Analyzing and Predicting Results of Elections

An Application of Modelling and Simulation Tools to the French Regional Elections 2010

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Introduction

First round of the french regional elections took place on March 14th, 2010, and second round on March 21st. The goal was to elect for the next 6 years 26 regional councils i.e some 1900 councilors.

At each step, voters had to choose between lists of people presented by political parties. In each region, seats of councilors are distributed according to the percentages of vote with a bonus of 1/4 for the winning list. If a list get more than 50% of votes at the first rounds, there is no second round, otherwise any list that have got at least 10% of votes can compete and merge of lists or alliances are possible.

During the week between the two rounds, surveys were very popular, as well as public debates, analyses of strategies of alliances, and people were very excited in showing statistics, trying to predict or discover what will be the final results.

Mathematica is well known to be a very nice tool for prototyping, modelling, simulation in a lot of domains. We had the idea to use it to develop a complete model of this election based on the previous one in 2004. We wanted to apply this model to forecast the results of the second round.

At the time we started writing about this idea, we were facing the challenge of acquiring the whole set of results of the two rounds of the last regional elections held in 2004, of building a model on these results taking into account the political alliances contracted in between the two rounds, and on applying it to the recently published results of the first round of this year election to predict the results of the second round.

When we proposed this communication, it was to early to claim the quality of the predictive models, but whatever would have been its accuracy, we were demonstrating, by describing our approaches and implementations, that *Mathematica* is really a valuable tool for performing very easily the necessary tasks of this computation process such as: acquiring data, checking it, analyzing it and building models, prototyping simulation engines, and visualizing the results.

Data acquisition

Official results of most of the elections held in France during the last decade are available on the site of the French Ministry of Internal Affairs in an interactive format suitable for a reader. This website is built as a convivial and complete interface of the official database of the results of elections and presents these results in terms of geographical units such as regions, departments, and municipalities.

Unfortunately, there is no public access to the database allowing to use a query langage. Fortunately the site is built automatically. Hence the acquisition of the whole set of these data should be possible by designing software robots that automatically visit several sets of pages of this site, automatically extract the corresponding data from each page and then recombine the data together.

The structure of the website follows the geographical organisation and is very similar from one election to another. There are integer codes associated to region, departments, communes (and candidates) and pages are located in a hierarchy of files and directories widely using these codes. Visiting from the root this tree-like file system and analysing corresponding pages will provide us at the same time with the necessary geographic informations, and the results of the election.

When analysing pages, we are interested in getting values that appears in tables and in getting codes that are present in the linked URL. *Mathematica* provides a very efficient and clever Import functionality, that allow to select what kind of element of the object to import we are interested in. In our case, the Data element and the XMLObject element will be very helpful.

visiting the Index pages

2004 Régionales

Liste des départements dont les résultats sont complets :

Choisissez un département :

Résultats définitifs*

Résultats France Entière
Résultats régions : ALSACE AQUITAINE AUVERGNE BASSE NORMANDIE BOURGOGNE BRETAGNE CENTRE CHAMPAGNE-ARDENNE CORSE FRANCHE-COMTE GUADELOUPE GUYANE HAUTE NORMANDIE ILE DE FRANCE LA REUNION LANGUEDOC-ROUSSILLON LIMOUSIN LORRAINE MARTINIQUE MIDI-PYRENEES NORD-PAS DE CALAIS PAYS DE LOIRE PICARDIE POITOU-CHARENTES PROVENCE-ALPES-COTE D'AZUR RHONE-ALPES
Résultats départements : 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 21 22 23 24 25 26 27 28 29 2A 2B 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 971 972 973 974

Candidatures 2ème tour : Alsace Aquitaine Auvergne Basse Normandie Bourgogne Bretagne Centre Champagne-Ardenne Corse Franche-Comté Guadeloupe Guyane Haute Normandie Ile de France La Réunion Languedoc-Roussillon Limousin Lorraine Martinique Midi-Pyrenees Nord-Pas de calais Pays de Loire Picardie Poitou-Charentes Provence-Alpes-Cote d'Azur Rhone-Alpes

Candidatures 1er tour : Alsace Aquitaine Auvergne Basse Normandie Bourgogne Bretagne Centre Champagne-Ardenne Corse Franche-Comté Guadeloupe Guyane Haute Normandie Ile de France La Réunion Languedoc-Roussillon Limousin Lorraine Martinique Midi-Pyrenees Nord-Pas de calais Pays de Loire Picardie Poitou-Charentes Provence-Alpes-Cote d'Azur Rhone-Alpes

getting the region codes and names

```
mainPage["04"]
```

A very large output was generated. Here is a sample of it:

```
XMLObject[Document][{XMLObject[Declaration][Version → 1.0, Standalone → yes]}, <<1>>, {}]
```

Show Less | Show More | Show Full Output | Set Size Limit...

```
mainPage["04"] // View
```

html

head
▶ body
head
▶ body

We are interested in some links appearing in the index files. Once located with the help of the viewer, it is easy to get them, and to define, as a side effect the functions associating codes and names.

```
Clear[filter, RegionCode, RegionName, regionCodes, regionNames]
filter[XMLElement["a", {_, "href" → s1_}, {s2_}]] :=
 With[{ss1 = StringReplace[s1, "./" ~~ __ ~~ "/" ~~ x__ ~~ ".html" :> x]}, (RegionName[ss1] = s2; RegionCode[s2] = ss1)]
regionCodes = Sort[Map[filter,
    Take[Rest[Cases[Cases[mainPage["04"], XMLElement["p", __], Infinity], XMLElement["a", __], Infinity]], 26]]]
regionNames = Map[RegionName, regionCodes]
```

```
{001, 002, 003, 004, 011, 021, 022, 023, 024, 025, 026,
 031, 041, 042, 043, 052, 053, 054, 072, 073, 074, 082, 083, 091, 093, 094}
```

```
{GUADELOUPE, MARTINIQUE, GUYANE, LA REUNION, ILE DE FRANCE, CHAMPAGNE-ARDENNE,
 PICARDIE, HAUTE NORMANDIE, CENTRE, BASSE NORMANDIE, BOURGOGNE, NORD-PAS DE CALAIS, LORRAINE,
 ALSACE, FRANCHE-COMTE, PAYS DE LOIRE, BRETAGNE, POITOU-CHARENTES, AQUITAINE, MIDI-PYRENEES,
 LIMOUSIN, RHONE-ALPES, AUVERGNE, LANGUEDOC-ROUSSILLON, PROVENCE-ALPES-COTE D'AZUR, CORSE}
```

We check that the lists of regions are the same in 2004 and 2010.

```
Map[RegionCode, regionNames] == regionCodes
Sort[Map[filter, Take[Rest[
      Cases[Cases[mainPage["10"], XMLElement["p", __], Infinity], XMLElement["a", __], Infinity]], 26]]] == regionCodes
Map[RegionName, regionCodes] == regionNames
```

```
True
```

```
True
```

```
False
```

getting the department codes and relations between departments and region

```
Clear[filter, Region, departmentCodes]
filter[XMLElement["a", {_, "href" → s1_}, {_}]] :=
 With[{s = First[StringCases[s1, "./" ~~ x__ ~~ "/" ~~ y__ ~~ "/" ~~ __ :> {x, y}]]}, (Region[s[[2]]] = s[[1]]; s[[2]])]
departmentCodes = Map[filter,
   Take[Drop[Cases[Cases[mainPage["04"], XMLElement["p", __], Infinity], XMLElement["a", __], Infinity], 27], 100]]
```

```
{001, 002, 003, 004, 005, 006, 007, 008, 009, 010, 011, 012, 013, 014, 015, 016, 017, 018, 019, 021, 022, 023, 024, 025, 026,
 027, 028, 029, 02A, 02B, 030, 031, 032, 033, 034, 035, 036, 037, 038, 039, 040, 041, 042, 043, 044, 045, 046, 047, 048, 049,
 050, 051, 052, 053, 054, 055, 056, 057, 058, 059, 060, 061, 062, 063, 064, 065, 066, 067, 068, 069, 070, 071, 072, 073, 074,
 075, 076, 077, 078, 079, 080, 081, 082, 083, 084, 085, 086, 087, 088, 089, 090, 091, 092, 093, 094, 095, 971, 972, 973, 974}
```

```
Map[filter, Take[Drop[Cases[Cases[mainPage["10"], XMLElement["p", __], Infinity], XMLElement["a", __], Infinity], 27],
    100]] == departmentCodes
```

```
True
```

Visiting France Page

Résultat des élections Régionales 2010

ACCUEIL
FRANCE ENTIERE
Nombre de siège(s) à pourvoir : 1880

RESULTATS*

	Nombre	% Inscrits	% Votants
Inscrits	43 350 204		
Abstentions	21 148 939	48,79	
Votants	22 201 265	**51,21**	
Blancs ou nuls	1 006 951	2,32	4,54
Exprimés	21 194 314	48,89	95,46

Nuances de listes	Voix	% Exprimés	Sièges
Listes du Parti Comm. et du Parti Gauche (LCOP)	56 092	0,26	6
Listes du Parti Socialiste (LSOC)	660 189	3,11	58
Listes des Verts (LVEC)	207 435	0,98	11
Listes divers gauche (LDVG)	698 556	3,30	92
Listes d'Union de la gauche (LUG)	9 834 486	46,40	1006
Listes régionaliste (LREG)	117 742	0,56	27
Listes Centre-MoDem (LCMD)	178 858	0,84	10
Listes de la majorité (LMAJ)	7 497 649	35,38	511
Listes du Front National (LFN)	1 943 307	9,17	118

RAPPEL DES RESULTATS DU 1ER TOUR*

	Nombre	% Inscrits	% Votants
Inscrits	43 642 325		
Abstentions	23 422 367	53,67	
Votants	20 219 958	**46,33**	
Blancs ou nuls	744 063	1,70	3,68
Exprimés	19 475 895	44,63	96,32

Nuances de listes	Voix	% Exprimés	Sièges
Listes d'extrême gauche (LEXG)	662 161	3,40	
Listes du Parti Comm. et du Parti Gauche (LCOP)	1 137 250	5,84	
Listes du Parti Socialiste (LSOC)	4 579 853	23,52	31
Listes des Verts (LVEC)	2 372 379	12,18	
Listes divers gauche (LDVG)	594 999	3,06	4
Listes d'Union de la gauche (LUG)	1 094 059	5,62	
Autres liste (LAUT)	366 354	1,88	2
Listes régionaliste (LREG)	146 118	0,75	
Listes Centre-MoDem (LCMD)	817 560	4,20	
Listes de la majorité (LMAJ)	5 066 942	26,02	4
Listes divers droite (LDVD)	241 151	1,24	
Listes du Front National (LFN)	2 223 800	11,42	
Listes d'extrême droite (LEXD)	173 269	0,89	

```
TabView[francePage["04"]]
```

1 | 2 | 3 | 4

{ Informations d'accessibilité , Aller à la page d'accueil , Aller au contenu ,
Aller au menu , Aller au moteur de recherche interne , Contacter l'administrateur du site }

getting results and information on political families

```
Clear[Result, Seats, FamilyCode, FamilyName, familyCodes, familyNames]
Scan[Function[year, (
   Scan[(Result[year, "R1", #[[1]], "FRANCE"] = ToNumber[#[[2]]]) &, Rest[francePage[year][[3, 3, 1]]]];
   Scan[(Result[year, "R2", #[[1]], "FRANCE"] = ToNumber[#[[2]]]) &,
    Rest[francePage[year][[3, 2, 1]]]]; familyCodes[year, "R1"] =
    Map[(FamilyName[#[[1, 2]]] = #[[1, 1]]; FamilyCode[#[[1, 1]]] = #[[1, 2]]; Result[year, "R1", #[[1, 2]], "FRANCE"] =
         ToNumber[#[[2, 1]]]; Seats[year, "R1", #[[1, 2]], "FRANCE"] = ToNumber[#[[2, 2]]]; #[[1, 2]]) &,
     Map[{StringCases[First[#], x__ ~~ "(" ~~ y__ ~~ ")" :> {StringDrop[x, -1], y}][[1]],
         Drop[PadRight[Rest[#], 3], {2}]} &, Rest[francePage[year][[3, 3, 2]]]]];
   familyCodes[year, "R2"] = Map[(FamilyName[#[[1, 2]]] = #[[1, 1]]; FamilyCode[#[[1, 1]]] = #[[1, 2]];
        Result[year, "R2", #[[1, 2]], "FRANCE"] = ToNumber[#[[2, 1]]];
        Seats[year, "R2", #[[1, 2]], "FRANCE"] = ToNumber[#[[2, 2]]]; #[[1, 2]]) &, Map[
       {StringCases[First[#], x__ ~~ "(" ~~ y__ ~~ ")" :> {StringDrop[x, -1], y}][[1]], Drop[PadRight[Rest[#], 3], {2}]} &,
       Rest[francePage[year][[3, 2, 2]]]]];
   familyNames[year, "R1"] = Map[FamilyName, familyCodes[year, "R1"]];
   familyNames[year, "R2"] = Map[FamilyName, familyCodes[year, "R2"]])], {"04", "10"}]

familyCodes["04", "R1"]
familyCodes["04", "R2"]
familyCodes["10", "R1"]
familyCodes["10", "R2"]
```

{LXG, LGA, LVE, LDG, LEC, LRG, LCP, LDV, LDR, LDD, LFN, LXD}

{LGA, LDG, LRG, LDR, LDD, LFN}

{LEXG, LCOP, LSOC, LVEC, LDVG, LUG, LAUT, LREG, LCMD, LMAJ, LDVD, LFN, LEXD}

{LCOP, LSOC, LVEC, LDVG, LUG, LREG, LCMD, LMAJ, LFN}

Visiting Pages of Regions

Résultat des élections Régionales 2010

ACCUEIL > PROVENCE-ALPES-COTE D'AZUR

Résultats par département :
***Cliquez sur le département de votre choix*:**
ALPES DE HAUTE PROVENCE HAUTES ALPES ALPES MARITIMES BOUCHES DU RHONE VAR VAUCLUSE

RESULTATS*

	Nombre	% Inscrits	% Votants
Inscrits	3 347 091		
Abstentions	1 599 698	47,79	
Votants	1 747 393	**52,21**	
Blancs ou nuls	53 225	1,59	3,05
Exprimés	1 694 168	50,62	96,95

Liste conduite par	Voix	% Exprimés	Sièges
M. Jean-Marie LE PEN (LFN)	387 374	22,87	21
M. Thierry MARIANI (LMAJ)	559 412	33,02	30
M. Michel VAUZELLE (LUG)	747 382	44,11	72

RAPPEL DES RESULTATS DU 1ER TOUR*

	Nombre	% Inscrits	% Votants
Inscrits	3 347 258		
Abstentions	1 845 298	55,13	
Votants	1 501 960	**44,87**	
Blancs ou nuls	42 128	1,26	2,80
Exprimés	1 459 832	43,61	97,20

Liste conduite par	Voix	% Exprimés	Sièges
M. Pierre GODARD (LEXG)	30 814	2,11	
M. Jean-Marie LE PEN (LFN)	296 283	20,30	
Mme Isabelle BONNET (LEXG)	9 028	0,62	
M. Jean-Marc COPPOLA (LCOP)	89 256	6,11	
Mme Catherine LEVRAUD (LCMD)	36 699	2,51	
M. Patrice MIRAN (LAUT)	34 076	2,33	
Mme Laurence VICHNIEVSKY (LVEC)	159 426	10,92	
M. Thierry MARIANI (LMAJ)	388 365	26,60	
M. Jacques BOMPARD (LEXD)	39 284	2,69	
M. Michel VAUZELLE (LSOC)	376 601	25,80	

En raison des arrondis à la deuxième décimale, la somme des %Exprimés peut ne pas être égale à 100,00% .

getting results and information on candidates

```
Clear[RegionResult, filter, Family, Candidat]
filter[s_String] :=
 Reverse[StringSplit[StringDrop[StringReplace[StringDrop[s, -1], {"M." → "", "Mme" → ""}], 1], Whitespace, 2]]
Scan[Function[year,
  Scan[Function[region,
    With[{rp = If[Length[regionPage[year, region][[3]]] == 3, regionPage[year, region][[3]],
        Append[regionPage[year, region][[3]], regionPage[year, region][[3, 2]]]]},
     Scan[(RegionResult[year, "R1", #[[1]], region] = ToNumber[#[[2]]]) &, Rest[rp[[3, 1]]]]; Scan[
      (RegionResult[year, "R2", #[[1]], region] = ToNumber[#[[2]]]) &, Rest[rp[[2, 1]]]]; Candidat[year, "R1", region] =
      Map[(Family[year, "R1", #[[1, 1]]] = #[[1, 2]]; RegionResult[year, "R1", #[[1, 1]], region] = ToNumber[#[[2, 1]]];
         Seats[year, "R1", #[[1, 1]], region] = ToNumber[#[[2, 2]]]; #[[1, 2]]; #[[1, 1]]) &,
       Map[{StringCases[First[#], x__ ~~ "(" ~~ y__ ~~ ")" :→ {filter[x], y}][[1]], Drop[PadRight[Rest[#], 3], {2}]} &,
        Rest[rp[[3, 2]]]]];
     Candidat[year, "R2", region] = Map[(Family[year, "R2", #[[1, 1]]] = #[[1, 2]]; RegionResult[year, "R2", #[[1, 1]],
           region] = ToNumber[#[[2, 1]]]; Seats[year, "R2", #[[1, 1]], region] = ToNumber[#[[2, 2]]]; #[[1, 1]]) &,
       Map[{StringCases[First[#], x__ ~~ "(" ~~ y__ ~~ ")" :→ {filter[x], y}][[1]], Drop[PadRight[Rest[#], 3], {2}]} &,
        Rest[rp[[2, 2]]]]]]], regionCodes]], {"04", "10"}]
```

getting candidates codes

```
Clear[filter1, filter2, CandidatCode, CandidatRound2, CandidatElected, candidatCodes]
filter1[s_String] := StringReplace[
  Reverse[StringSplit[StringDrop[StringReplace[StringDrop[s, -1], {"M." → "", "Mme" → ""}], 1], Whitespace, 2]],
  (StartOfString ~~ Whitespace) | (Whitespace ~~ EndOfString) :→ ""]
filter2[XMLElement["a", {_, "href" → s1_, _}, {s2_}]] :=
 With[{ss1 = StringReplace[s1, x__ ~~ ".html" :→ x]}, {ss1, StringCases[s2, x__ ~~ "(" ~~ y__ ~~ ")" :→ filter1[x]]}]
Scan[Function[year,
   (filter[{}, s_] := (CandidatElected[year, StringDrop[s, 2]] = StringTake[s, 2]);
    filter[{c_}, s_] := (If[StringTake[s, 2] == "C2", CandidatRound2[year, StringDrop[s, 2]] = True];
      CandidatCode[year, c] = StringDrop[s, 2]);
    candidatCodes[year] = DeleteCases[Flatten[Map[Function[region, Map[filter[#[[2]], #[[1]]] &,
          Map[filter2, Cases[Rest[regionTable[year, region]], XMLElement["a", _, {_String}], Infinity]]]],
       regionCodes]], "E1" | "E2"])], {"04", "10"}];
```

Visiting Pages of Departments

Résultat des élections Régionales 2004

ACCUEIL > PROVENCE-ALPES-COTE D'AZUR > VAR (83)

Résultats par commune :
Cliquez sur la lettre correspondant à l'initiale
A B C D E F G H L M N O P R S T V

RESULTATS*

	Nombre	% Inscrits	% Votants
Inscrits	664 782		
Abstentions	239 377	36,01	
Votants	425 405	**63,99**	
Blancs ou nuls	13 000	1,96	3,06
Exprimés	412 405	62,04	96,94

Liste conduite par	Voix	% Exprimés
M. Michel VAUZELLE (LGA)	167 069	40,51
M. RENAUD MUSELIER (LDR)	155 587	37,73
M. Guy MACARY (LFN)	89 749	21,76

RAPPEL DES RESULTATS DU 1ER TOUR*

	Nombre	% Inscrits	% Votants
Inscrits	664 764		
Abstentions	270 726	40,73	
Votants	394 038	**59,27**	
Blancs ou nuls	15 722	2,37	3,99
Exprimés	378 316	56,91	96,01

Liste conduite par	Voix	% Exprimés
M. SAMUEL JOHSUA (LXG)	9 762	2,58
M. Michel VAUZELLE (LGA)	114 042	30,14
M. PHILIPPE SANMARCO (LDG)	5 532	1,46
M. PATRICE MIRAN (LEC)	12 293	3,25
M. ABEL DJERARI (LDV)	877	0,23
M. FRANCK VIDAL (LDV)	42	0,01
M. RENAUD MUSELIER (LDR)	107 796	28,49
M. J.MARIE MURE RAVAUD (LDD)	4 658	1,23
M. JEROME ROCQUIGNY DE (LDD)	1 773	0,47
M. ALAIN PERSIA (LDD)	5 314	1,40
M. Guy MACARY (LFN)	91 055	24,07
M. ALAIN VAUZELLE (LXD)	11 399	3,01
Mme ALINE VIDAL DAUMAS (LCP)	13 773	3,64

En raison des arrondis à la deuxième décimale, la somme des %Exprimés peut ne pas être égale à 100,00% .

```
Clear[DepartmentLetter, DepartmentResult, filter1, filter2]
filter1[XMLElement["a", {_, "href" → s1_}, {_}]] := s1
filter2[s_String] :=
 Reverse[StringSplit[StringDrop[StringReplace[StringDrop[s, -1], {"M." → "", "Mme" → ""}], 1], Whitespace, 2]]
Scan[Function[year,
  Scan[Function[dept,
    DepartmentLetter[year, dept] =
     Map[filter1, Cases[Cases[Cases[Cases[departmentTable[year, dept], XMLElement["table", _, _], Infinity],
          XMLElement["p", _, _], Infinity], XMLElement["span", _, _], Infinity], XMLElement["a", _, _], Infinity]];
    With[{dp = If[Length[departmentPage[year, dept]] == 3, departmentPage[year, dept],
        Append[departmentPage[year, dept], departmentPage[year, dept][[2]]]]},
     Scan[(DepartmentResult[year, "R1", #[[1]], dept] = ToNumber[#[[2]]]) &, Rest[dp[[3, 1]]]];
     Scan[(DepartmentResult[year, "R2", #[[1]], dept] = ToNumber[#[[2]]]) &, Rest[dp[[2, 1]]]];
     Scan[(DepartmentResult[year, "R1", #[[1, 1]], dept] = ToNumber[#[[2]]]) &,
      Map[{StringCases[First[#], x__ ~~ "(" ~~ y__ ~~ ")" :> {filter2[x], y}][[1]], #[[2]]} &, Rest[dp[[3, 2]]]]];
     Scan[(DepartmentResult[year, "R2", #[[1, 1]], dept] = ToNumber[#[[2]]]) &,
      Map[{StringCases[First[#], x__ ~~ "(" ~~ y__ ~~ ")" :> {filter2[x], y}][[1]], #[[2]]} &,
       Rest[dp[[2, 2]]]];]], departmentCodes]], {"04", "10"}]

Select[departmentCodes, DepartmentLetter["04", #] != DepartmentLetter["10", #] &]

{}

departmentLetters = Flatten[Map[DepartmentLetter["04", #] &, departmentCodes]];
```

Visiting Communes Pages

getting the list of communes

ACCUEIL > PROVENCE-ALPES-COTE D'AZUR > VAR (83)

Résultats par commune :

Cliquez sur la lettre correspondant à l'initiale

A B C D E F G H L M N O P R S T V

Choix d'une commune commençant par la lettre -G-

Garéoult
Gassin
Ginasservis
Gonfaron
Grimaud

```
communeCodes["10"]
```

A very large output was generated. Here is a sample of it:

```
{001006, 001007, 001008, 001004, 001005, 001009, 001010, 001011, 001012, 001013, 001014, 001015,
 001016, 001017, 001019, 001021, 001022, 001023, 001024, 001027, 001028, 001170, 001029, 001030, 001033,
 <<36645>>, 974416, 974418, 974419, 974420, 974421, 075056AR01, 075056AR02, 075056AR03, 075056AR04,
 075056AR05, 075056AR06, 075056AR07, 075056AR08, 075056AR09, 075056AR10, 075056AR11, 075056AR12,
 075056AR13, 075056AR14, 075056AR15, 075056AR16, 075056AR17, 075056AR18, 075056AR19, 075056AR20}
```

Show Less | Show More | Show Full Output | Set Size Limit...

Visiting pages of communes

Résultat des élections Régionales 2010

ACCUEIL > PROVENCE-ALPES-COTE D'AZUR > VAR (83) > Grimaud

Résultats par commune :
Cliquez sur la lettre correspondant à l'initiale
A B C D E F G H L M N O P R S T V

RESULTATS*

	Nombre	% Inscrits	% Votants
Inscrits	3 282		
Abstentions	1 653	50,37	
Votants	1 629	**49,63**	
Blancs ou nuls	52	1,58	3,19
Exprimés	1 577	48,05	96,81

Liste conduite par	Voix	% Exprimés
M. Jean-Marie LE PEN (LFN)	334	21,18
M. Thierry MARIANI (LMAJ)	870	55,17
M. Michel VAUZELLE (LUG)	373	23,65

RAPPEL DES RESULTATS DU 1ER TOUR*

	Nombre	% Inscrits	% Votants
Inscrits	3 282		
Abstentions	1 879	57,25	
Votants	1 403	**42,75**	
Blancs ou nuls	33	1,01	2,35
Exprimés	1 370	41,74	97,65

Liste conduite par	Voix	% Exprimés
M. Pierre GODARD (LEXG)	15	1,09
M. Jean-Marie LE PEN (LFN)	292	21,31
Mme Isabelle BONNET (LEXG)	3	0,22
M. Jean-Marc COPPOLA (LCOP)	30	2,19
Mme Catherine LEVRAUD (LCMD)	25	1,82
M. Patrice MIRAN (LAUT)	37	2,70
Mme Laurence VICHNIEVSKY (LVEC)	136	9,93
M. Thierry MARIANI (LMAJ)	630	45,99
M. Jacques BOMPARD (LEXD)	14	1,02
M. Michel VAUZELLE (LSOC)	188	13,72

En raison des arrondis à la deuxième décimale, la somme des %Exprimés peut ne pas être égale à 100,00% .

```
DownValues[CommuneResult] // Length
```

```
1 382 760
```

Checking Data

When a huge amount of data have been acquired automatically, it is important to check their coherence, that will point out any trouble in the acquisition process.

A vote can not be lost

At any geographical level, and for any round of any election, the number of people registered to vote should be equal equal to the sum of abstentions, non-expressed votes, and any other possible expressed votes.

At France level

```
CheckResult[year_, round_, "FRANCE"] := Result[year, round, "Inscrits", "FRANCE"] -
   (Result[year, round, "Abstentions", "FRANCE"] + Result[year, round, "Blancs ou nuls", "FRANCE"] +
     Total[Map[Result[year, round, #, "FRANCE"] &, familyCodes[year, round]]])
```

```
Outer[CheckResult[#1, #2, "FRANCE"] &, {"04", "10"}, {"R1", "R2"}]
```

```
{{0, 0}, {0, 0}}
```

At Region level

```
CheckRegionResult[year_, round_, reg_] := RegionResult[year, round, "Inscrits", reg] -
   (RegionResult[year, round, "Abstentions", reg] + RegionResult[year, round, "Blancs ou nuls", reg] +
     Total[Map[RegionResult[year, round, #, reg] &, Candidat[year, round, reg]]])
```

```
Outer[CheckRegionResult, {"04", "10"}, {"R1", "R2"}, regionCodes]
```

```
{{{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}},
  {{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}}}
```

At Department level

```
CheckDepartmentResult[year_, round_, dept_] := DepartmentResult[year, round, "Inscrits", dept] -
   (DepartmentResult[year, round, "Abstentions", dept] + DepartmentResult[year, round, "Blancs ou nuls", dept] +
     Total[Map[DepartmentResult[year, round, #, dept] &, Candidat[year, round, Region[dept]]]])
```

```
Outer[CheckDepartmentResult, {"04", "10"}, {"R1", "R2"}, departmentCodes]
```

```
{{{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
    0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
    0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
    0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
    0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}},
  {{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
    0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
    0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
    0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
    0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}}}
```

At Commune level

```
CheckCommuneResult[year_, round_] := Map[CheckCommuneResult[year, round, #] &, communeCodes[year]]
```

```
CheckCommuneResult[year_, round_, comm_] := TrueQ[CommuneResult[year, round, "Inscrits", comm] ==
    CommuneResult[year, round, "Abstentions", comm] + CommuneResult[year, round, "Blancs ou nuls", comm] +
     Total[Map[CommuneResult[year, round, #, comm] &, Candidat[year, round, Region[StringTake[comm, 3]]]]]]
```

```
Outer[CheckCommuneResult, {"04", "10"}, {"R1", "R2"}]
```

A very large output was generated. Here is a sample of it:

```
{{{True, True, True, True, True, True, True, True, True, True, True, True, True, True, True, True, True, True, True, True,
   True, True, True, True, True, True, True, True, True, True, True, True, True, True, True, True, True, True,
   True, True, True, True, True, True, True, True, True, True, True, True, True, ≪36 593≫, True, True, True,
   True, True, True, True, True, True, True, True, True, True, True, True, True, True, True, True, True, True,
   True, True, True, True, True, True, True, True, True, True, False, False, False, False, False, False, False,
   False, False, False, False, False, False, False, False, False, False, False, False, False}, {≪1≫}}, ≪1≫}
```

Show Less | Show More | Show Full Output | Set Size Limit...

Geographical consistency

between France and regions

between regions and departments

```
Clear[GeoCheck3]
GeoCheck3[year_, round_] := Map[GeoCheck3[year, round, #] &, regionCodes]
GeoCheck3[year_, round_, region_] := Map[GeoCheck3[year, round, #, region] &,
  Join[{"Inscrits", "Abstentions", "Blancs ou nuls", "Exprimés", "Votants"}, Candidat[year, round, region]]]
GeoCheck3[year_, round_, res_, region_] := RegionResult[year, round, res, region] -
  Total[Map[DepartmentResult[year, round, res, #] &, Department[region]]]
```

```
Outer[GeoCheck3[#1, #2] &, {"04", "10"}, {"R1", "R2"}]
```

```
{{{{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}},
  {{0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}}},
 {{{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}},
  {{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0},
   {0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0}, {0, 0, 0, 0, 0, 0, 0, 0, 0}}}}
```

between departments and communes

Modelling

Goal of our model is to compute the result of the second round in term of the result of the first round.

a simple model to understand

For the global properties, we will use a simple ratio and proportion model.

	Round 1		Round 2
2004	$Res_{2004}(1)$	→	$Res_{2004}(2)$
2010	$Res_{2010}(1)$	→	$\frac{Res_{2004}(2)\, Res_{2010}(1)}{Res_{2004}(1)}$

```
Model[res_, "FRANCE"] :=
 Floor[N[Result["10", "R1", res, "FRANCE"] / Result["04", "R1", res, "FRANCE"] * Result["04", "R2", res, "FRANCE"]]]
```

importance of granularity

```
RegionModel[res_, region_] := Floor[N[
   RegionResult["10", "R1", res, region] / RegionResult["04", "R1", res, region] * RegionResult["04", "R2", res, region]]]
RegionModel[res_, "FRANCE"] := Total[Map[RegionModel[res, #] &, regionCodes]]

DepartmentModel[res_, dept_] := Floor[N[DepartmentResult["10", "R1", res, dept] / DepartmentResult["04", "R1", res, dept] *
    DepartmentResult["04", "R2", res, dept]]]
DepartmentModel[res_, "FRANCE"] := Total[Map[DepartmentModel[res, #] &, departmentCodes]]
```

Inscrits | Abstentions | Blancs ou nuls | Exprimés

	expected	real
France	661 135	744 063
Region	663 774	744 063
Department	663 760	744 063

modelling report of votes

political families

The big challenge is to define (compute) the matrix below that expresses the way the votes are reported between different candidates.
The black coefficients are the most likely, but could be slightly changed.
An approximation of the red coefficients can be computed by studying the merge of lists of candidates between the two rounds.

$$\begin{pmatrix} LCOP \\ LSOC \\ LVEC \\ LDVG \\ LUG \\ LREG \\ LCMD \\ LMAJ \\ LFN \end{pmatrix} = k. \begin{pmatrix} 0.3 & 1 & 0 & 0 & 0 & 0.1 & 0 & 0 & 0 & 0 & 0 & 0.1 \\ 0.3 & 0 & 1 & 0 & 0 & 0.15 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0.2 & 0 & 0 & 1 & 0 & 0 & 0.1 & 0 & 0 & 0 & 0 & 0 \\ 0.1 & 0 & 0 & 0 & 1 & 0 & 0.1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0.1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0.1 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0.1 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0.15 & 0 & 0 & 1 & 0 & 0.2 \\ 0.1 & 0 & 0 & 0 & 0 & 0 & 0.1 & 0 & 0 & 0 & 1 & 0.7 \end{pmatrix} . \begin{pmatrix} LEXG \\ LCOP \\ LSOC \\ LVEC \\ LDVG \\ LUG \\ LAUT \\ LREG \\ LCMD \\ LMAJ \\ LDVD \\ LFN \\ LEXD \end{pmatrix}$$

This matrix has to be tested against the resut of the previous elections.
As political families changed between 2004 and 2006, it has to be adapted.

Simulation

expected result

```
ExpectedResult[region_] :=
 With[{list = Map[{#, Extract[MatrixReport[region].Map[With[{l = Map[{Family["10", "R1", #], RegionResult[
                      "10", "R1", #, region]} &, Candidat["10", "R1", region]]}, If[Position[l, #] == {},
                0, Last[Extract[l, First[First[Position[l, #]]]]]] &, familyCodes["10", "R1"]],
          Position[familyCodes["10", "R2"], #][[1]]} &, Map[Family["10", "R2", #] &, Candidat["10", "R2", region]]]},
  With[{s = Total[Map[Last, list]]}, Map[{#[[1]], N[#[[2]] / s]} &, list]]]

Map[ExpectedResult, Rest[regionCodes]]
```

```
{{{LMAJ, 0.213212}, {LREG, 0.647474}, {LDVG, 0.139314}}, {{LDVG, 0.109425}, {LMAJ, 0.890575}},
 {{LSOC, 0.17658}, {LMAJ, 0.421742}, {LDVG, 0.401678}}, {{LMAJ, 0.995551}, {LUG, 0.0044494}},
 {{LUG, 0.392404}, {LFN, 0.204395}, {LMAJ, 0.403201}}, {{LUG, 0.}, {LMAJ, 0.600529}, {LFN, 0.399471}},
 {{LFN, 0.331032}, {LUG, 0.00281042}, {LMAJ, 0.666157}}, {{LMAJ, 0.682754}, {LFN, 0.317246}, {LUG, 0.}},
 {{LMAJ, 0.466103}, {LUG, 0.533897}}, {{LFN, 0.161883}, {LMAJ, 0.372007}, {LUG, 0.466109}},
 {{LUG, 0.00254089}, {LMAJ, 0.532172}, {LFN, 0.465287}}, {{LUG, 0.440539}, {LMAJ, 0.335868}, {LFN, 0.223594}},
 {{LFN, 0.317086}, {LMAJ, 0.67999}, {LUG, 0.00292404}}, {{LFN, 0.314322}, {LMAJ, 0.683343}, {LUG, 0.00233473}},
 {{LUG, 0.511765}, {LMAJ, 0.488235}}, {{LVEC, 0.17043}, {LMAJ, 0.322059}, {LSOC, 0.507511}},
 {{LUG, 0.}, {LMAJ, 1.}}, {{LMAJ, 0.673786}, {LCMD, 0.320369}, {LUG, 0.00584538}},
 {{LUG, 0.}, {LMAJ, 1.}}, {{LCOP, 0.35872}, {LUG, 0.00529158}, {LMAJ, 0.635988}},
 {{LUG, 0.00461174}, {LMAJ, 0.647414}, {LFN, 0.347974}}, {{LMAJ, 1.}, {LUG, 0.}},
 {{LDVG, 0.492641}, {LMAJ, 0.311584}, {LFN, 0.195775}}, {{LFN, 0.449341}, {LMAJ, 0.546023}, {LUG, 0.00463612}},
 {{LREG, 0.233565}, {LMAJ, 0.531733}, {LREG, 0.233565}, {LUG, 0.00113782}}}
```

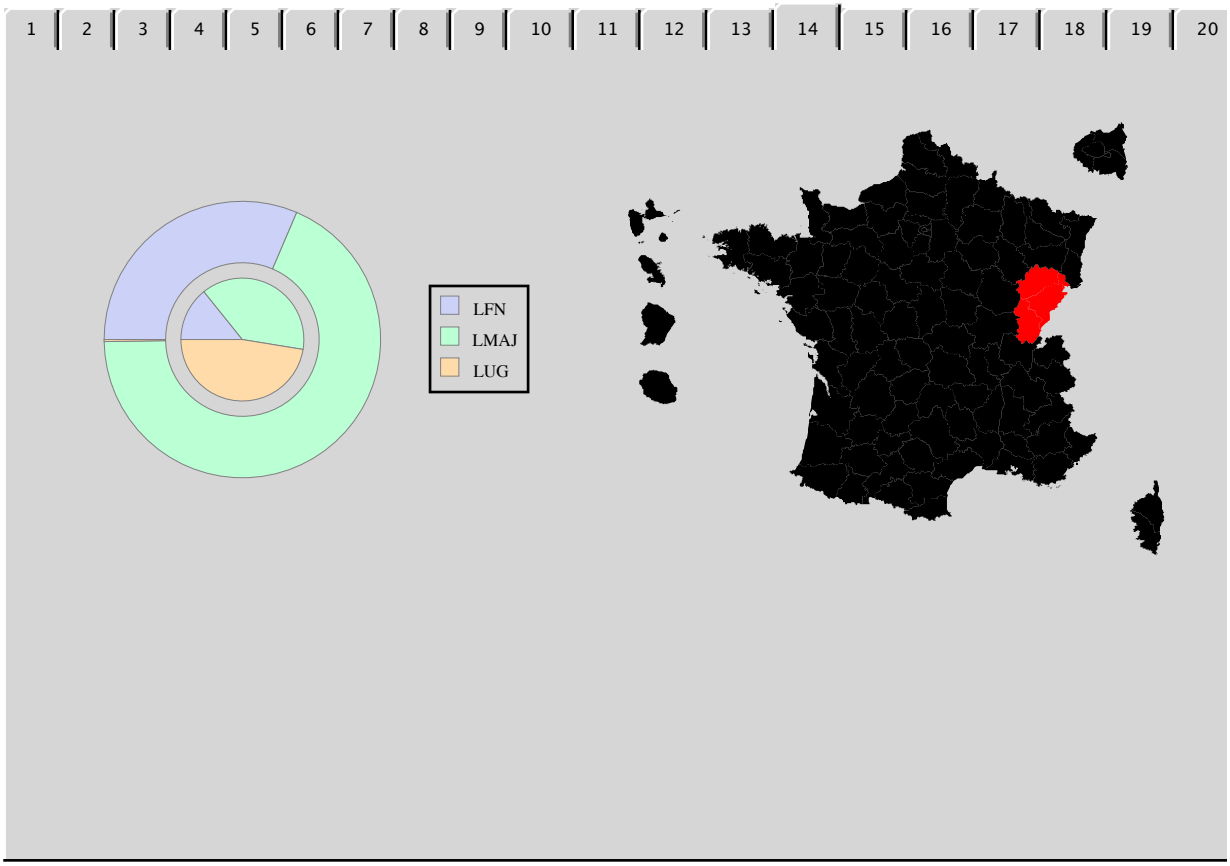
real result

```
RealResult[region_] :=
 With[{l = Map[{Family["10", "R2", #], RegionResult["10", "R2", #, region]} &, Candidat["10", "R2", region]]},
  With[{s = Total[Map[Last, l]]}, Map[{#[[1]], N[#[[2]] / s]} &, l]]]

Map[RealResult, Rest[regionCodes]]
```

```
{{{LMAJ, 0.106264}, {LREG, 0.410284}, {LDVG, 0.483452}}, {{LDVG, 0.438917}, {LMAJ, 0.561083}},
 {{LSOC, 0.18989}, {LMAJ, 0.454615}, {LDVG, 0.355495}}, {{LMAJ, 0.43308}, {LUG, 0.56692}},
 {{LUG, 0.443131}, {LFN, 0.171765}, {LMAJ, 0.385104}}, {{LUG, 0.482776}, {LMAJ, 0.324258}, {LFN, 0.192966}},
 {{LFN, 0.142003}, {LUG, 0.551004}, {LMAJ, 0.306994}}, {{LMAJ, 0.364635}, {LFN, 0.135352}, {LUG, 0.500014}},
 {{LMAJ, 0.428471}, {LUG, 0.571529}}, {{LFN, 0.138195}, {LMAJ, 0.335289}, {LUG, 0.526516}},
 {{LUG, 0.518973}, {LMAJ, 0.259053}, {LFN, 0.221974}}, {{LUG, 0.500061}, {LMAJ, 0.315509}, {LFN, 0.18443}},
 {{LFN, 0.145703}, {LMAJ, 0.461599}, {LUG, 0.392697}}, {{LFN, 0.142268}, {LMAJ, 0.383473}, {LUG, 0.474259}},
 {{LUG, 0.563881}, {LMAJ, 0.436119}}, {{LVEC, 0.173719}, {LMAJ, 0.32359}, {LSOC, 0.502691}},
 {{LUG, 0.606091}, {LMAJ, 0.393909}}, {{LMAJ, 0.280144}, {LCMD, 0.156514}, {LUG, 0.563341}},
 {{LUG, 0.677686}, {LMAJ, 0.322314}}, {{LCOP, 0.19098}, {LUG, 0.479479}, {LMAJ, 0.32954}},
 {{LUG, 0.50755}, {LMAJ, 0.340207}, {LFN, 0.152244}}, {{LMAJ, 0.403194}, {LUG, 0.596806}},
 {{LDVG, 0.541887}, {LMAJ, 0.264314}, {LFN, 0.193799}}, {{LFN, 0.228651}, {LMAJ, 0.330199}, {LUG, 0.44115}},
 {{LREG, 0.0984556}, {LMAJ, 0.276509}, {LREG, 0.25884}, {LUG, 0.366196}}}
```

comparison



Conclusion

The current work focused on the ability to acquire the data, and performs the modelling computations.

Mathematica has shown to be a very valuable tool for all the step of process.

A more serious study of the report of votes between the two rounds and the way to model it is necessary to get significative result.

The framework that has been set up could be very useful to analyse and simulate assumptions usually made to explain a priori or a posteriori results of elections, especially by introducing intervals on the “report matrix”.

A lot of work remains ... to be presented during the next *Mathematica* Users Conference ! See you in Champaign !

Code