PRmethod-KB.gp.c:107: warning: unused variable `my_i1'
18 PRmethod-KB.gp.c:107: warning: unused variable `my_i2'
19         GP/PARI CALCULATOR Version 2.3.2 (released)
20         amd64 running linux (x86-64/GMP-4.2.2 kernel) 64-bit version
21         compiled: Nov 30 2007, gcc-3.4.3 20041212 (Red Hat 3.4.3-9.EL4)
22         (readline v4.3 enabled, extended help available)
23
24         Copyright (C) 2000-2006 The PARI Group
25
26 PARI/GP is free software, covered by the GNU General Public License, and
27 comes WITHOUT ANY WARRANTY WHATSOEVER.
28
29 Type ? for help, \q to quit.
30 Type ?12 for how to get moral (and possibly technical) support.
31
32
33 -----
34 10 digits
35 -----
36
37 ? PintzRuzsa_psiapprox(4/5+10^(-20),13,10)
38 The expected number of correct decimal digits is = 10
39 Approximation for the minimal lambda is = 10^(-10)
40 Needed matrix exponent for this precision is = 2^39
41 Number of iterations in the dyadic procedure = 162
42 The approximated final values are:
43 max-upper-matrix = 0.9123781030527322323638
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```
44 min-upper-matrix = 0.9123781030521349899098
45 max-lower-matrix = 0.9123781030527020894117
46 min-lower-matrix = 0.9123781030521048469576
47 The approximated values for the moments are:
48 moment-max-upper-matrix = 0.6181690752736390706245
49 moment-min-upper-matrix = 0.6181690752728714301565
50 moment-max-lower-matrix = 0.6181690752736003276488
51 moment-min-lower-matrix = 0.6181690752728326871808
52 The minimal lambda is in [1.285307939545900000000,1.285307939546100000000]
53 Final result (in the centre of the interval): d = 0.9123781030527322323638
54 time = 3,459 ms.
55
56
57 -----
58 20 digits
59 -----
60
61 ? PintzRuzsa_psiapprox(4/5+10^(-20),20,20)
62 The expected number of correct decimal digits is = 20
63 Approximation for the minimal lambda is = 10^(-20)
64 Needed matrix exponent for this precision is = 2^72
65 Number of iterations in the dyadic procedure = 286
66 The approximated final values are:
67 max-upper-matrix = 0.91237810305275834972134056121053
68 min-upper-matrix = 0.91237810305275834972127103303804
69 max-lower-matrix = 0.91237810305275834972133828300078
70 min-lower-matrix = 0.91237810305275834972126875482828
71 The approximated values for the moments are:
72 moment-max-upper-matrix = 0.61816907526618862724769127210477
73 moment-min-upper-matrix = 0.61816907526618862724760190699264
74 moment-max-lower-matrix = 0.61816907526618862724768834390369
75 moment-min-lower-matrix = 0.61816907526618862724759897879155
76 The minimal lambda is in [1.285307939537797246997990000000,1.2853079395377972469980100000000]
77 Final result (in the centre of the interval): d = 0.91237810305275834972134056121053
78 time = 40,779 ms.
79
80 -----
81 30 digits
82 -----
83
84 ? PintzRuzsa_psiapprox(4/5+10^(-20),27,30)
85 The expected number of correct decimal digits is = 30
86 Approximation for the minimal lambda is = 10^(-30)
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87 Needed matrix exponent for this precision is = 2^105
88 Number of iterations in the dyadic procedure = 427
89 The approximated final values are:
90 max-upper-matrix = 0.912378103052758349721358590459910416545890
91 min-upper-matrix = 0.912378103052758349721358590459902322401313
92 max-lower-matrix = 0.912378103052758349721358590459910399454390
93 min-lower-matrix = 0.912378103052758349721358590459902305309813
94 The approximated values for the moments are:
95 moment-max-upper-matrix = 0.618169075266188626931299358124429477729334
96 moment-min-upper-matrix = 0.618169075266188626931299358124419074261045
97 moment-max-lower-matrix = 0.618169075266188626931299358124429455761493
98 moment-min-lower-matrix = 0.618169075266188626931299358124419052293204
99 The minimal lambda is in [1.28530793953779724665119741228005900000000,1.28530793953779724665119741228006100000000]
100 Final result (in the centre of the interval): d = 0.912378103052758349721358590459910416545890
101 time = 3mn, 48,573 ms.
102
103 -----
104 50 digits
105 -----
106
107 ? PintzRuzsa_psiapprox(4/5+10^(-20),39,50)
108 The expected number of correct decimal digits is = 50
109 Approximation for the minimal lambda is = 10^(-50)
110 Needed matrix exponent for this precision is = 2^172
111 Number of iterations in the dyadic procedure = 642
112 The approximated final values are:
113 max-upper-matrix = 0.91237810305275834972135859045990929414085615244675930311308271
114 min-upper-matrix = 0.91237810305275834972135859045990929414085615244675924826502561
115 max-lower-matrix = 0.91237810305275834972135859045990929414085615244675930308170857
116 min-lower-matrix = 0.91237810305275834972135859045990929414085615244675924823365148
117 The approximated values for the moments are:
118 moment-max-upper-matrix = 0.61816907526618862693129935808253892939620562407405246163756394
119 moment-min-upper-matrix = 0.61816907526618862693129935808253892939620562407405239114092069
120 moment-max-lower-matrix = 0.61816907526618862693129935808253892939620562407405246159723852
121 moment-min-lower-matrix = 0.61816907526618862693129935808253892939620562407405239110059527
122 The minimal lambda is in [1.285307939537797246651197412234147997556201178151445990000000,1.285307939537797246651197412234147997556]
123 Final result (in the centre of the interval): d = 0.91237810305275834972135859045990929414085615244675930311308271
124 ? ###
125 *** last result computed in 29mn, 1,394 ms.
126 -----
127
128 -----
129 2/3 on a quad core pc
```

```
130 -----
131 [languasc@labsrv0 ~]$ nice /usr/local/Gruppi/PariGP/bin/gp2c-run -pmy_ -g -W PRmethod-KB.gp
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135 PRmethod-KB.gp.c:107: warning: unused variable `my_i'
136 PRmethod-KB.gp.c:107: warning: unused variable `my_i1'
137 PRmethod-KB.gp.c:107: warning: unused variable `my_i2'
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139         amd64 running linux (x86-64/GMP-4.2.2 kernel) 64-bit version
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146 comes WITHOUT ANY WARRANTY WHATSOEVER.
147
148 Type ? for help, \q to quit.
149 Type ?12 for how to get moral (and possibly technical) support.
150
151 -----
152 10 digits
153 -----
154
155 ? PintzRuzsa_psiapprox(2/3+10^(-20),12,10)
156 The expected number of correct decimal digits is = 10
157 Approximation for the minimal lambda is = 10^(-10)
158 Needed matrix exponent for this precision is = 2^39
159 Number of iterations in the dyadic procedure = 160
160 The approximated final values are:
161 max-upper-matrix = 0.8337213168426473838898
162 min-upper-matrix = 0.8337213168420918764748
163 max-lower-matrix = 0.8337213168425383672048
164 min-lower-matrix = 0.8337213168419828597898
165 The approximated values for the moments are:
166 moment-max-upper-matrix = 0.4413015839592436256564
167 moment-min-upper-matrix = 0.4413015839586416916237
168 moment-max-lower-matrix = 0.4413015839591254978852
169 moment-min-lower-matrix = 0.4413015839585235638525
170 The minimal lambda is in [1.083575154049900000000,1.083575154050100000000]
171 Final result (in the centre of the interval): d = 0.8337213168426473838898
172 time = 2,774 ms.
```

```
173  
174 -----  
175 20 digits  
176 -----  
177  
178 ? PintzRuzsa_psiapprox(2/3+10^(-20),19,20)  
179 The expected number of correct decimal digits is = 20  
180 Approximation for the minimal lambda is = 10^(-20)  
181 Needed matrix exponent for this precision is = 2^72  
182 Number of iterations in the dyadic procedure = 281  
183 The approximated final values are:  
184 max-upper-matrix = 0.83372131684338485515459227435255  
185 min-upper-matrix = 0.83372131684338485515452760477806  
186 max-lower-matrix = 0.83372131684338485515458851235650  
187 min-lower-matrix = 0.83372131684338485515452384278202  
188 The approximated values for the moments are:  
189 moment-max-upper-matrix = 0.44130158394251203320300447723651  
190 moment-min-upper-matrix = 0.44130158394251203320293440289238  
191 moment-max-lower-matrix = 0.44130158394251203320300040083107  
192 moment-min-lower-matrix = 0.44130158394251203320293032648693  
193 The minimal lambda is in [1.0835751540289729521859900000000,1.0835751540289729521860100000000]  
194 Final result (in the centre of the interval): d = 0.83372131684338485515459227435255  
195 time = 34,920 ms.  
196  
197  
198 -----  
199 30 digits  
200 -----  
201  
202  
203 ? PintzRuzsa_psiapprox(2/3+10^(-20),26,30)  
204 The expected number of correct decimal digits is = 30  
205 Approximation for the minimal lambda is = 10^(-30)  
206 Needed matrix exponent for this precision is = 2^105  
207 Number of iterations in the dyadic procedure = 419  
208 The approximated final values are:  
209 max-upper-matrix = 0.833721316843384855154592152588205415890590  
210 min-upper-matrix = 0.833721316843384855154592152588197887361263  
211 max-lower-matrix = 0.833721316843384855154592152588205404464508  
212 min-lower-matrix = 0.833721316843384855154592152588197875935182  
213 The approximated values for the moments are:  
214 moment-max-upper-matrix = 0.441301583942512033013203743647633606807313  
215 moment-min-upper-matrix = 0.441301583942512033013203743647625449079988
```

```
216 moment-max-lower-matrix = 0.441301583942512033013203743647633594426295
217 moment-min-lower-matrix = 0.441301583942512033013203743647625436698970
218 The minimal lambda is in [1.08357515402897295195834526955999900000000,1.08357515402897295195834526956000100000000]
219 Final result (in the centre of the interval): d = 0.833721316843384855154592152588205415890590
220 time = 3mn, 24,120 ms.
221
222 -----
223 50 digits
224 -----
225
226 ? PintzRuzsa_psiapprox(2/3+10^(-20),37,50)
227 The expected number of correct decimal digits is = 50
228 Approximation for the minimal lambda is = 10^(-50)
229 Needed matrix exponent for this precision is = 2^172
230 Number of iterations in the dyadic procedure = 632
231 The approximated final values are:
232 max-upper-matrix = 0.83372131684338485515459215258820372013640387733149037455160858
233 min-upper-matrix = 0.83372131684338485515459215258820372013640387733149032353630951
234 max-lower-matrix = 0.83372131684338485515459215258820372013640387733149037427262730
235 min-lower-matrix = 0.83372131684338485515459215258820372013640387733149032325732823
236 The approximated values for the moments are:
237 moment-max-upper-matrix = 0.44130158394251203301320374362026095967315416832525801753662405
238 moment-min-upper-matrix = 0.44130158394251203301320374362026095967315416832525796225771350
239 moment-max-lower-matrix = 0.44130158394251203301320374362026095967315416832525801723432687
240 moment-min-lower-matrix = 0.44130158394251203301320374362026095967315416832525796195541632
241 The minimal lambda is in [1.0835751540289729519583452695271703132640461989595857900000000,1.083575154028972951958345269527170313264
242 Final result (in the centre of the interval): d = 0.83372131684338485515459215258820372013640387733149037455160858
243 time = 24mn, 37,985 ms.
244
245
246
247 -----
248 -----
```