Graph Macro Tools You Can Use in SAS® V9.3, With Or Without SAS/GRAPH®

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Converting Complexity To Clarity™
Strong Smart Systems™

Notice

Put it before them

- briefly . . .
  so they will read it
- clearly . . .
  so they will understand it
- picturesquely . . .
  so they will remember it
- and, above, all accurately . . .
  so they will be guided by its light

— *Joseph Pulitzer*

For another reason

to always create a graph of your data

(i.e., to get “picturesque”),

look in the Proceedings & Tools CD,

and please find Phil Holland’s article

“Anscombe’s Quartet”

OK, I agree with Pulitzer about brevity, but my slides are verbose

- If you have poor hearing (like me),

verbose text slides can help

- It is easier to understand written text

than spoken text, in any language

- If verbose slides irritate or bore you,

only listen to me, unless I show a graph

- My verbose slides are still communicative

AFTER the presentation, or if you missed it.

Scope of Presentation

- Results from Using Macros
- How To Use Macros
- See paper for macro internal code

Scope of Macros

- Management Reporting
- Presentation Graphics
- Not Analytical or Statistical Graphs

Needs & Tools for Mgt Rpting or Presentation Slides

- Comparison PLUS Shares – pie charts
- Comparison or

  Comparison PLUS Shares – bar charts
- Tracking Over Time – no macros here

Communication Benefits of Macros

- Deliver image PLUS precise numbers:
  - image for easy, quick inference
  - numbers for reliable inference
- Support ordering of image elements:
  - show them what's important
- Suppress clutter:
  - focus attention on data and its significance

Show Them What's Important: Solutions for a Finite Work Day in an Era of Information Overload

Show Them What Is Important

- Use Ranking
- Let Part Stand for the Whole

Let Part Stand for the Whole
Three Ways

- Top N
- Top P%
- Min or Max Cut-Off

Let part stand for the whole

- But let user know what is missing
- So, provide a way to get missing info
  - companion complete table if print
  - hyperlink to complete table if web
  - if subset is a picture,

    hyperlink to The Whole Picture

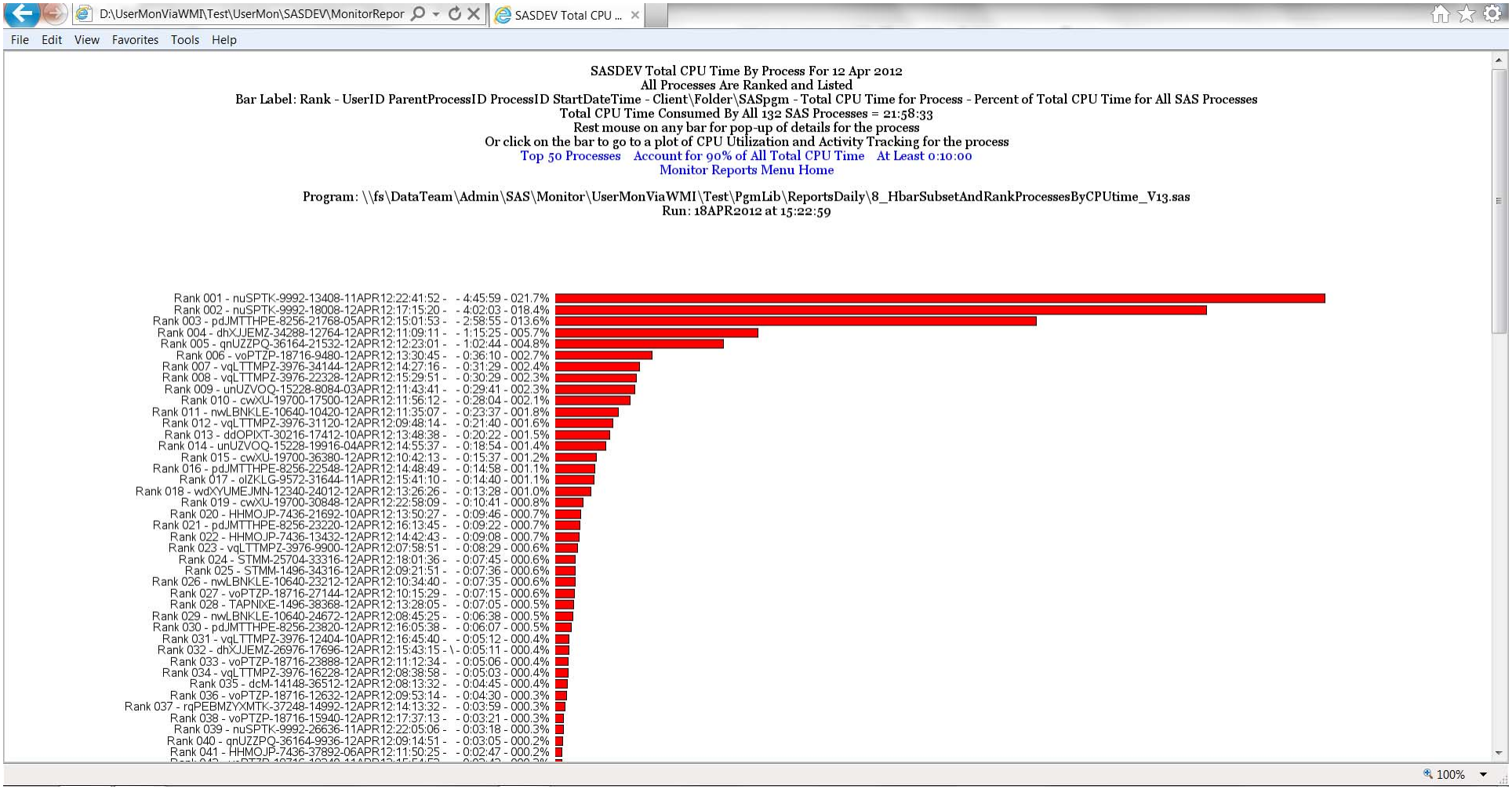
Let part stand for the whole

Examples from a real application

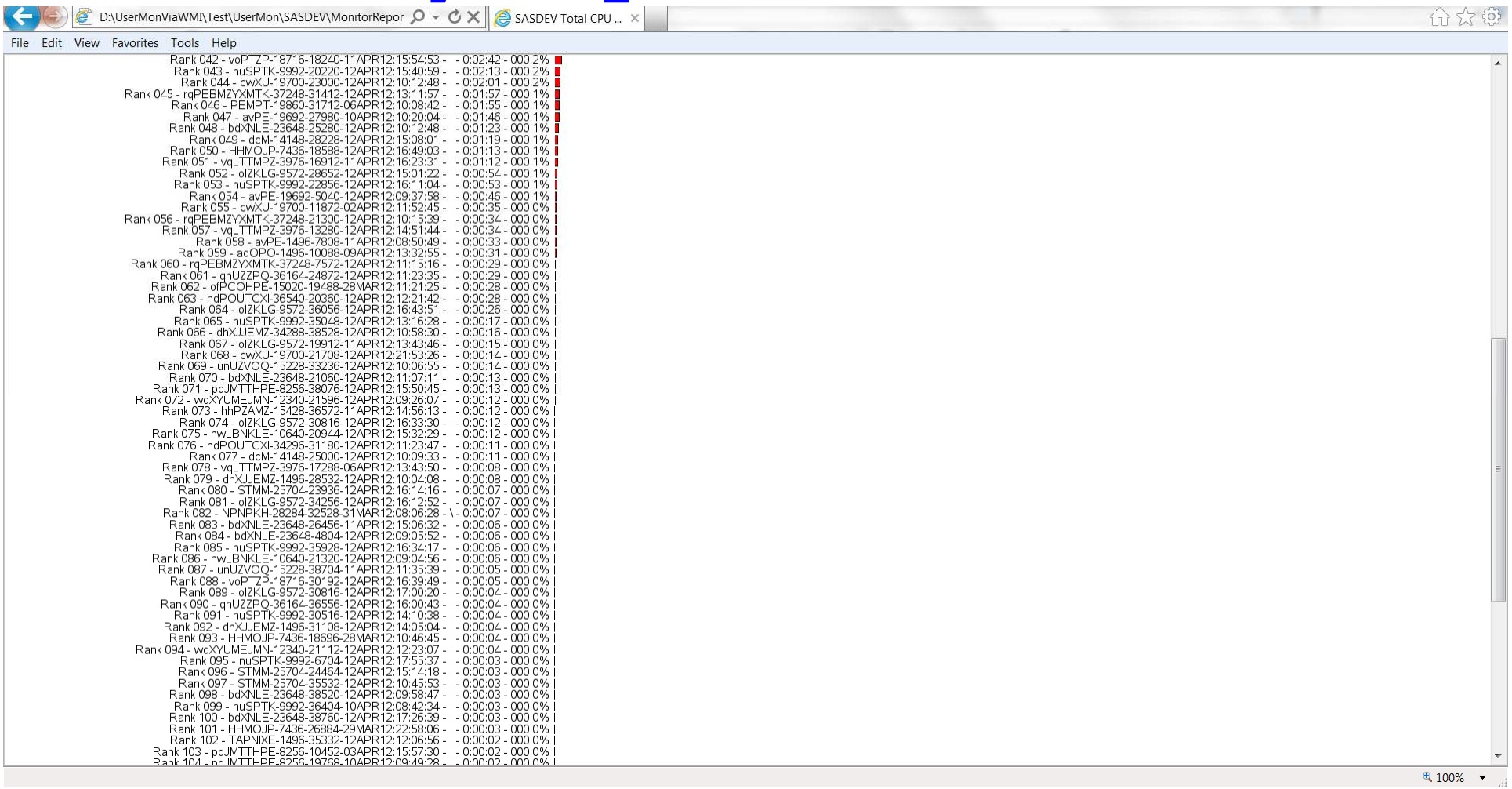
SAS/GRAPH & SAS macro language

Four Interconnnected Views

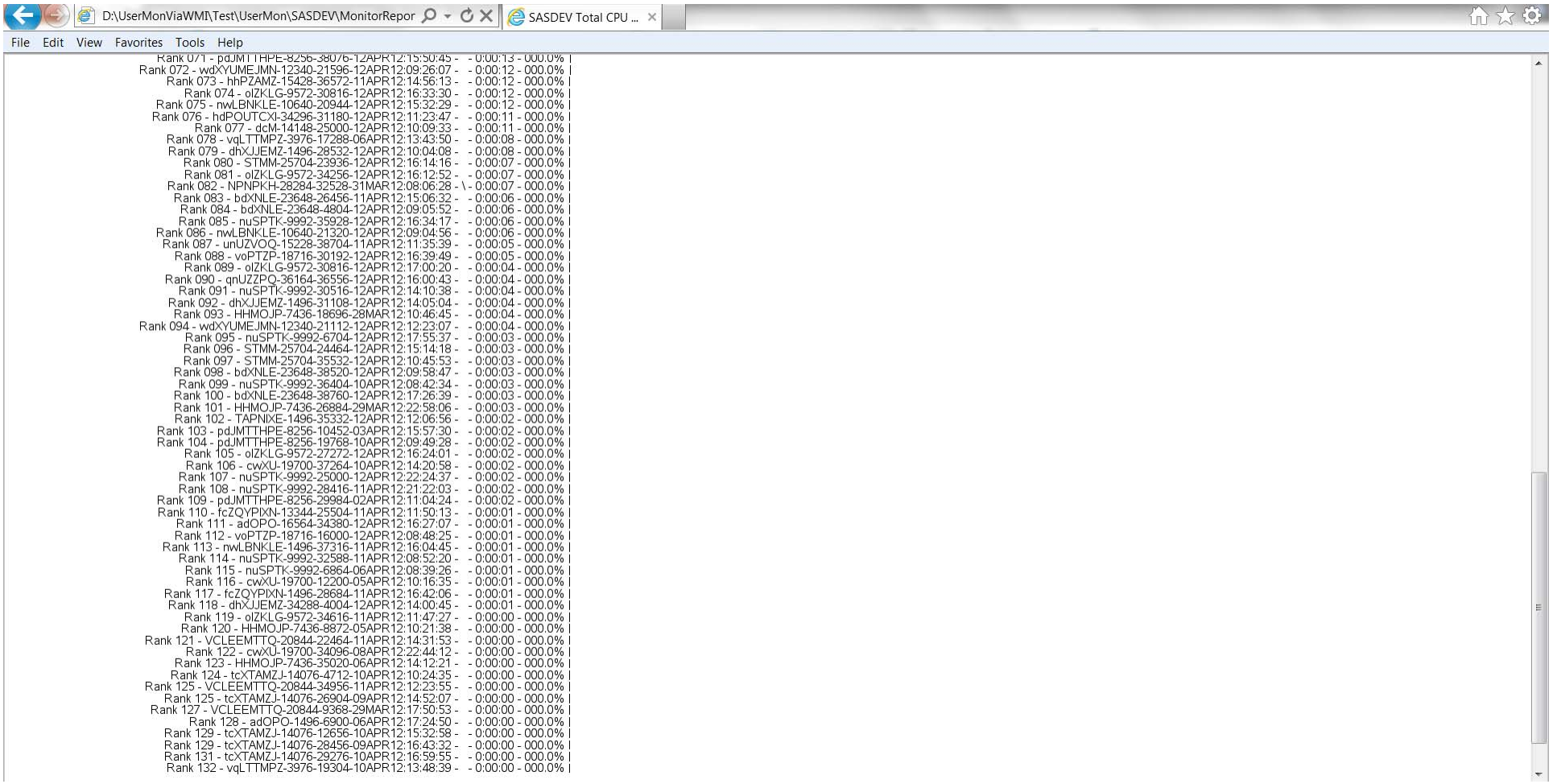
First, All of the Data showing first 41 bars so far



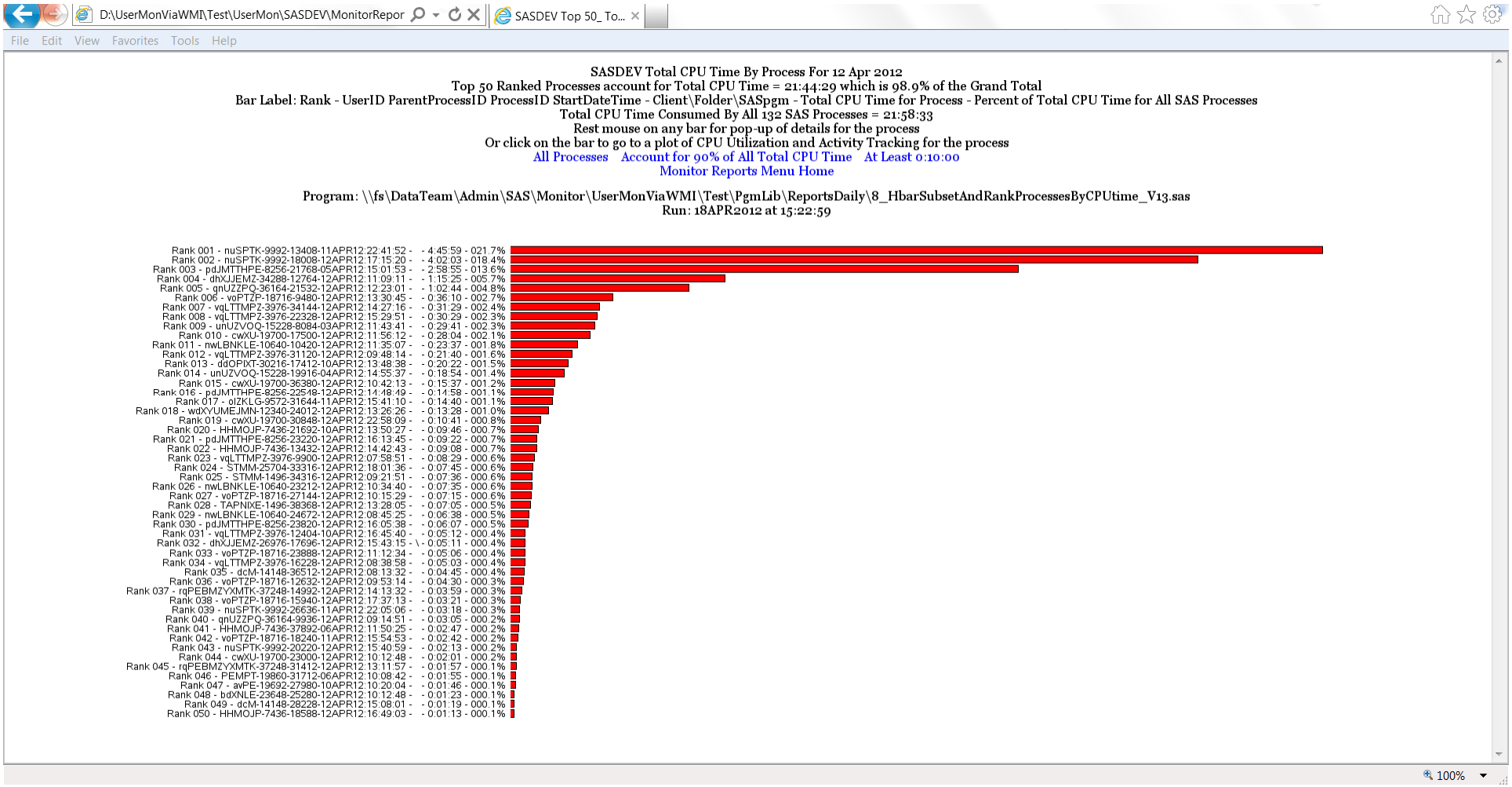
Scrolling down to obs 42
Not very impactful information



Scrolling down to the bottom of 132 observations



Top 50 Resource Consumers



Title Block, Title Line 2, Title Line 4
What Delivered, Total Context

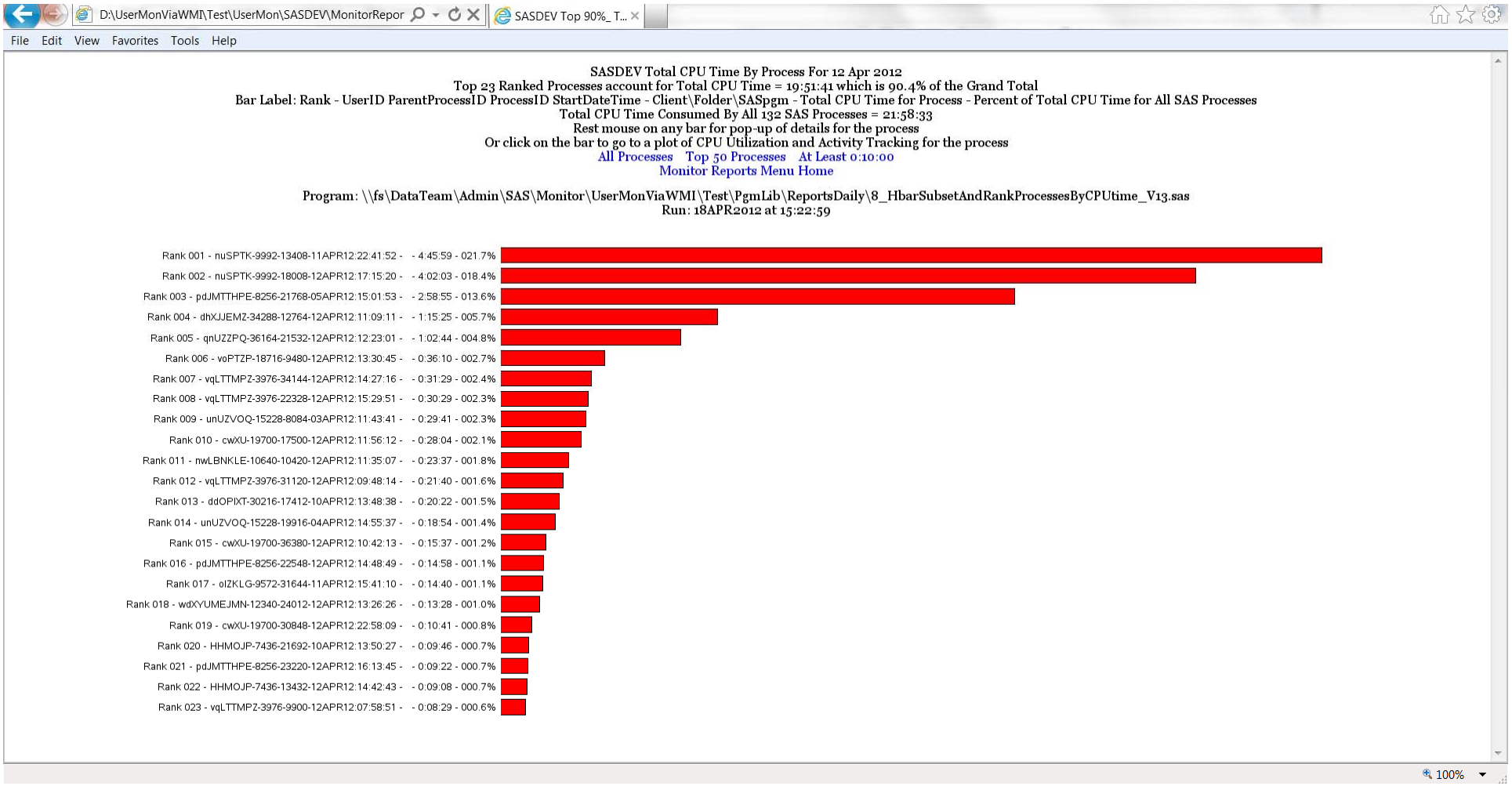
SASDEV Total CPU Time By Process For 12 Apr 2012
Top 50 Ranked Processes account for Total CPU Time = 21:44:29 which is 98.9% of the Grand Total
Bar Label: Rank - UserID ParentProcessID ProcessID StartDateTime - Client\Folder\SASpgm - Total CPU Time for Process - Percent of Total CPU Time for All SAS Processes
Total CPU Time Consumed By All 132 SAS Processes = 21:58:33
Rest mouse on any bar for pop-up of details for the process
Or click on the bar to go to a plot of CPU Utilization and Activity Tracking for the process
All Processes Account for 90% of All Total CPU Time At Least 0:10:00
Monitor Reports Menu Home

Program: \\fs\DataTeam\Admin\SAS\Monitor\UserMonViaWMI\Test\PgmLib\ReportsDaily\8_HbarSubsetAndRankProcessesByCPUtime_V13.sas
Run: 18APR2012 at 15:22:59

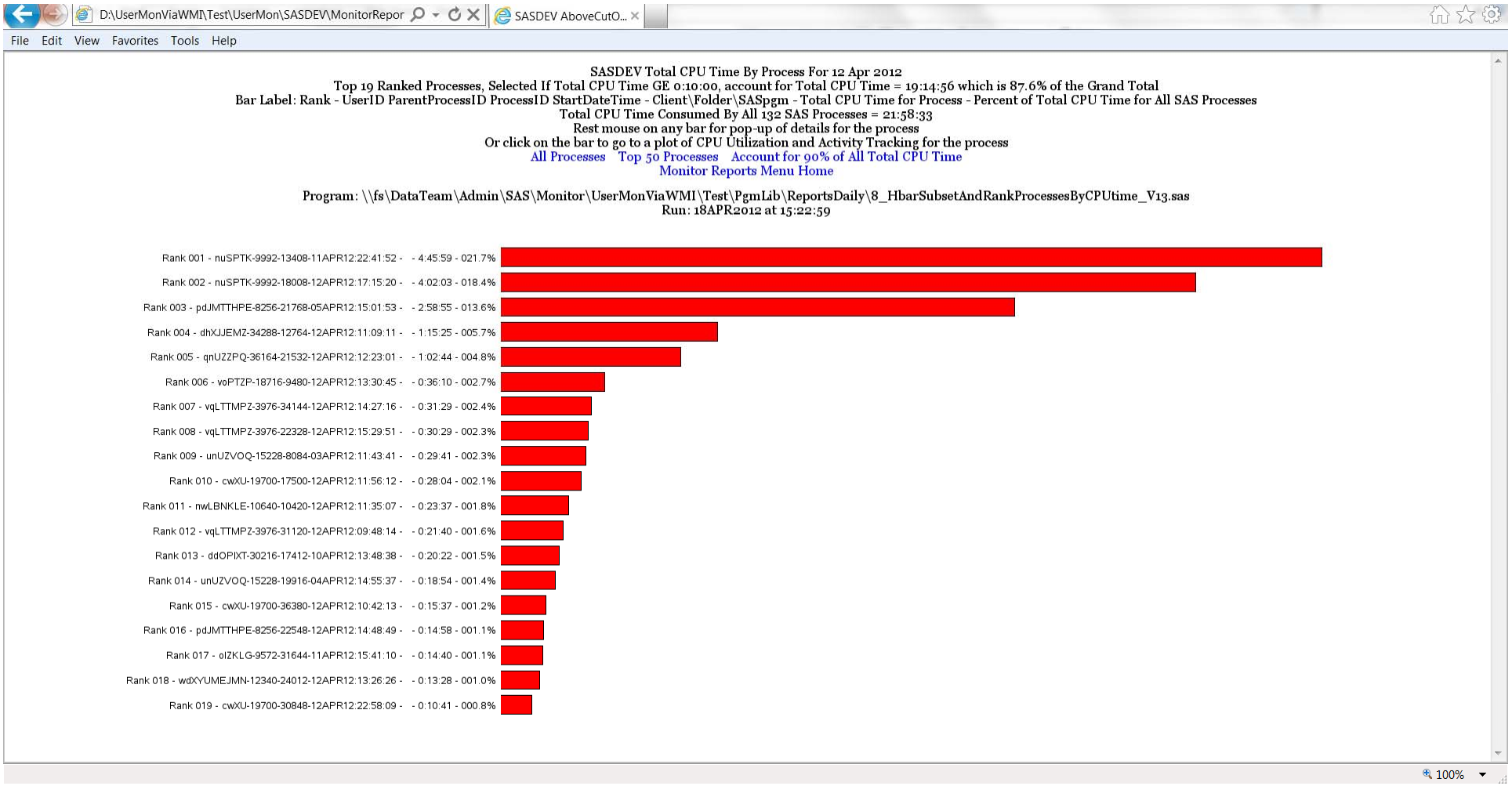
Top 50 Ranked Processes account for Total CPU Time = 21:44:29 which is 98.9% of the Grand Total

Total CPU Time Consumed By All 132 SAS Processes = 21:58:33

Which Top Resource Consumers Account for 90% of the Load?



Which Top Resource Consumers Use At Least This Minimum?



Macro for Adaptable Subsetted and Ranked Horizontal Bar Chart

Macro in Paper is Powerful, but includes less function

Macro in Paper is Powerful, but includes less function

- Present ALL, or any choice of Top N
- No hyperlinks between subset and ALL
- No dynamic automatic subtitles
  - to list count shown and subtotal
  - to list total count and grand total
- No drilldown from bar to other info

  (in the prod app., bars were sums, and were linked to spreadsheets)

No ALT text for these web charts ("ALT text" = data tip)

- For a web-enabled plot, ALT text is needed for reliable identification of precise x & y values of each data point
- With these web-delivered bar charts, all of the precise information for any bar is in the bar label

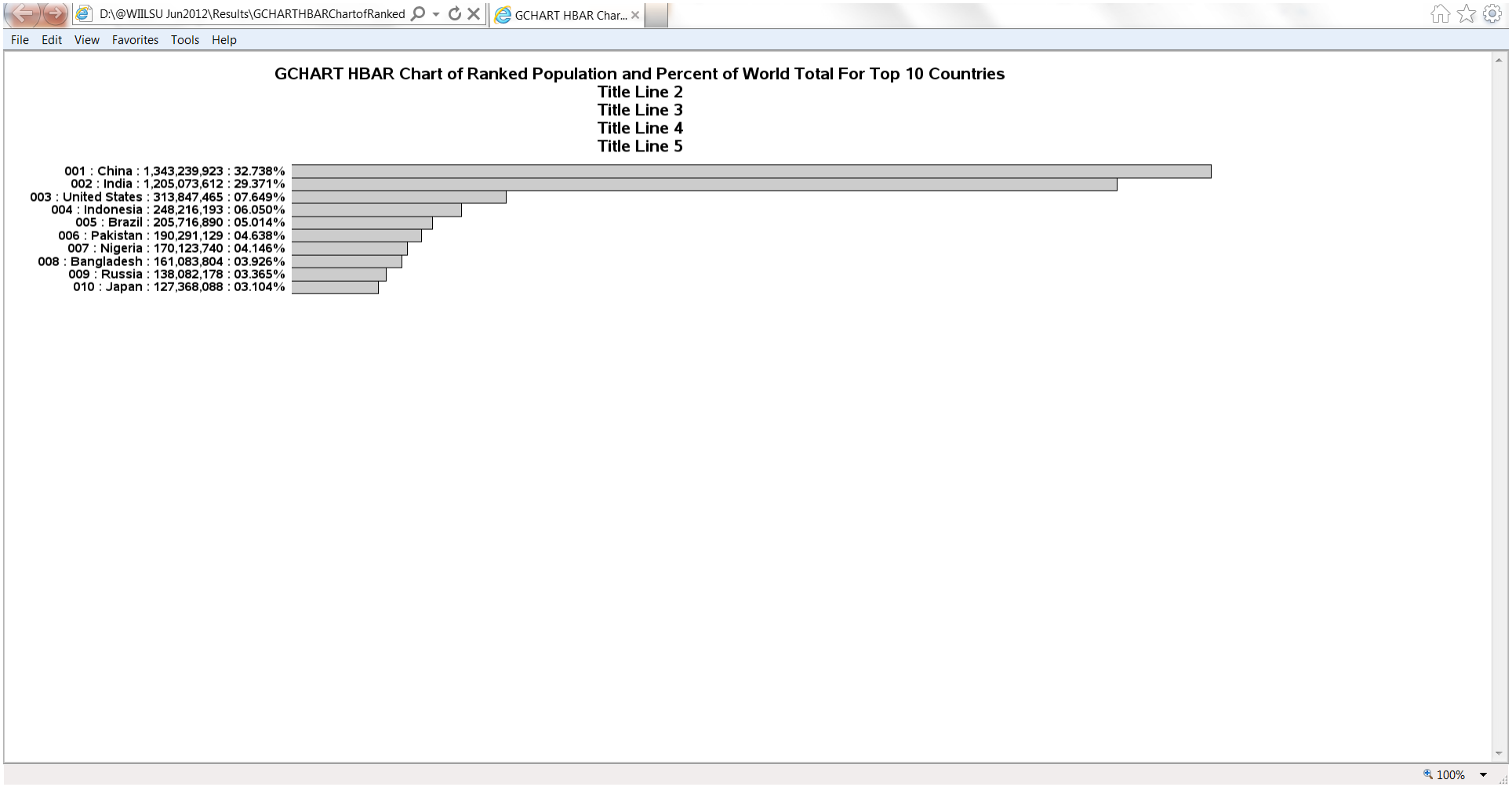
```
%AdaptableHorizontalBarGCHART(
Data=DataLib.PopulationByCountryPerWFB2012
,BarCountMax=10 /* any integer or All */
,RptPath=YourChoiceOfLocation
,TitlePrefix=GCHART HBAR Chart of Ranked
Population and Percent of World Total For
,TitleSuffix=Countries
,BarLabelVar=Country
,BarValueVar=Population
,BarValueFormat=comma13.);
```

```
 /* Default Macro Parameter Assignments You Can Change */
,BarColor=CXCCCCCC /* light grey */
,TitleFont='Albany AMT/Bold'
,TitleHeight=16 PT
,TextFont='Albany AMT/Bold'
,TextHeight=12 PT
,X_pixels=1600
,DefaultYpixels=850
,BarCountForDefaultYpixels=50
,DefaultShareOfSpaceForBars=0.81 /* Manually adjust this
    based on:
    DefaultYpixels,
    BarCountForDefaultYpixels,
    number of TITLE lines,
    choice of title & text fonts,
    and title & text heights */
```

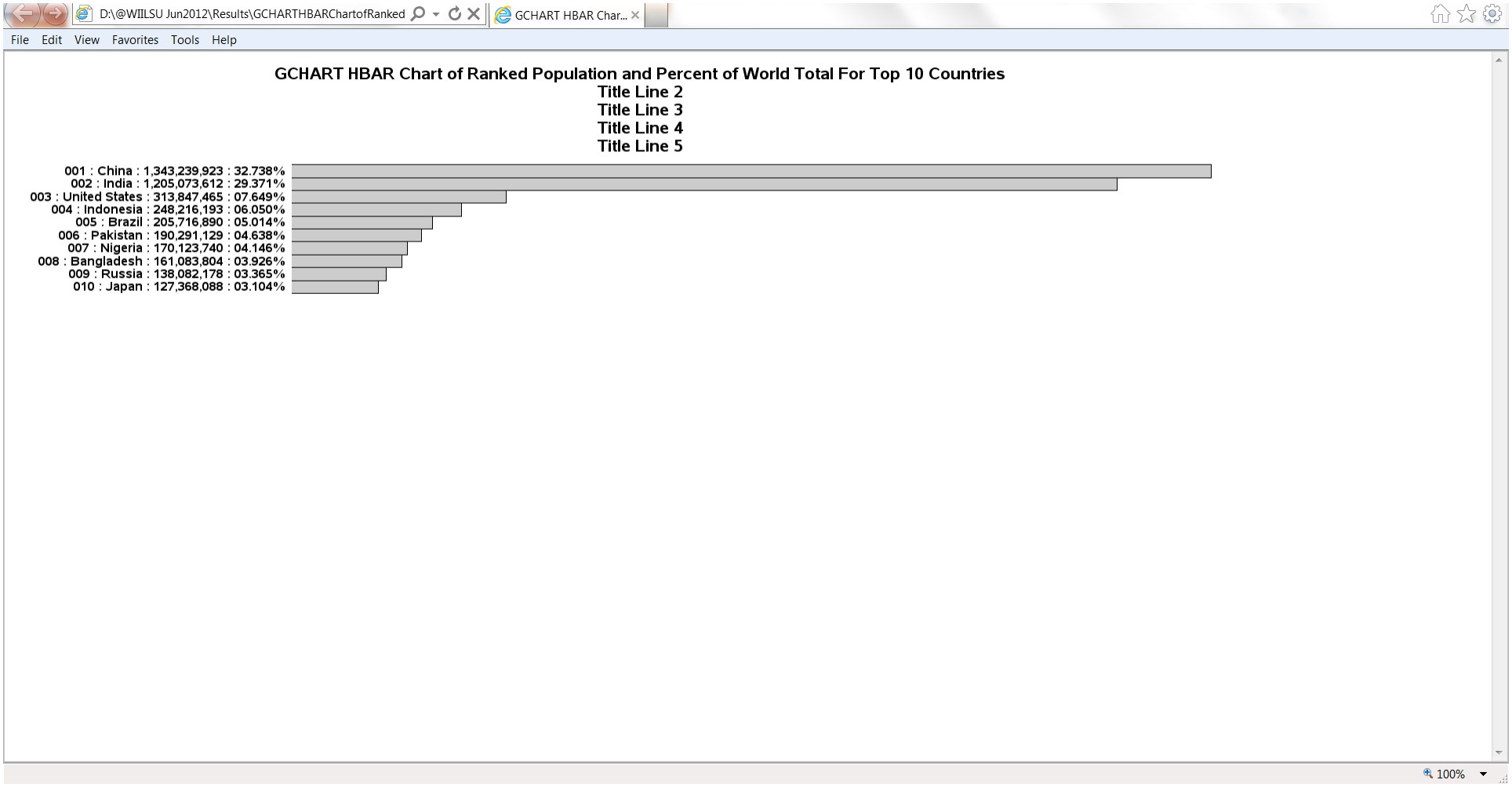
```
/* A Key Default Macro Parameter Assignment
   That You Are Likely To Want To Change */

,DefaultShareOfSpaceForBars=0.81
/* Manually adjust this based on:
   DefaultYpixels,
   BarCountForDefaultYpixels,
   number of TITLE lines,
   choice of title & text fonts,
   and title & text heights */
```

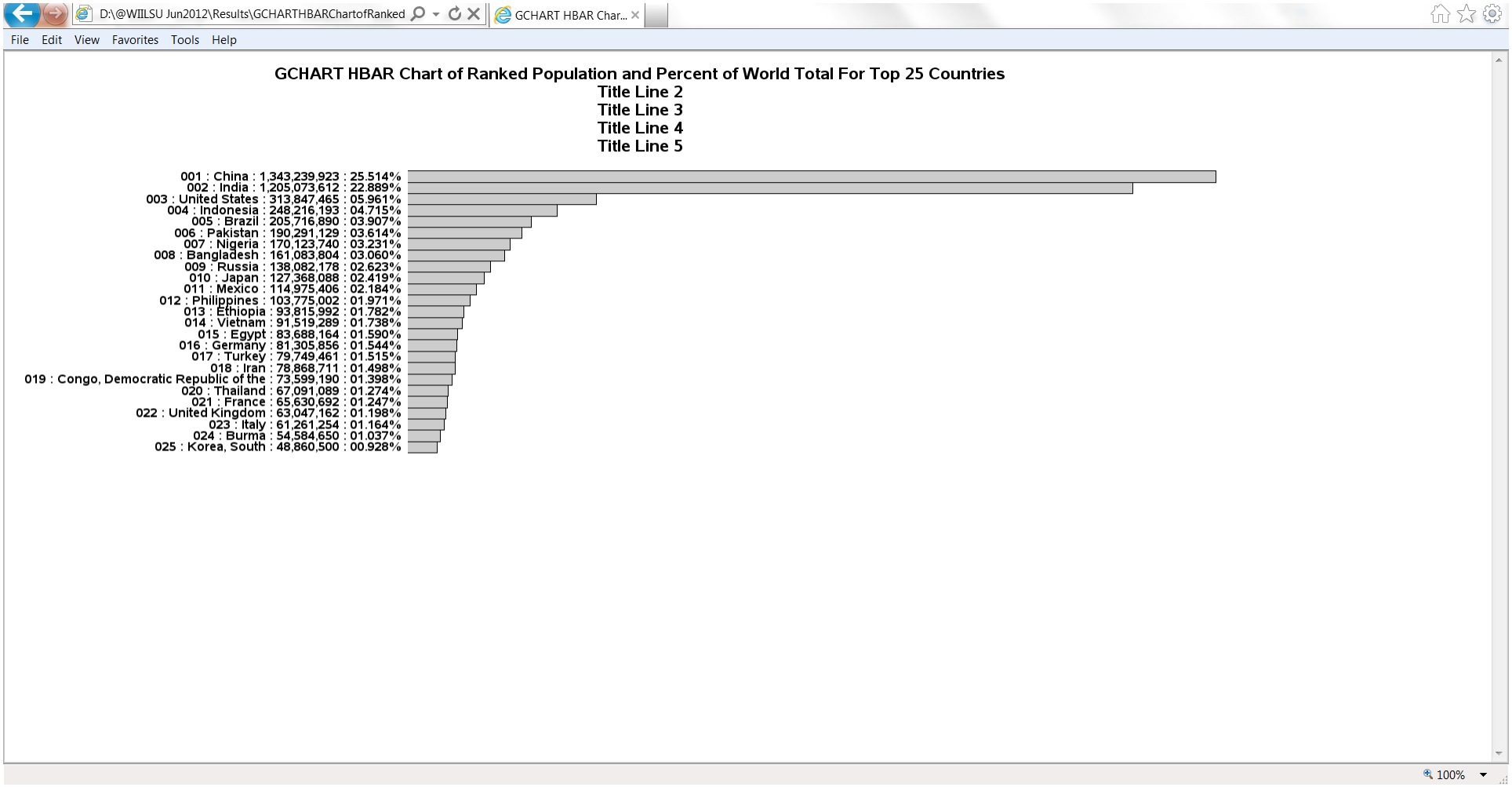
Top 10


D:\@WIILSU Jun2012\Results\GCHARTHBARChartofRanked
GCHART HBAR Char...
File Edit View Favorites Tools Help
GCHART HBAR Chart of Ranked Population and Percent of World Total For Top 10 Countries
Title Line 2
Title Line 3
Title Line 4
Title Line 5
001 : China : 1,343,239,923 : 32.738%
002 : India : 1,205,073,612 : 29.371%
003 : United States : 313,847,465 : 07.649%
004 : Indonesia : 248,216,193 : 06.050%
005 : Brazil : 205,716,890 : 05.014%
006 : Pakistan : 190,291,129 : 04.638%
007 : Nigeria : 170,123,740 : 04.146%
008 : Bangladesh : 161,083,804 : 03.926%
009 : Russia : 138,082,178 : 03.365%
010 : Japan : 127,368,088 : 03.104%
100%

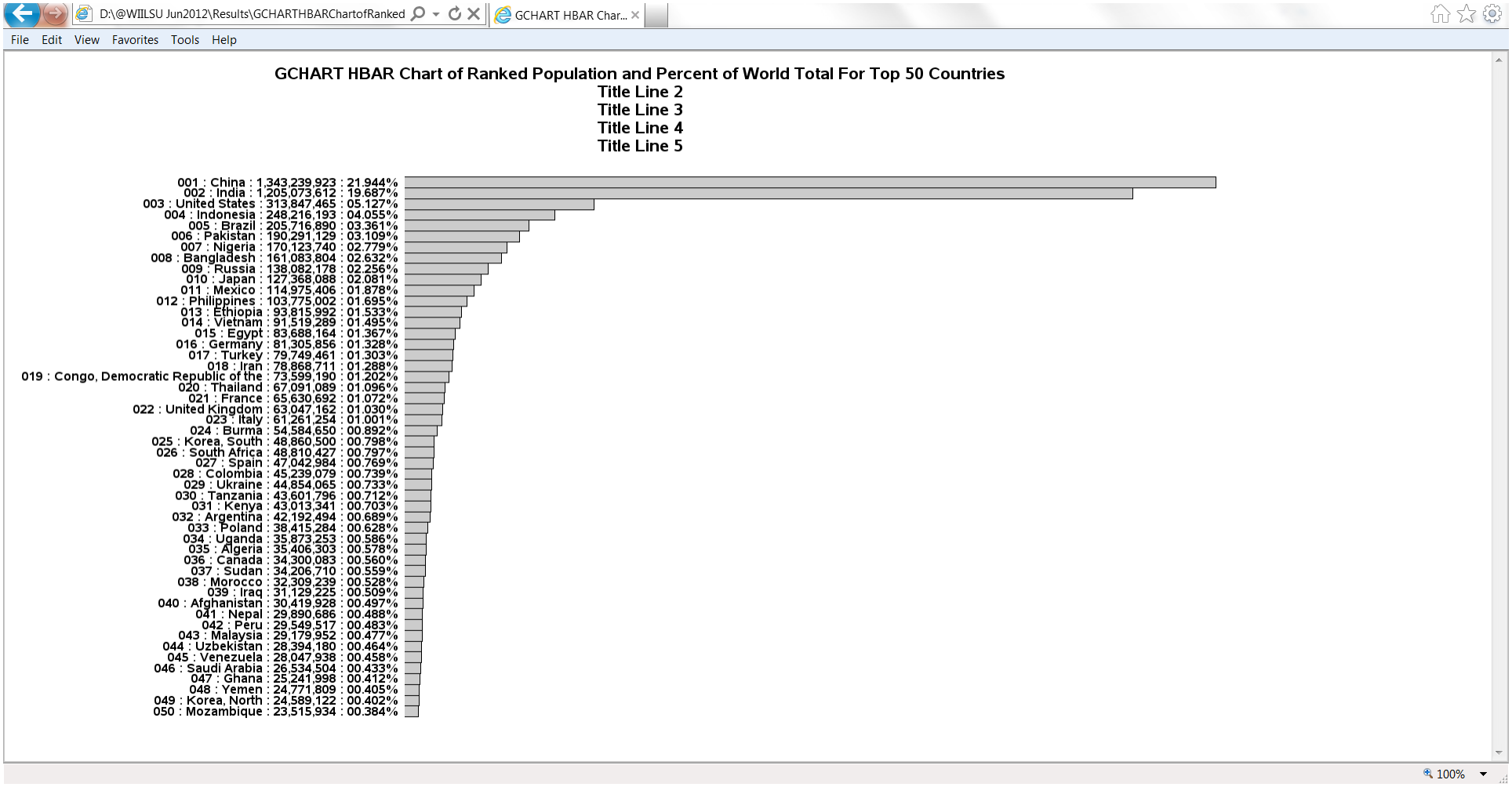
Extra Title Lines can be replaced with your customization of macro



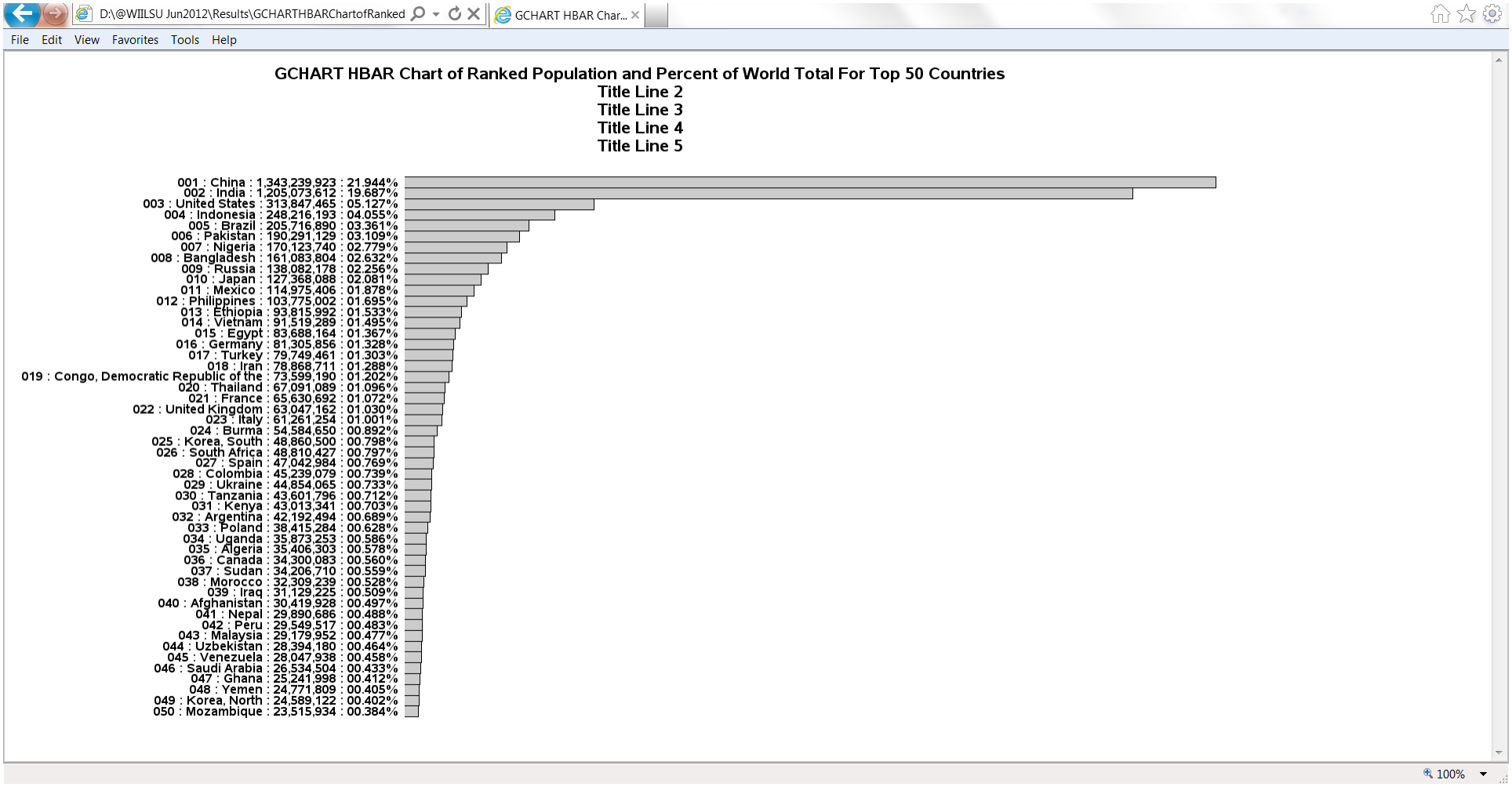
Top 25


D:\@WIILSU Jun2012\Results\GCHARTHBARChartofRanked
GCHART HBAR Char...
File Edit View Favorites Tools Help
GCHART HBAR Chart of Ranked Population and Percent of World Total For Top 25 Countries
Title Line 2
Title Line 3
Title Line 4
Title Line 5
001 : China : 1,343,239,923 : 25.514%
002 : India : 1,205,073,612 : 22.889%
003 : United States : 313,847,465 : 05.961%
004 : Indonesia : 248,216,193 : 04.715%
005 : Brazil : 205,716,890 : 03.907%
006 : Pakistan : 190,291,129 : 03.614%
007 : Nigeria : 170,123,740 : 03.231%
008 : Bangladesh : 161,083,804 : 03.060%
009 : Russia : 138,082,178 : 02.623%
010 : Japan : 127,368,088 : 02.419%
011 : Mexico : 114,975,406 : 02.184%
012 : Philippines : 103,775,002 : 01.971%
013 : Ethiopia : 93,815,992 : 01.782%
014 : Vietnam : 91,519,289 : 01.738%
015 : Egypt : 83,688,164 : 01.590%
016 : Germany : 81,305,856 : 01.544%
017 : Turkey : 79,749,461 : 01.515%
018 : Iran : 78,868,711 : 01.498%
019 : Congo, Democratic Republic of the : 73,599,190 : 01.398%
020 : Thailand : 67,091,089 : 01.274%
021 : France : 65,630,692 : 01.247%
022 : United Kingdom : 63,047,162 : 01.198%
023 : Italy : 61,261,254 : 01.164%
024 : Burma : 54,584,650 : 01.037%
025 : Korea, South : 48,860,500 : 00.928%
100%

Macro defaults are set to nearly fill MY screen when subset is Top 50



But chose to use only1600 pixels despite 1920 pixel screen width



When designing a web graph, try to fill available space in browser window
(without creating need to scroll)
for the expected audience:

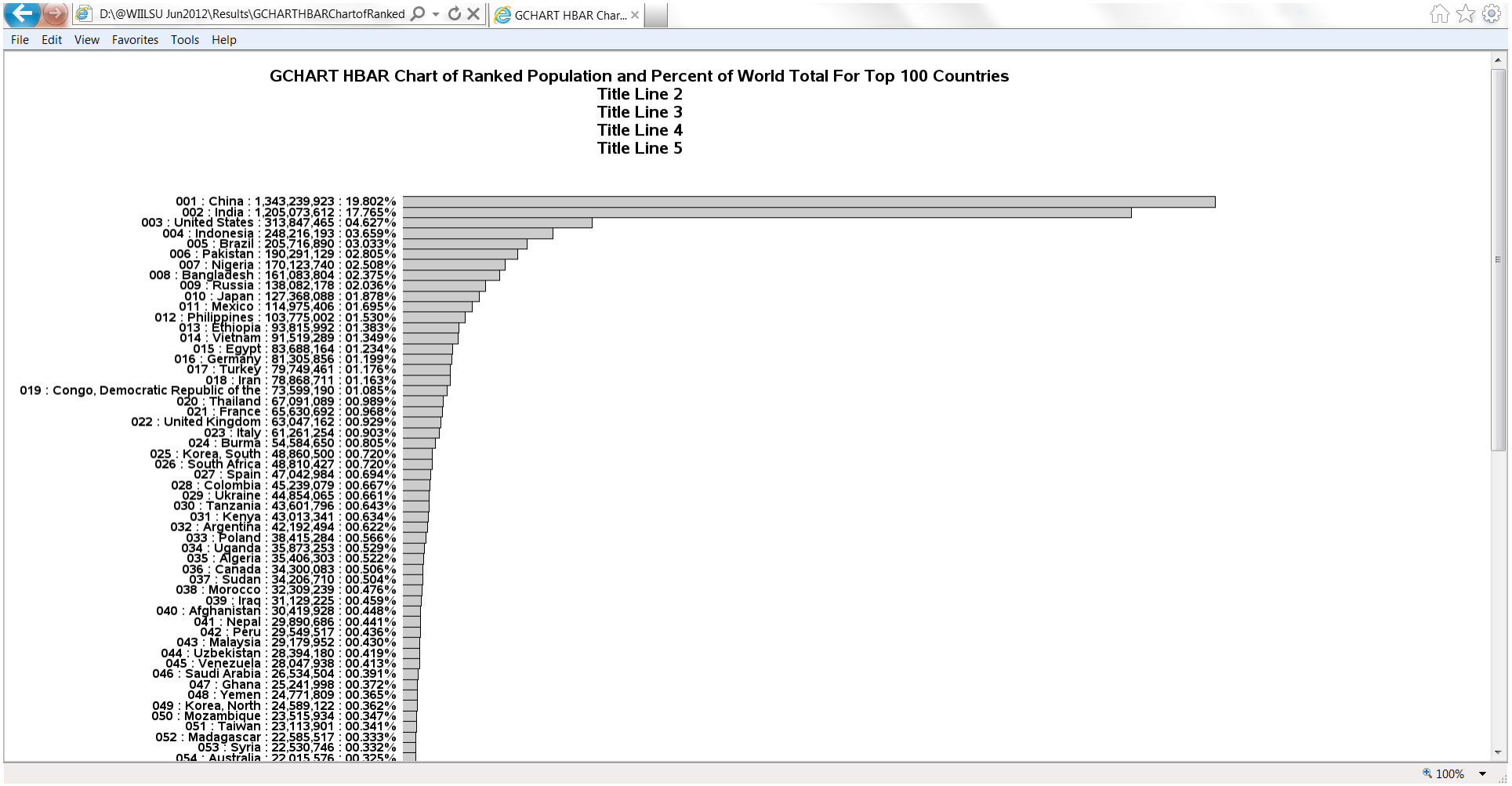
Traditional or Wide Screen?

Expected Resolution?

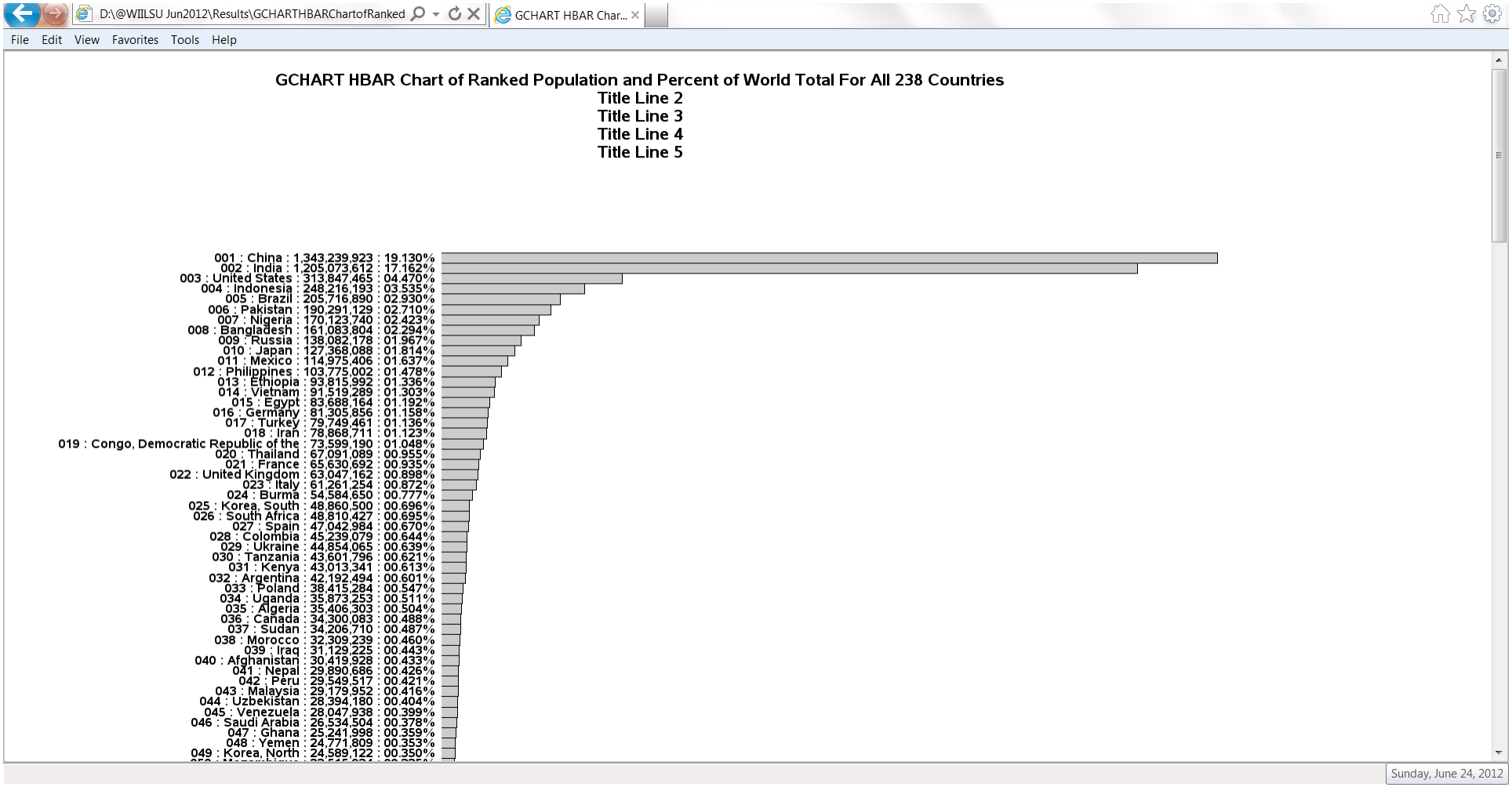
Expected Web Browser?

Any expected tool bar(s)?

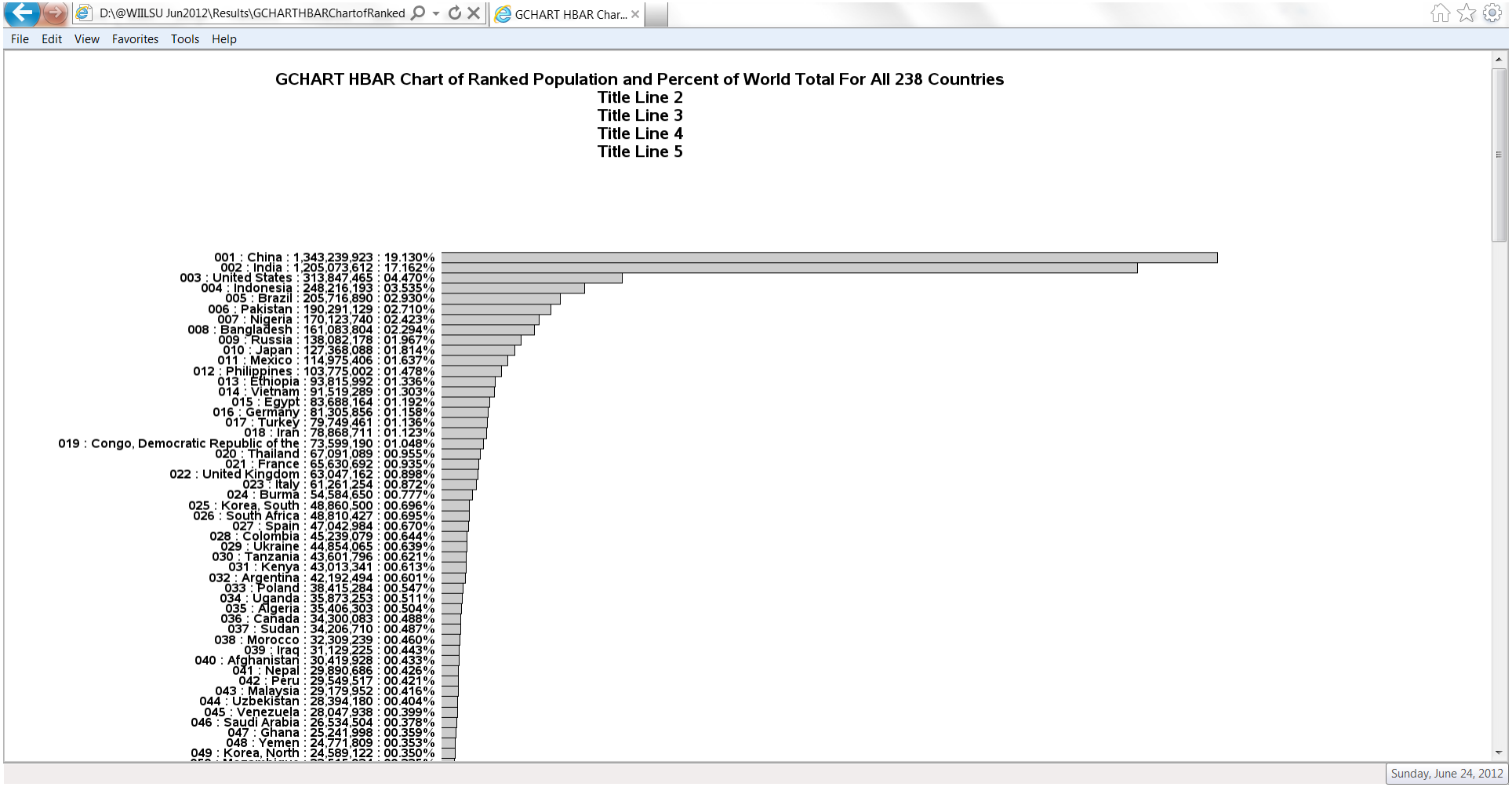
Top 100


D:\@WIILSU Jun2012\Results\GCHARTHBARChartofRanked
GCHART HBAR Char...
File Edit View Favorites Tools Help
GCHART HBAR Chart of Ranked Population and Percent of World Total For Top 100 Countries
Title Line 2
Title Line 3
Title Line 4
Title Line 5
001 : China : 1,343,239,923 : 19.802%
002 : India : 1,205,073,612 : 17.765%
003 : United States : 313,847,465 : 04.627%
004 : Indonesia : 248,216,193 : 03.659%
005 : Brazil : 205,716,890 : 03.033%
006 : Pakistan : 190,291,129 : 02.805%
007 : Nigeria : 170,123,740 : 02.508%
008 : Bangladesh : 161,083,804 : 02.375%
009 : Russia : 138,082,178 : 02.036%
010 : Japan : 127,368,088 : 01.878%
011 : Mexico : 114,975,406 : 01.695%
012 : Philippines : 103,775,002 : 01.530%
013 : Ethiopia : 93,815,992 : 01.383%
014 : Vietnam : 91,519,289 : 01.349%
015 : Egypt : 83,688,164 : 01.234%
016 : Germany : 81,305,856 : 01.199%
017 : Turkey : 79,749,461 : 01.176%
018 : Iran : 78,868,711 : 01.163%
019 : Congo, Democratic Republic of the : 73,599,190 : 01.085%
020 : Thailand : 67,091,089 : 00.989%
021 : France : 65,630,692 : 00.968%
022 : United Kingdom : 63,047,162 : 00.929%
023 : Italy : 61,261,254 : 00.903%
024 : Burma : 54,584,650 : 00.805%
025 : Korea, South : 48,860,500 : 00.720%
026 : South Africa : 48,810,427 : 00.720%
027 : Spain : 47,042,984 : 00.694%
028 : Colombia : 45,239,079 : 00.667%
029 : Ukraine : 44,854,065 : 00.661%
030 : Tanzania : 43,601,796 : 00.643%
031 : Kenya : 43,013,341 : 00.634%
032 : Argentina : 42,192,494 : 00.622%
033 : Poland : 38,415,284 : 00.566%
034 : Uganda : 35,873,253 : 00.529%
035 : Algeria : 35,406,303 : 00.522%
036 : Canada : 34,300,083 : 00.506%
037 : Sudan : 34,206,710 : 00.504%
038 : Morocco : 32,309,239 : 00.476%
039 : Iraq : 31,129,225 : 00.459%
040 : Afghanistan : 30,419,928 : 00.448%
041 : Nepal : 29,890,686 : 00.441%
042 : Peru : 29,549,517 : 00.436%
043 : Malaysia : 29,179,952 : 00.430%
044 : Uzbekistan : 28,394,180 : 00.419%
045 : Venezuela : 28,047,938 : 00.413%
046 : Saudi Arabia : 26,534,504 : 00.391%
047 : Ghana : 25,241,998 : 00.372%
048 : Yemen : 24,771,809 : 00.365%
049 : Korea, North : 24,589,122 : 00.362%
050 : Mozambique : 23,515,934 : 00.347%
051 : Taiwan : 23,113,901 : 00.341%
052 : Madagascar : 22,585,517 : 00.333%
053 : Syria : 22,530,746 : 00.332%
054 : Australia : 22,015,576 : 00.325%
100%

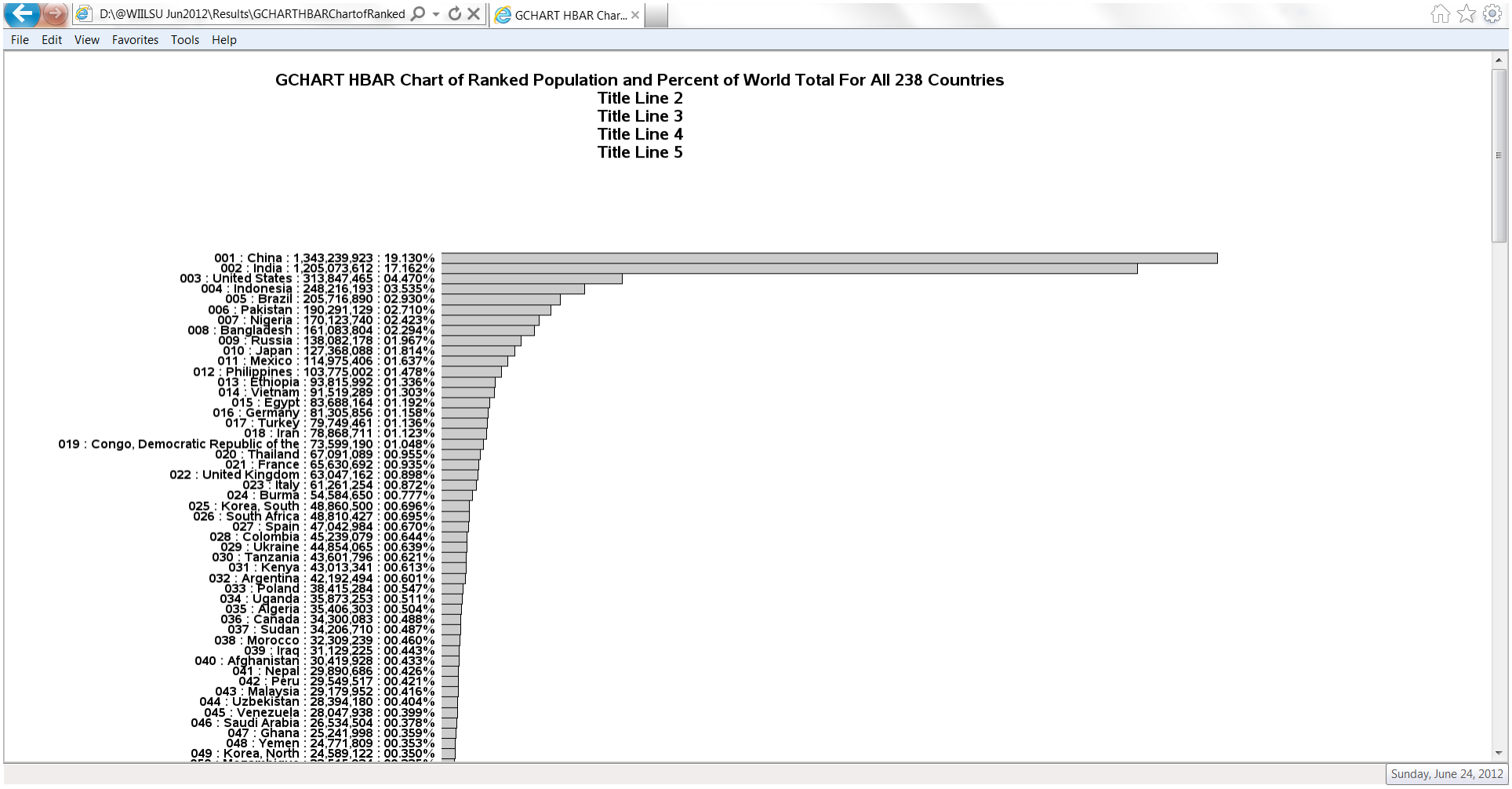
All 238


D:\@WIILSU Jun2012\Results\GCHARTHBARChartofRanked
GCHART HBAR Char...
File Edit View Favorites Tools Help
GCHART HBAR Chart of Ranked Population and Percent of World Total For All 238 Countries
Title Line 2
Title Line 3
Title Line 4
Title Line 5
001 : China : 1,343,239,923 : 19.130%
002 : India : 1,205,073,612 : 17.162%
003 : United States : 313,847,465 : 04.470%
004 : Indonesia : 248,216,193 : 03.535%
005 : Brazil : 205,716,890 : 02.930%
006 : Pakistan : 190,291,129 : 02.710%
007 : Nigeria : 170,123,740 : 02.423%
008 : Bangladesh : 161,083,804 : 02.294%
009 : Russia : 138,082,178 : 01.967%
010 : Japan : 127,368,088 : 01.814%
011 : Mexico : 114,975,406 : 01.637%
012 : Philippines : 103,775,002 : 01.478%
013 : Ethiopia : 93,815,992 : 01.336%
014 : Vietnam : 91,519,289 : 01.303%
015 : Egypt : 83,688,164 : 01.192%
016 : Germany : 81,305,856 : 01.158%
017 : Turkey : 79,749,461 : 01.136%
018 : Iran : 78,868,711 : 01.123%
019 : Congo, Democratic Republic of the : 73,599,190 : 01.048%
020 : Thailand : 67,091,089 : 00.955%
021 : France : 65,630,692 : 00.935%
022 : United Kingdom : 63,047,162 : 00.898%
023 : Italy : 61,261,254 : 00.872%
024 : Burma : 54,584,650 : 00.777%
025 : Korea, South : 48,860,500 : 00.696%
026 : South Africa : 48,810,427 : 00.695%
027 : Spain : 47,042,984 : 00.670%
028 : Colombia : 45,239,079 : 00.644%
029 : Ukraine : 44,854,065 : 00.639%
030 : Tanzania : 43,601,796 : 00.621%
031 : Kenya : 43,013,341 : 00.613%
032 : Argentina : 42,192,494 : 00.601%
033 : Poland : 38,415,284 : 00.547%
034 : Uganda : 35,873,253 : 00.511%
035 : Algeria : 35,406,303 : 00.504%
036 : Canada : 34,300,083 : 00.488%
037 : Sudan : 34,206,710 : 00.487%
038 : Morocco : 32,309,239 : 00.460%
039 : Iraq : 31,129,225 : 00.443%
040 : Afghanistan : 30,419,928 : 00.433%
041 : Nepal : 29,890,686 : 00.426%
042 : Peru : 29,549,517 : 00.421%
043 : Malaysia : 29,179,952 : 00.416%
044 : Uzbekistan : 28,394,180 : 00.404%
045 : Venezuela : 28,047,938 : 00.399%
046 : Saudi Arabia : 26,534,504 : 00.378%
047 : Ghana : 25,241,998 : 00.359%
048 : Yemen : 24,771,809 : 00.353%
049 : Korea, North : 24,589,122 : 00.350%
Sunday, June 24, 2012

Still Unremediated Imperfection: For high bar count, get too much space between titles and bars



extra space between titles & bars is ugly, but not functional impairment



```
%AdaptableHorizontalBarGCHART(
Data=DataLib.PopulationByCountryPerWFB2012
,BarCountMax=10 /* any integer or All */
,RptPath=YourChoiceOfLocation
,TitlePrefix=GCHART HBAR Chart of Ranked
Population and Percent of World Total For
,TitleSuffix=Countries
,BarLabelVar=Country
,BarValueVar=Population
,BarValueFormat=comma13.);
```

```
 /* Default Macro Parameter Assignments You Can Change */
,BarColor=CXCCCCCC /* light grey */
,TitleFont='Albany AMT/Bold'
,TitleHeight=16 PT
,TextFont='Albany AMT/Bold'
,TextHeight=12 PT
,X_pixels=1600
,DefaultYpixels=850
,BarCountForDefaultYpixels=50
,DefaultShareOfSpaceForBars=0.81 /* Manually adjust this
based on:
    DefaultYpixels,
    BarCountForDefaultYpixels,
    number of TITLE lines,
    choice of title & text fonts,
    and title & text heights */
```

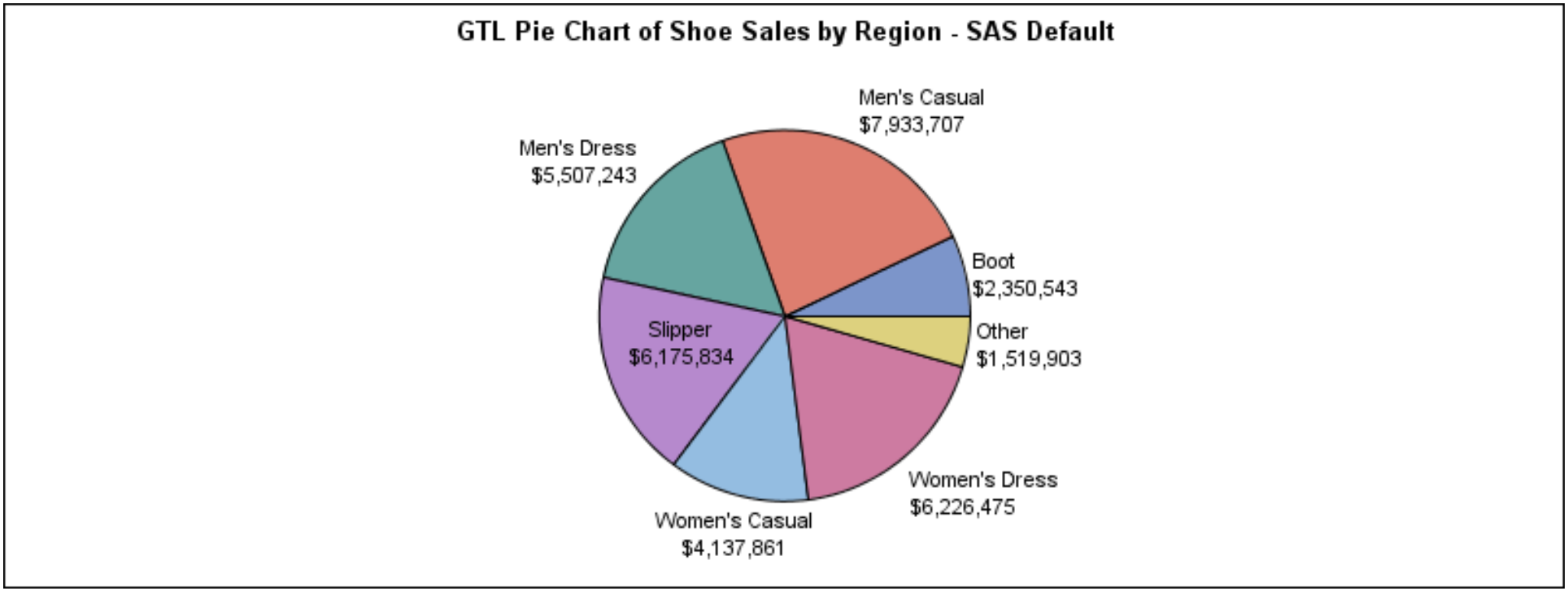
```
/* A Key Default Macro Parameter Assignment
   That You Are Likely To Want To Change */

,DefaultShareOfSpaceForBars=0.81
/* Manually adjust this based on:
   DefaultYpixels,
   BarCountForDefaultYpixels,
   number of TITLE lines,
   choice of title & text fonts,
   and title & text heights */
```

Pie Chart

- Some statisticians disapprove
- Armchair graphics critics disapprove
- Why, I am mystified
- I have created communication-effective pie charts since the 1990's

SAS Default Pie Chart



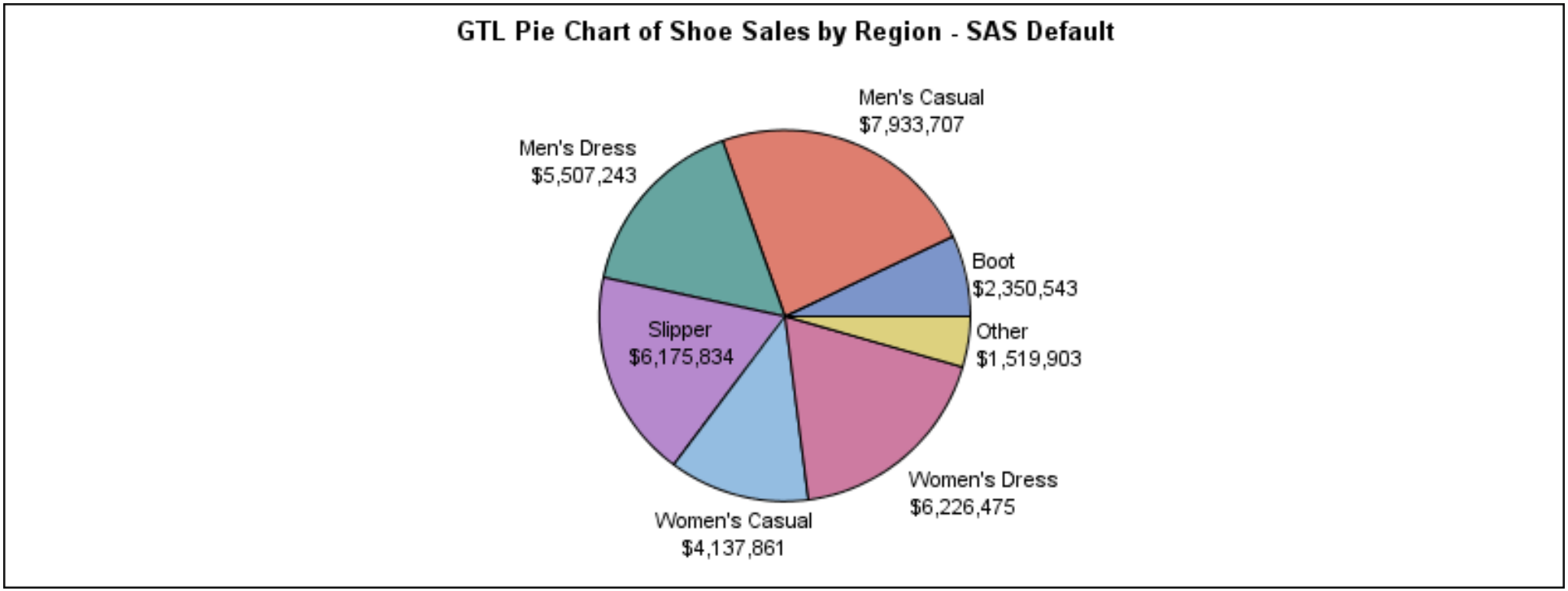
SAS Defaults

Ordered by alpha label, not size

Numeric Percent Share Not Shown

"Other" withholds information

Some labels inside, Some outside



Why object to "Other"?

- Graphs should answer questions,

  not prompt them: What is in "Other"?

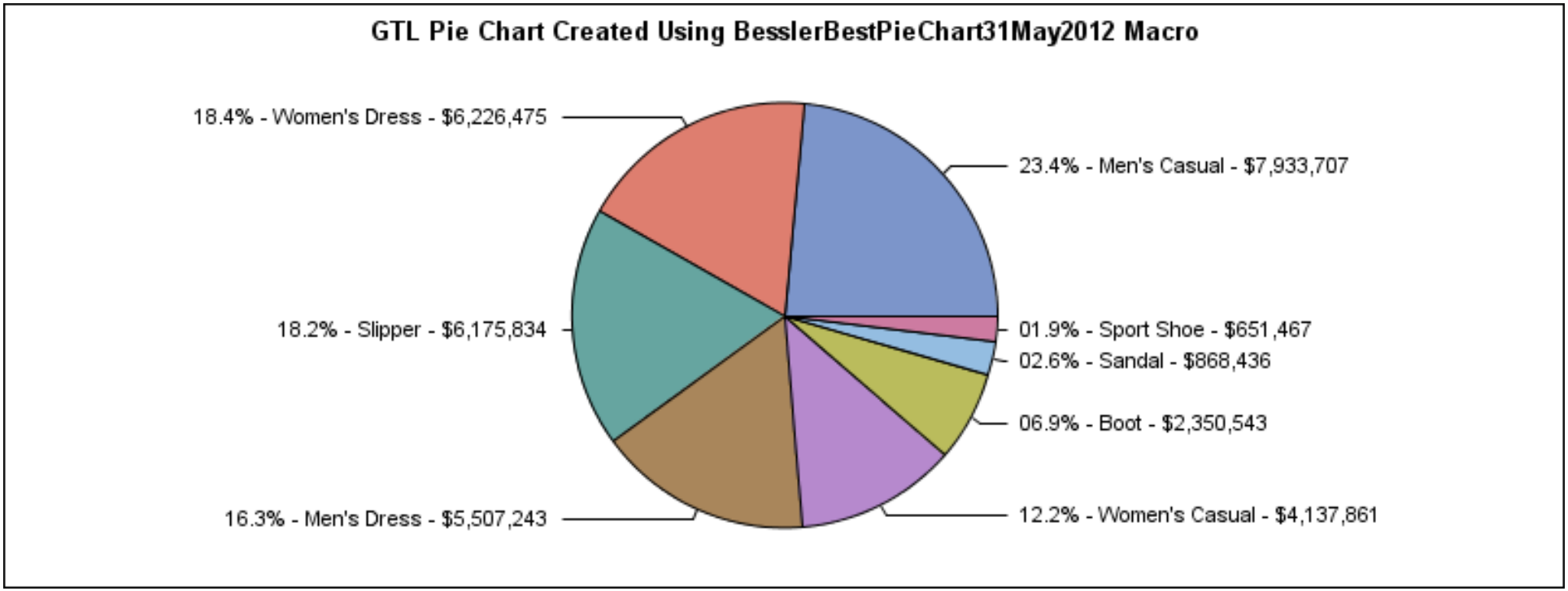
- However, see my Pac-Man Pie Chart

Why object to labels inside?

- Text over color harder to read
- Limits amount of text that fits

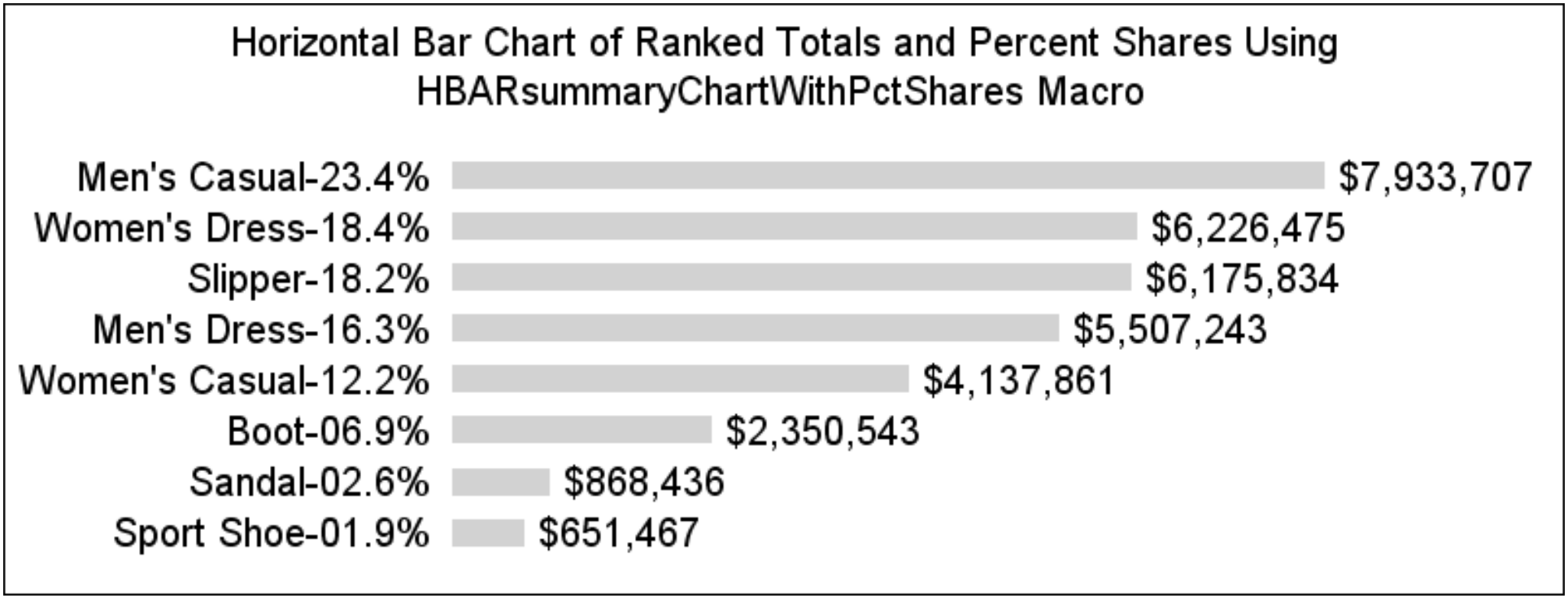
```
%BesslerBestPieChart27Jun2012
(Data=sashelp.shoes
,SliceLabelVar=Product
,SliceMeasureVar=Sales
,SliceMeasureFormat=dollar10.
,Order=Descending
,ChartTitle=GTL Pie Chart Created . . .
,ChartFileName=YourFileName
,ChartFoldername=YourFolderLocation
,ChartHeight=300px
,ChartWidth=800px);
```

Result From Macro



```
%HBARsummaryChartWithPctShares
(Data=sashelp.shoes
,BarLabelVar=Product
,BarMeasureVar=Sales
,FontSize=16pt
,BarWidth=0.5
,Order=Descending
,ChartTitle=Horizontal Bar Chart of Ranked Totals and Percent
Shares Using HBARsummaryChartWithPctShares Macro
,ChartFileName=YourChoiceOfFileName
,ChartFolderName=YourChoiceOfLocation
,ChartHeight=303px  /* NOTE: At 300px,
    every other bar label is omitted by SAS.
    See discussion of FitPolicy=THIN in Reference 1.
    To see bad result, test with 300px. */
,ChartWidth=800px);
```

Result From Macro



This chart is an alternative
when pie chart is infeasible or unwanted

If interested, you can find more of my work

- Bessler on SAS, SAS/GRAPH, ODS, Color, SAS with Excel, PDF, SAS Multi-Media, etc.
- go to www.lexjansen.com
- search by author name
- Lex Jansen's treasure trove of links
- over 17,000 SAS papers (some as early as 1996) by any author for SAS Global Forum, SUGI, MWSUG, NESUG, PharmaSUG, PhUSE, PNWSUG, SCSUG, SESUG, WUSS conferences

Thanks for coming today

For your comments, questions, suggestions:

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Le_Roy_Bessler@wi.rr.com

Converting Complexity To Clarity™

Strong Smart Systems™