



# THE PROGRAMMING CHALLENGES OF DOUBLE MATCH TRIANGULATOR

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[www.doublematchtriangulator.com](http://www.doublematchtriangulator.com)

# DOUBLE MATCH TRIANGULATOR IS ...

- An autosomal DNA analysis tool
- A semi-finalist in the RootsTech 2017 Innovator Showdown
- Conceptualized and developed by me starting Summer 2016
- Written in Delphi, which is essentially object extended Pascal
- A Windows program that reads FamilyTreeDNA CBR files
- Creating an Excel output file to help analyze the DNA

# CHROMOSOME BROWSER RESULTS FILE (CBR)

```
100000_Chromosome_Browser_Results_20160822.csv - Notepad
File Edit Format View Help
Harry B00000,Joel S00001,1,170876383,183564808,10.64,2800
Harry B00000,Joel S00001,2,1091127,3733675,5.26,900
Harry B00000,Joel S00001,2,29300205,33023313,4.91,1100
Harry B00000,Joel S00001,2,51848242,54747547,2.81,900
Harry B00000,Joel S00001,2,72881715,79080783,7.33,1600
Harry B00000,Joel S00001,3,36495,4378767,10.85,1888
Harry B00000,Joel S00001,4,69117497,71060137,1.24,500
Harry B00000,Joel S00001,4,114253251,116767884,1.97,500
Harry B00000,Joel S00001,5,142643609,145610930,3.44,700
Harry B00000,Joel S00001,5,167621874,169059675,2.62,500
Harry B00000,Joel S00001,5,176763725,180625733,7.69,1053
Harry B00000,Joel S00001,6,56101204,63572255,1.38,500
Harry B00000,Joel S00001,6,72335742,74438934,1.56,500
Harry B00000,Joel S00001,7,83468650,86999456,1.76,700
Harry B00000,Joel S00001,10,2380581,3387417,2.74,500
Harry B00000,Joel S00001,10,104404211,124004929,27.79,5750
Harry B00000,Joel S00001,11,48014889,57826280,3.01,1000
Harry B00000,Joel S00001,12,20668638,21368250,2.53,500
Harry B00000,Joel S00001,12,33401350,38671385,1.26,500
Harry B00000,Joel S00001,12,47590490,50042536,1.99,500
Harry B00000,Joel S00001,14,61876003,67118517,4.59,1100
Harry B00000,Joel S00001,14,99682846,106358708,9.35,1198
Harry B00000,Joel S00001,16,74078162,76241146,4.45,688
Harry B00000,Joel S00001,17,37316609,39713299,2.83,500
Harry B00000,Joel S00001,17,71112486,73584039,5.93,772
Harry B00000,Joel S00001,18,21019007,23644650,3.5,1000
Harry B00000,Joel S00001,18,44772622,46437311,1.37,500
Harry B00000,Joel S13869,1,34067461,36938054,3.91,700
Harry B00000,Joel S13869,1,85420456,87600621,2.25,597
Harry B00000,Joel S13869,1,103128353,107499183,2.86,800
Harry B00000,Joel S13869,2,57716395,66550469,7,2000
Ln 85545, Col 26
```

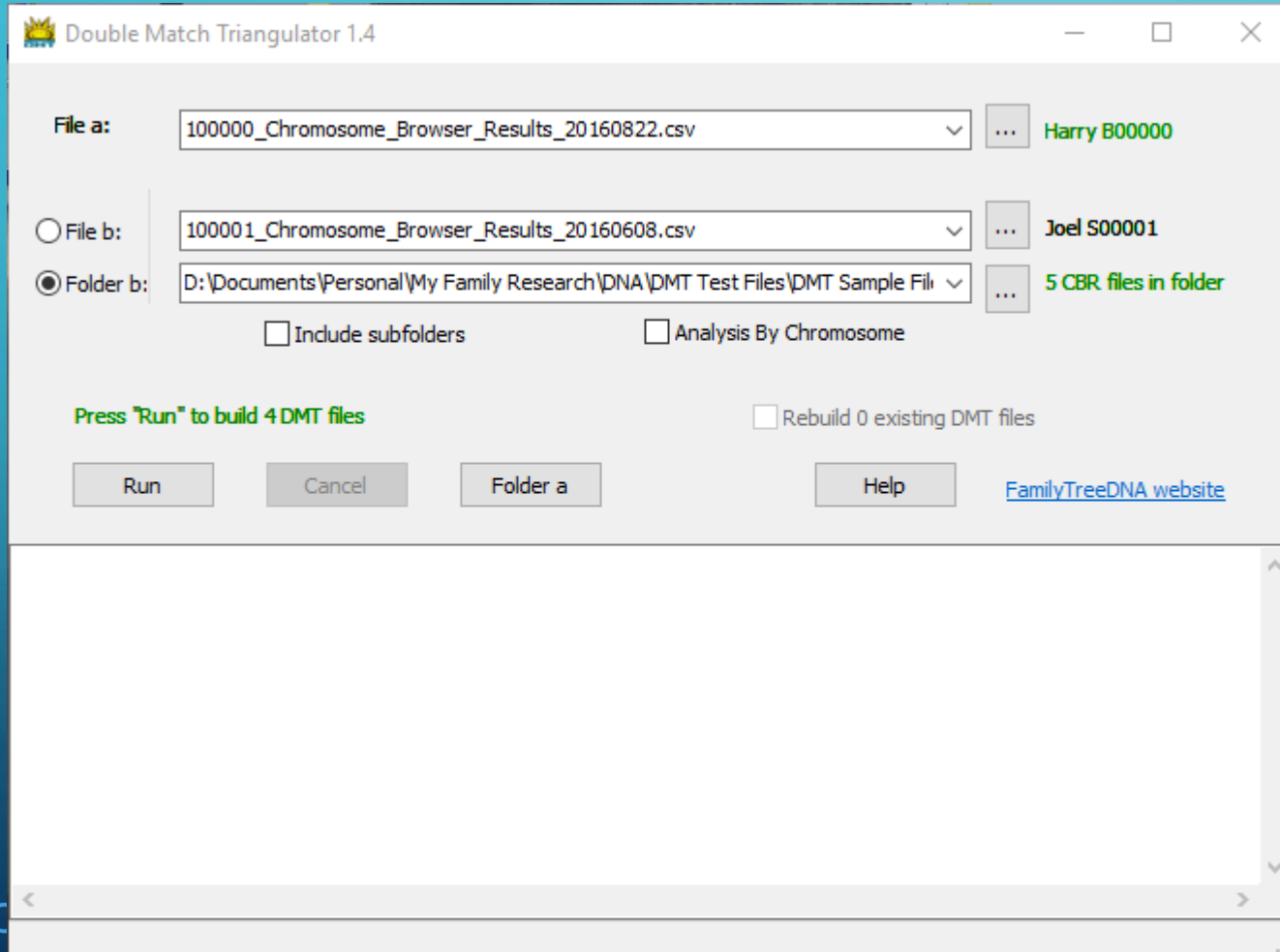


# INPUT CHALLENGES

- Handle input file problems
  - Merged by name
  - Non ASCII characters get mangled
- Merge the input from 2 large files quickly
  1. Load data first
  2. Sequential compare
  3. Sort results after



# USER INTERFACE CHALLENGES



- KISS
- One window
- Input of:
  - Two files
  - File + Directory
- Messages & Log File
- Help File

# EXCEL OUTPUT CHALLENGES

```
// See: http://stackoverflow.com/questions/39056055/office-automation-hangs-with-windows-
CoInitializeEx(nil, COINIT_APARTMENTTHREADED or COINIT_DISABLE_OLE1DDE);
oXL := CreateOleObject('Excel.Application');
oXL.Visible := False;
oXL.ScreenUpdating := False; { From: http://stackoverflow.com/questions/1436737
oXL.DisplayAlerts := false;

oXL.Workbooks.open(MapFilename, 1 { ReadOnly } );

oSheet := oXL.ActiveSheet;
if ChromosomeNum = 0 then
  oSheet.Name := 'Map'
else
  oSheet.Name := 'Map ' + inttostr(ChromosomeNum);

if ChromosomeNum = 0 then { Move the People Info to its own page } begin
  o2Sheet := oXL.Sheets.Add(NULL, oSheet, NULL, NULL);
  o2Sheet.Name := 'People';
  oXL.ActiveWindow.Zoom := 70;

  oRng := oSheet.Range['A' + inttostr(MatchAnalysis.Count + 2) + ':AK' + inttostr(1
  oRng.Cut;
  o2Sheet.Select;
  oXL.ActiveSheet.Paste;
  oSheet.Select;
end;

oSheet.Range['A1:N1'].ColumnWidth := 0.1;
oSheet.Range['O2:O2'].Select;
oXL.ActiveWindow.FreezePanes := True;
oXL.ActiveWindow.Zoom := 70;
```

- Excel Automation is NOT well Documented in its Delphi form

## EXCEL OUTPUT CHALLENGES (CONTINUED)

- Requires its own thread (or you'll get non-response)
  - Cannot cancel it if it fails
- Uses Variant Arrays
  - Using variant arrays to fill 200,000 rows is sloooooow.
    - Create CSV file takes 0.5 seconds. Create Excel file 100 seconds.
    - Solution found: Create CSV file and let Excel load it – 3 seconds.
- Requires Excel to be installed



The background is a teal-to-blue gradient. In the corners, there are decorative white circuit-like lines with small circles at the ends, resembling a PCB layout.

DOUBLE MATCH TRIANGULATOR

Developer  
Questions?