Portugal Census Information

Information Visualization
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Objective

Provide an accessible and interactive tool for understanding demographic, educational, and economic factors in Portugal.

Focus Areas

Resident Population

Education Level

Unemployment

Data Overview

Data Sources

Portuguese Census data from 2011 and 2021 (INE).

Resident Population, Education Level and Unemployment

Variables

Data Structure

Organized to the NUT 4 level (municipal level)

CSV Files

Data Sets

Dataset Overview
Before Filtering

ordem	nivel	cod_dim2	Zona Geográfica	Em 2001					
				Total		Grupos etários			
				HM	H	0-14	15-24	25-64	
			1	2	3	4	5	6	
300	3	11	Norte	3687293	1782931	644948	558278	1969309
400	4	111	Minho-Lima	250275	116808	37741	35949	126619
500	5	1601	Arcos de Valdevez	24761	11299	3184	3185	11762
600	6	160101	Aboim das Choças	354	159	36	32	168
700	6	160102	Aguiã	732	369	119	123	337
800	6	160103	Alvora	313	140	28	38	143
900	6	160104	Ázere	294	133	49	39	138
1000	6	160105	Cabana Maior	365	150	36	32	152
1100	6	160106	Cabreiro	574	255	39	49	269
1200	6	160107	Carralcova	132	54	7	15	56
1300	6	160108	Cendufe	403	197	64	63	181
1400	6	160109	Couto	641	289	72	75	327
1500	6	160110	Eiras	320	146	31	26	153
1600	6	160111	Ermelo	142	59	8	5	54
1700	6	160112	Extremo	157	72	14	15	70
1800	6	160113	Gavieira	446	202	33	43	212
1900	6	160114	Giela	499	225	81	83	256
2000	6	160115	Gondoriz	1109	498	137	147	527
2100	6	160116	Grade	402	178	61	58	159
2200	6	160117	Guilhadeses	969	446	150	138	475
2300	6	160118	Loureda	219	100	28	34	109
2400	6	160119	Jolda (Madalena)	415	196	61	65	190
2500	6	160120	Mei	142	71	20	20	66
2600	6	160121	Miranda	435	187	43	31	198
2700	6	160122	Monte Redondo	284	131	39	39	120
2800	6	160123	Oliveira	369	161	49	45	188
2900	6	160124	Paçô	861	399	168	117	442
3000	6	160125	Padroso	305	144	22	45	134
3100	6	160126	Parada	321	160	53	57	154

Dataset Overview

Resident population in 2021 - Final Format

```
1  Codigo;Local;HM;HM-0:14;HM-15:24;HM-25:64;HM-65+;H;H-0:14;H-15:24;H-25:64;H-65+;M;M-0:14;M-15:24;M-25:64;M-65+
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3  1;Continente;9855909;1264697;1031659;5225083;2334470;4687055;648167;527323;2510823;1000742;5168854;616530;504336;2714260;1333728
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5  111;Alto Minho;231266;25831;22338;118018;65079;108355;13160;11386;56543;27266;122911;12671;10952;61475;37813
6  1601;Arcos de Valdevez;20718;1923;1790;9547;7458;9483;942;897;4597;3047;11235;981;893;4950;4411
7  1602;Caminha;15797;1728;1371;8037;4661;7345;901;691;3779;1974;8452;827;680;4258;2687
8  1603;Melgaço;7773;578;519;3369;3307;3452;295;250;1573;1334;4321;283;269;1796;1973
9  1604;Monção;17816;1718;1412;8609;6077;8160;882;680;4125;2473;9656;836;732;4484;3604
10 1605;Paredes de Coura;8632;949;760;4265;2658;4144;473;408;2149;1114;4488;476;352;2116;1544
11 1606;Ponte da Barca;11044;1145;1073;5495;3331;5139;555;572;2631;1381;5905;590;501;2864;1950
12 1607;Ponte de Lima;41164;4892;4551;21652;10069;19393;2473;2330;10421;4169;21771;2419;2221;11231;5900
13 1608;Valença;13623;1630;1337;7042;3614;6420;846;684;3361;1529;7203;784;653;3681;2085
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15 1610;Vila Nova de Cerveira;8921;1051;856;4602;2412;4320;546;473;2296;1005;4601;505;383;2306;1407
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18 0302;Barcelos;116752;14715;14057;64965;23015;56218;7533;7262;31489;9934;60534;7182;6795;33476;13081
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24 0304;Cabeceiras de Basto;15558;1917;1826;8291;3524;7559;992;941;...;925;885;4211;1978
25 0307;Fafe;48497;5683;5292;26336;11186;23087;3007;2680;12635;476;...;2612;13701;6421
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27 1705;Mondim de Basto;6410;652;703;3262;1793;3099;359;360;1589;791;3311;293;343;1673;1002
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29 0311;Vieira do Minho;11955;1151;1185;6089;3530;5713;599;618;2925;1571;6242;552;567;3164;1959
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33 0104;Arouca;21146;2674;2286;11155;5031;10170;1349;1112;5557;2152;10976;1325;1174;5598;2879
34 0107;Espinho;31043;3300;3126;15843;8774;14461;1636;1603;7522;3700;16582;1664;1523;8321;5074
35 1304;Gondomar;164257;20464;17759;90939;35095;77991;10416;9113;43135;15327;86266;10048;8646;47804;19768
36 1306;Maia;134977;18481;14792;75568;26136;64127;9430;7528;35798;11371;70850;9051;7264;39770;14765
37 1308;Matosinhos;172557;21634;16954;94467;39502;81225;11044;8619;44579;16983;91332;10590;8335;49888;22519
38 0113;Oliveira de Azeméis;66175;7679;6910;36317;15269;32020;3973;3433;17838;6776;34155;3706;3477;18479;8493
```

Col 11: H-25:64

Context

Overview of Portugal's Socio-Economic Landscape

Relevance of the Census Data

A comparative Analysis (2011-2021)

Global Perspective with Local Implications

Target Users and Needs

Government Officials and Planners

Researchers and Students

General Public

AUDIENCE

Ability to analyze population trends, educational progress, and unemployment.

Interactive elements to filter by Area, Region, Town and Year,
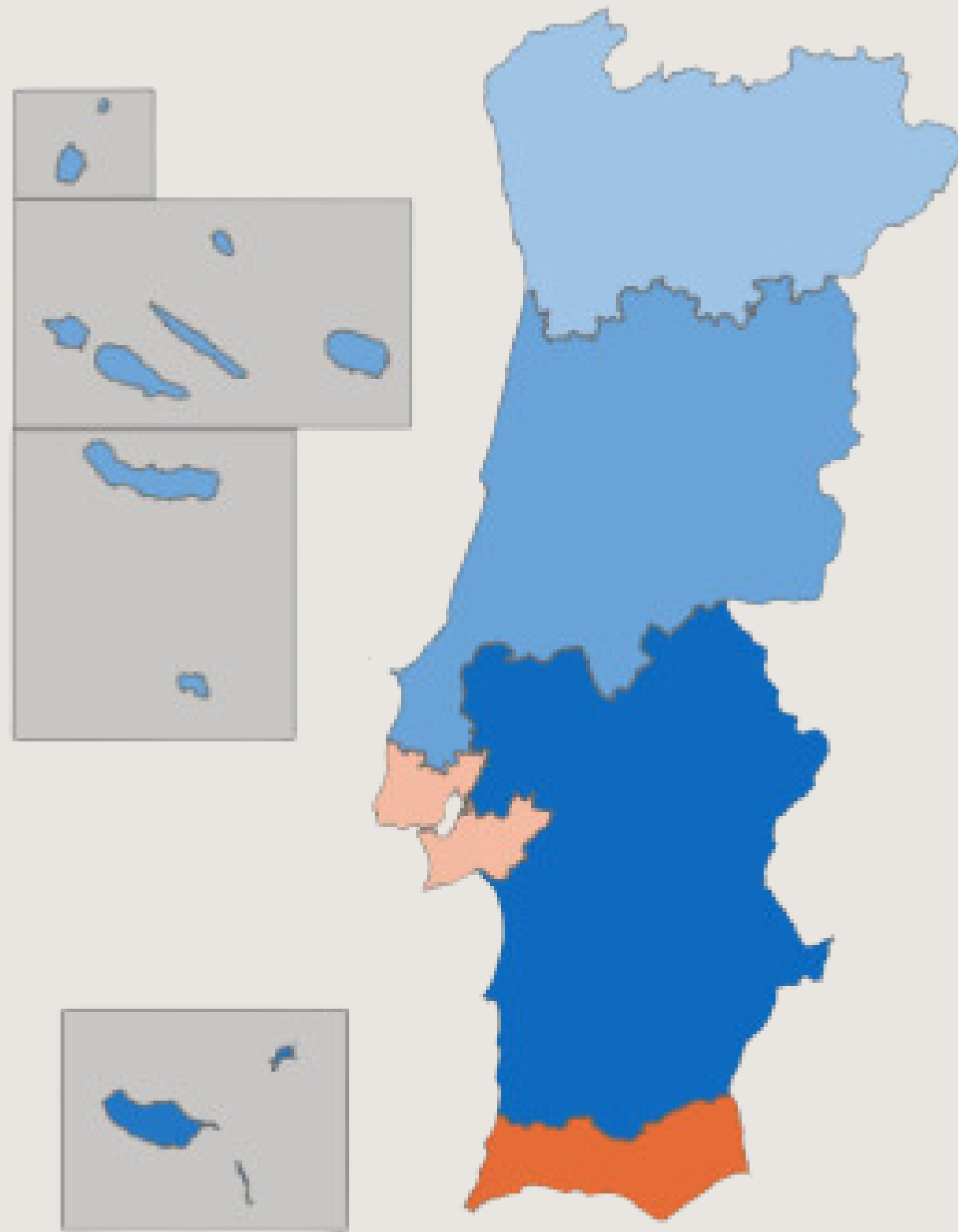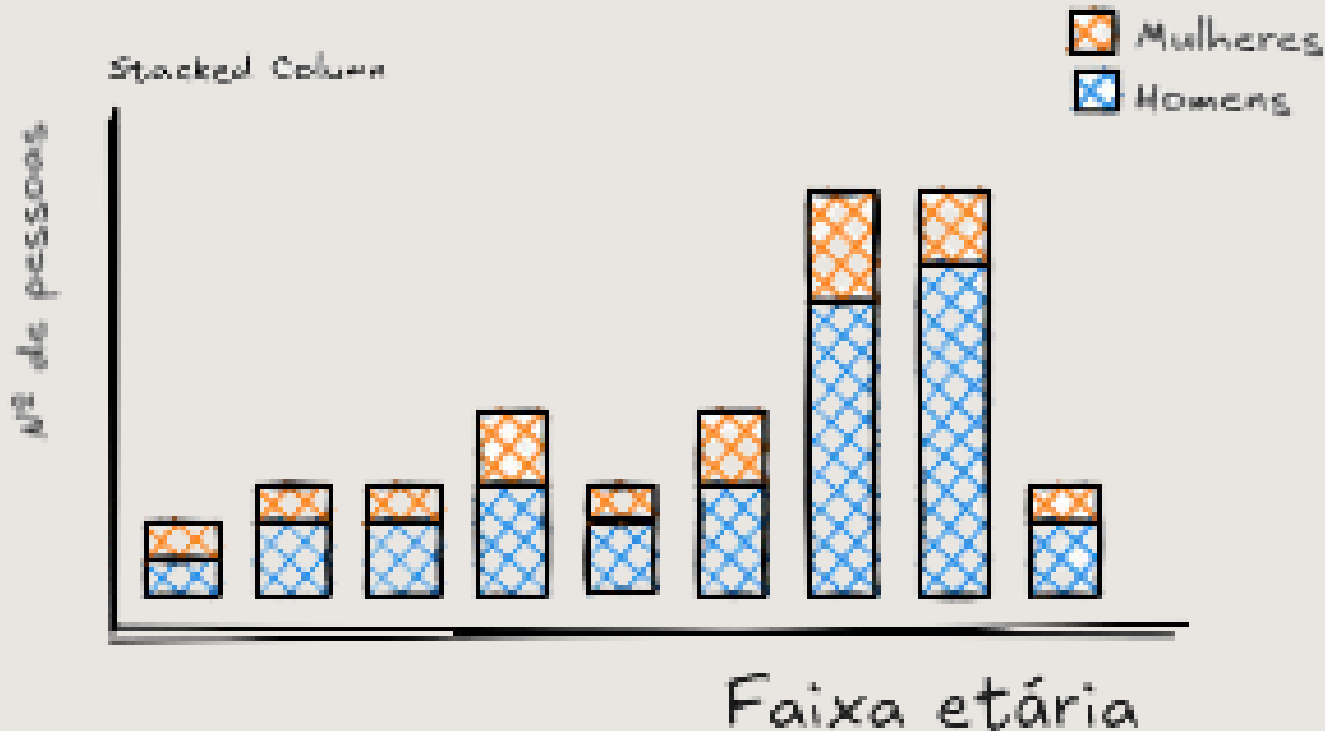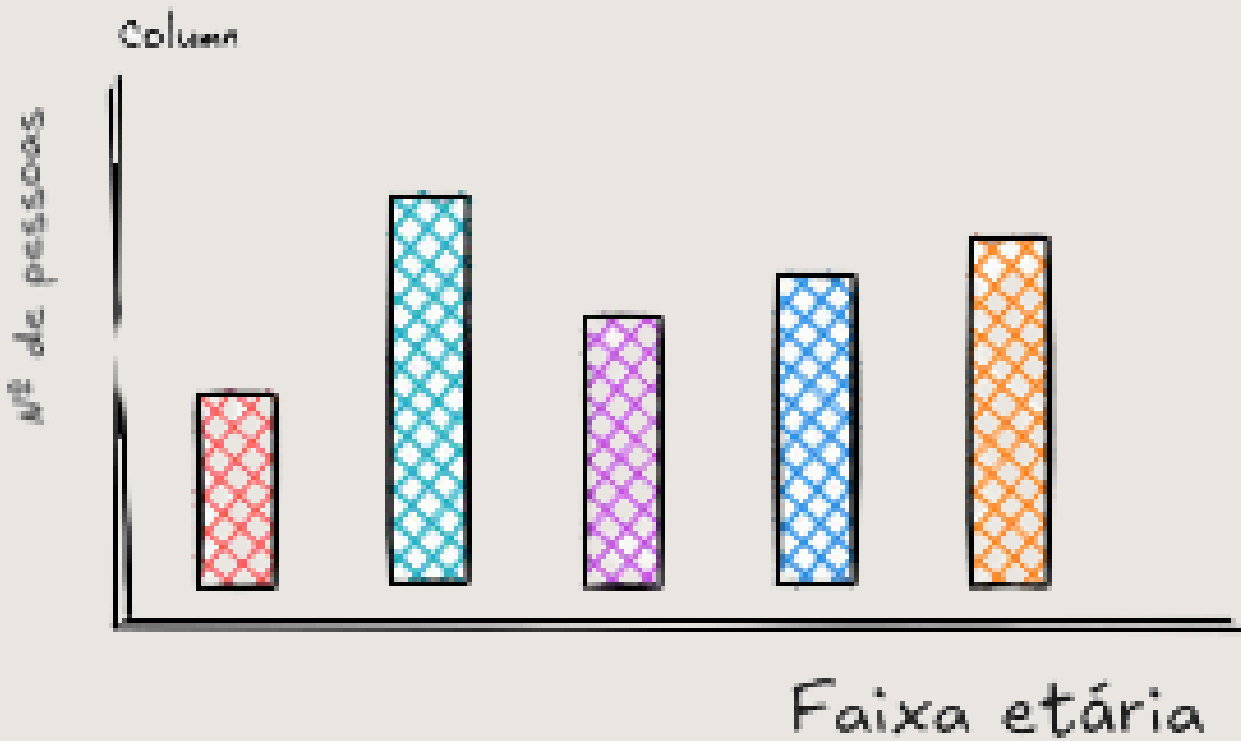
NEEDS

Low Fidelity Prototype

MAP VISUALIZATION

PURPOSE

Interactive map allows selection of regions or towns to explore detailed demographic, education, and unemployment data.

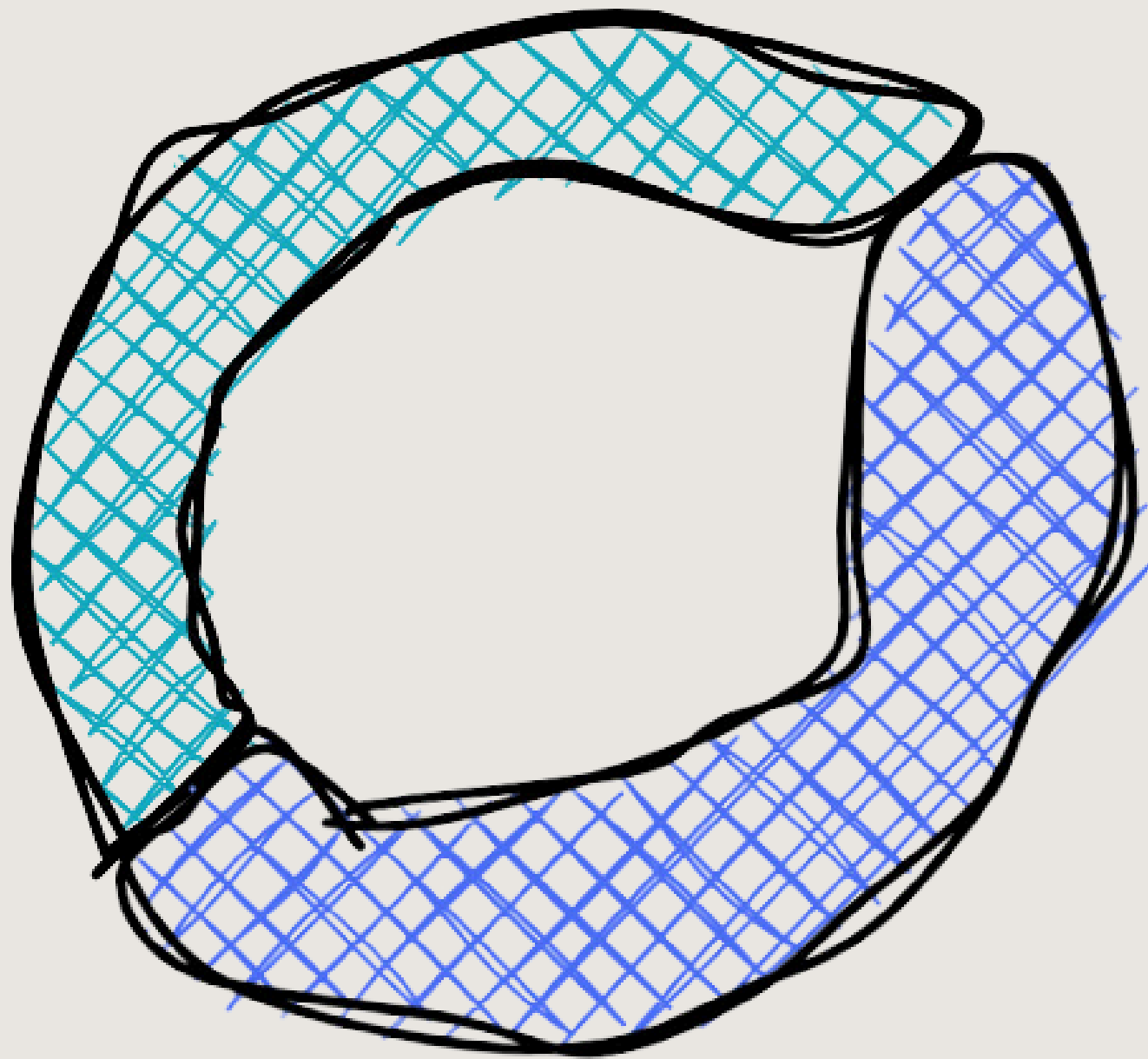# Population Distribution by Age and Gender

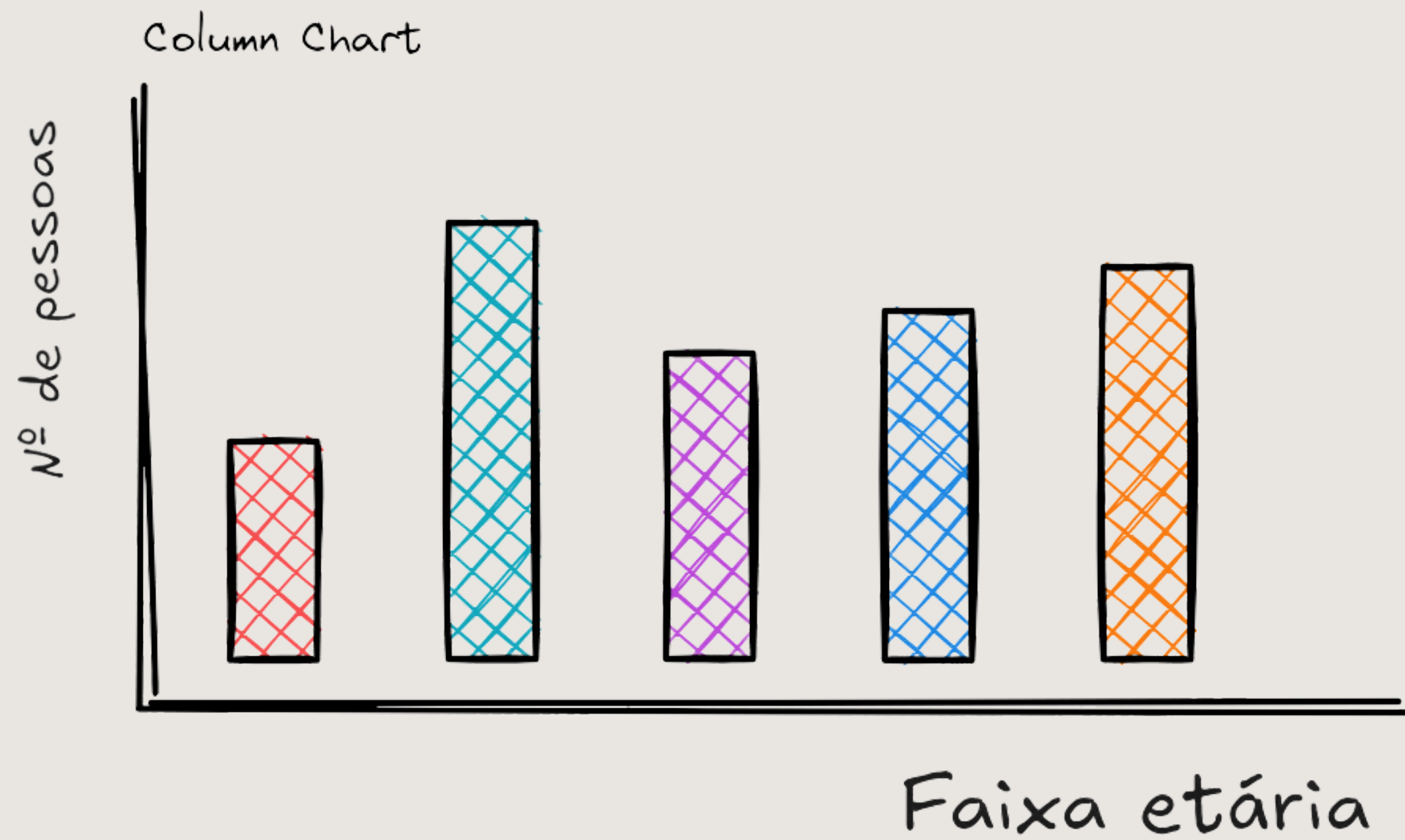# Population Distribution by Age and Gender

Donut (Men vs Woman)

PURPOSE

Shows the overall gender distribution across all age groups.

Population Distribution by Age and Gender

Column Chart
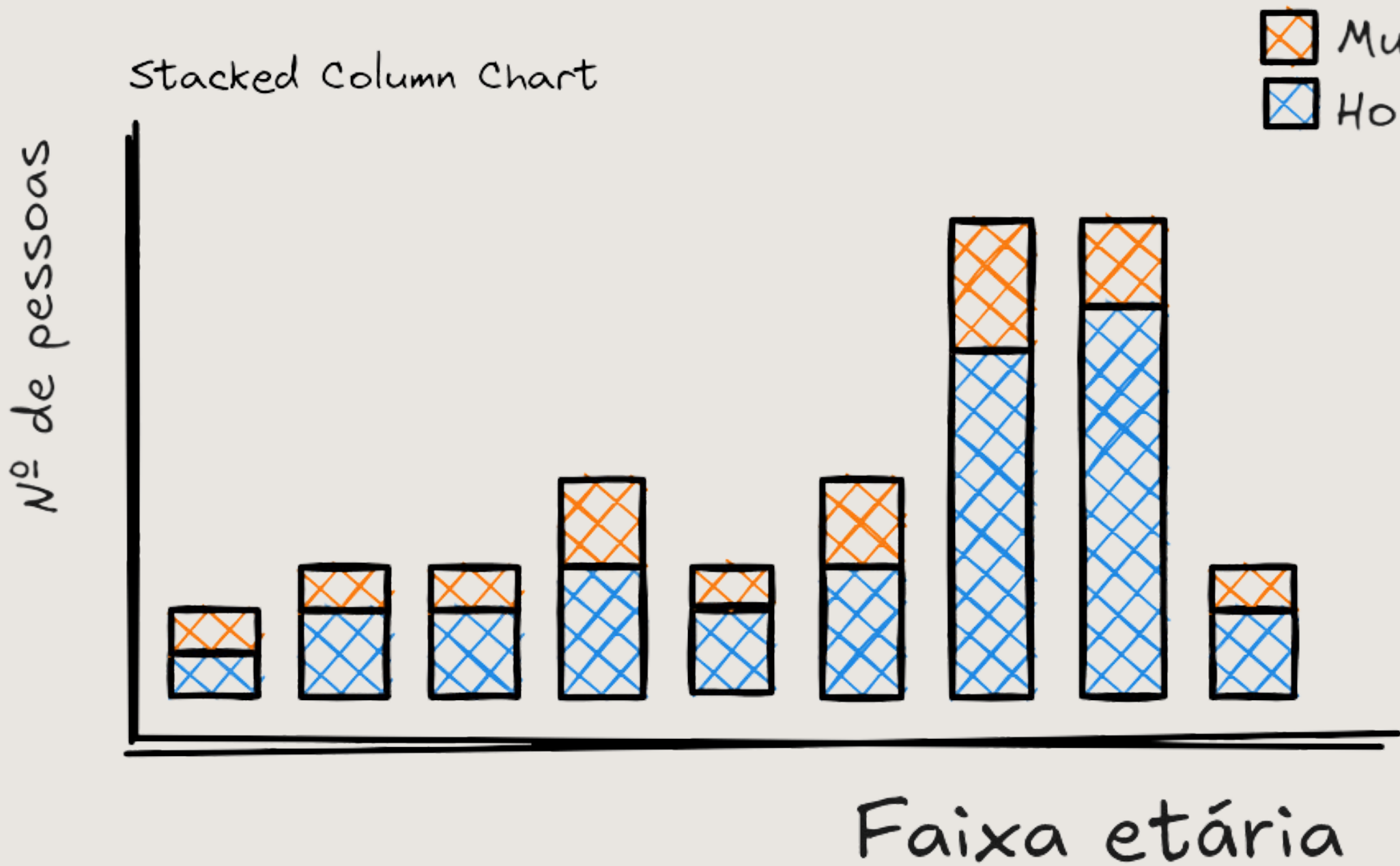
Nº de pessoas

Faixa etária

PURPOSE

Visualizes the age structure of the population, helping identify the size of each age group.

Population Distribution by Age and Gender

PURPOSE

Provides a gender breakdown within each age group, making it easy to compare male and female population proportions by age.

Education Level by Age and Gender

Cartiesan heatmap
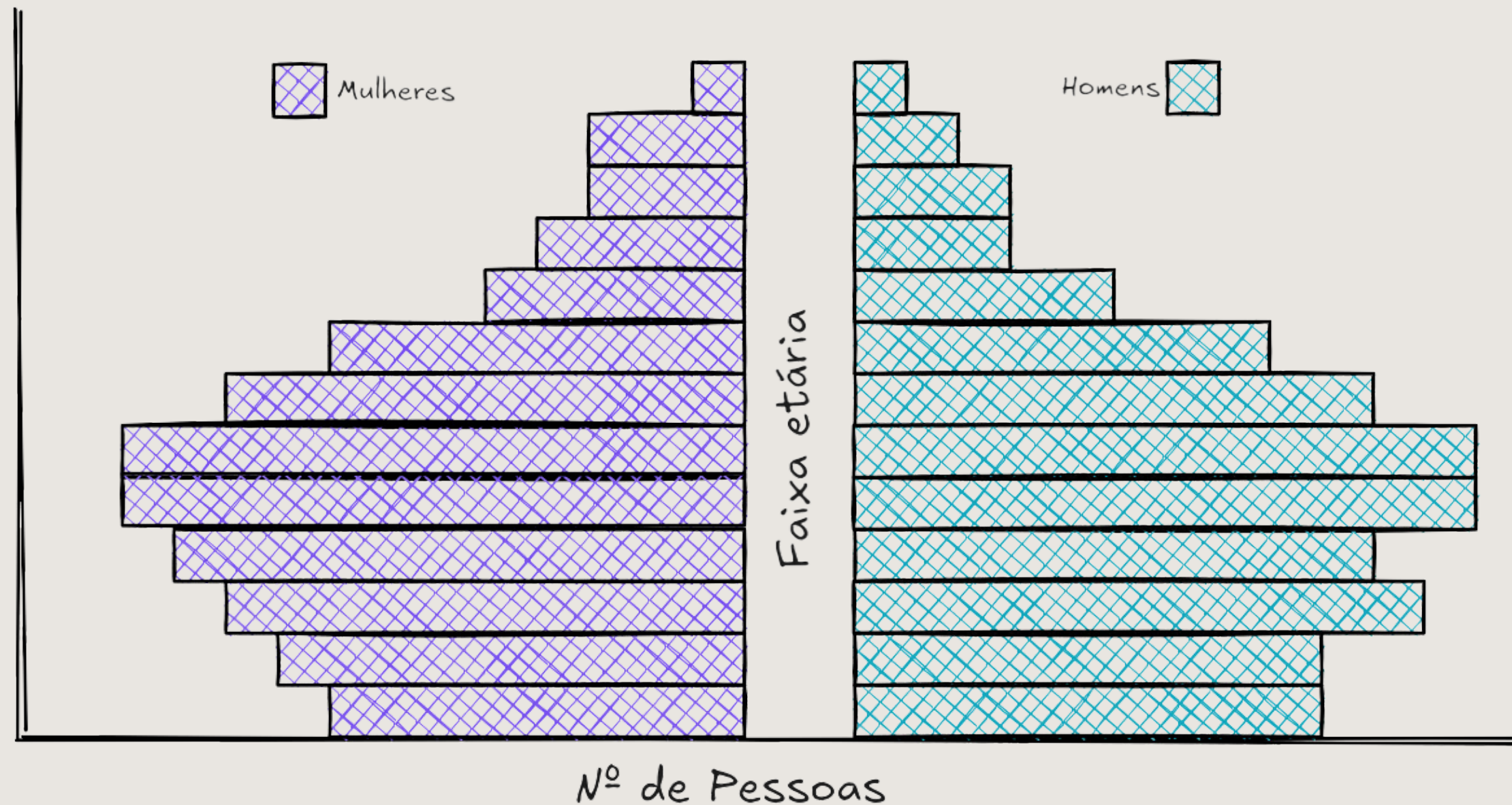Faixa etária
Grau de escolaridade

PURPOSE

Visualizes the distribution of education levels by age group, with each cell representing the density of individuals in a specific age group and education level category.

Unemployment Distribution

Population pyrimid

Mulheres

Homens

Faixa etária

Nº de Pessoas

PURPOSE

The population pyramid provides a clear, intuitive way to view demographic structure by showing the age distribution within each gender.

LFP User Evaluation

▲ Can you select a specific region or municipality on the map? What region did you choose?

▲ Is it clear how to switch between data categories (Population, Education, Unemployment)?

▲ Are the interactive filters for region and year selection intuitive to use? Did you have any difficulty finding them?

▲ After selecting the "Population" category, can you describe what insights to take from the bar chart and donut chart about age distribution and gender balance?

▲ Can you explain the difference in information between the population pyramid and the other population graphs?

▲ How to use the population pyramid to identify regions with older or younger populations?

▲ In the "Education" category, can you interpret the information presented in the Cartesian heat map? What does this tell you about education levels among different age groups?

▲ Is it clear what the color intensity represents in the heatmap? Can you explain the trend in education levels based on age?

▲ If you wanted to compare education levels between two age groups, how would you do it using this interface?

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Functional Prototype

Techonologies

HTML   **CSS**   **Bootstrap**   **D3**   **JavaScript**

Heuristic Evaluation

Jakob Nienlsen's 10 Usability Heuristics for UI Design, using the severity rating scale proposed by Nielsen:

0	I dont't agree that this is a usability problem at all
1	Cosmetic problem only: need not be fixed unless extra time is available on project
2	Minor usability problem: fixing this should be given low priority
3	Major usability problem: important to fix, so should be given high priority
4	Usability catastrophe: imperative to fix this before product can be released

Heuristic Evaluation

1.Visibility of System Status

Issue: There are no loading indicators when filters are applied or charts are updated, leaving users uncertain about progress.
Severity Rating: 2

2.Match Between System and the Real World

No issues identified.

3.User Control and Freedom

Issue: There is no clear option to "Reset Filters" or restart selections without reloading the page.
Severity Rating: 2

4. Consistency and Standards

No issues identified.

5. Error Prevention

Issue: There are no clear messages when invalid filter combinations are selected, leaving users unsure how to correct the issue.

Severity Rating: 2

7. Flexibility and Efficiency of Use

Issue: The system does not allow users to export data or save filter combinations, which could benefit advanced users.

Severity Rating: 2

6. Recognition Rather Than Recall

No issues identified.

8. Aesthetic and Minimalist Design

No issues identified.

9. Help Users Recognize, Diagnose, and Recover From Errors

Issue: The system lacks clear informational messages for invalid filters or when no data is available for the selected combination.

Severity Rating: 3

10. Help and Documentation

Issue: There is no "About" page or introductory explanation of how to use the system.

Severity Rating: 3

System Usability Scale (SUS)

▲ We asked colleagues to explore our aplication and fill in the questionnaire.

▲ We had 4 participants answering the questionnaire.

▲ The average SUS score value was 80

Projeto Final de Visualização de Informação - Teste de Usabilidade

Os participantes vão realizar tarefas definidas para testar o nosso website para explorar e visualizar dados.

Contacto
Para alguma pergunta em relação a este teste, por favor contacte-nos: *tiagocgomes@ua.pt* e *robertorcastro@ua.pt*!
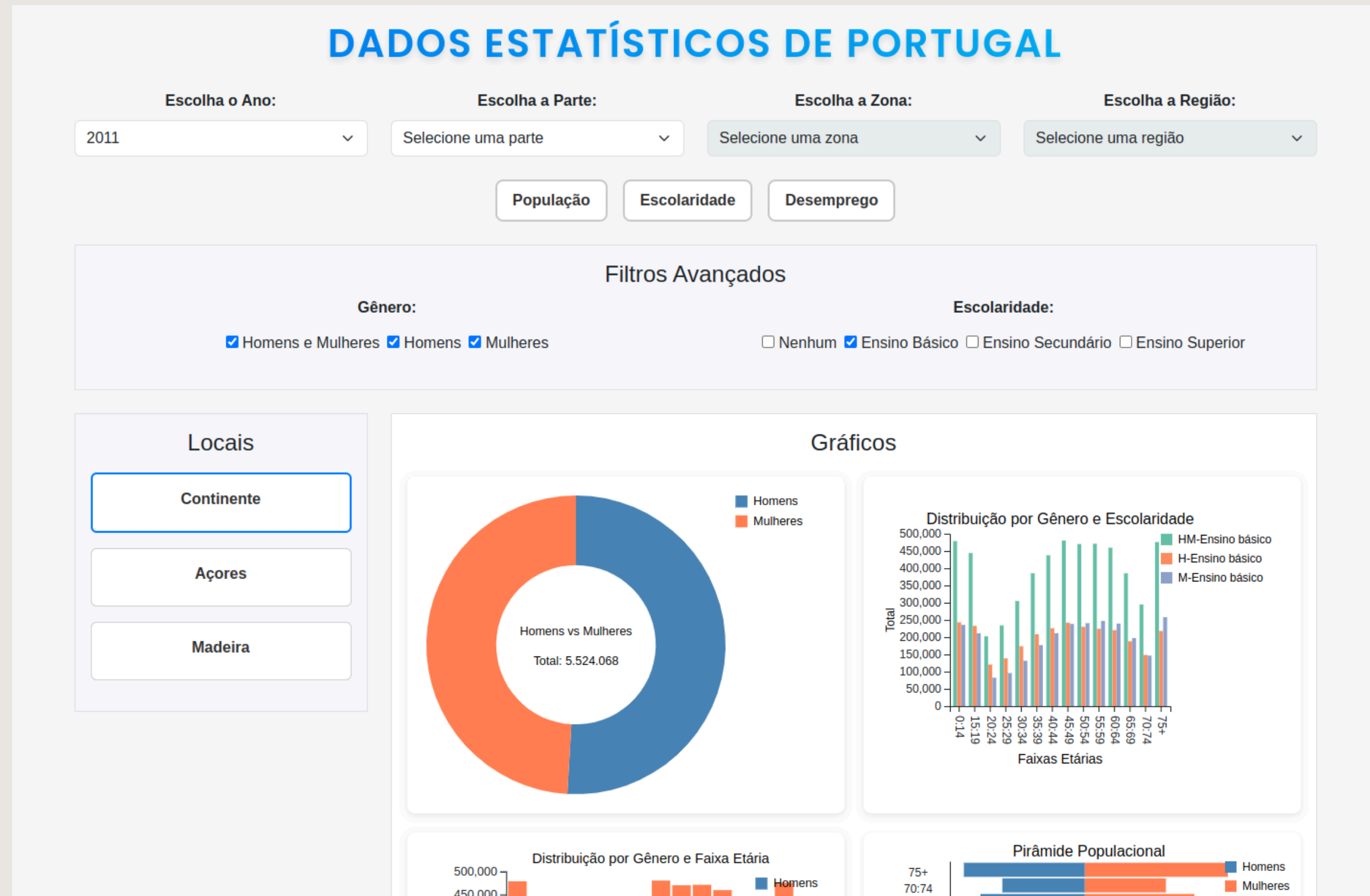
tiagocgomes2003@gmail.com Mudar de conta

Não partilhado

* Indica uma pergunta obrigatória

Género *

○ Masculino

○ Feminino

○ Prefiro não dizer

Functional Prototype

Future Work

Comparison of Data Across Different Years

Enable a feature that allows users to compare data across multiple years, visualizing trends side-by-side or through overlayed charts.

Enhanced Interactivity with Data Export

Introduce data export functionality so users can download charts and datasets in formats like CSV, PDF, or images.

Improved Error Handling and Data Validation

implements mechanisms for handle invalid or missing information.

THANKS!

Any questions?