



**The Islamia University of Bahawalpur**  
**Faculty of Engineering & Technology**  
**Department of Information and Communication Engineering**

**Fall 2025 Semester Project**

<b>Weightage:</b> 20 Theory Sessional Marks 30 Lab Marks
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Course: **Data Structures and Algorithms**      Instructor: **Dr. Asjad Amin**

Title: **Election Data Analysis System using Custom Data Structures in C++**

**Introduction:**

This is an individual project designed to strengthen your understanding of data structures, algorithm design, and complexity analysis through practical implementation in C++. You will design and implement a custom data structure to efficiently store, query, and analyze recent national election results from two assigned countries.

The project aims to blend theory with application by encouraging research, analysis, and software design around real-world data. Each student will research the electoral systems, vote distributions, and key statistics for the two selected countries, summarize findings in written form, and then implement a corresponding data structure that can model, manipulate, and analyze those datasets.

This project will enhance your programming and analytical skills, foster algorithmic thinking, and demonstrate how fundamental data structures apply to civic and political data analysis. Plagiarism, use of AI-generated code without acknowledgment, or copying from peers will result in a zero grade for the entire project.

**Task:**

**1. Country Selection**

Each student will be assigned **two unique countries** to study national elections conducted within the past ten years. A list of eligible countries will be provided. No duplicates are allowed within the same section.

**2. Research and Data Summary**

Prepare a **1–2 page research paper** summarizing key details for each assigned country:

- Election year, system (FPTP / PR / Mixed)
- Major political parties and alliances
- Number of seats and constituencies
- Total votes, turnout percentage, invalid ballots
- Seat distribution and ruling coalition

All data must be cited from **authentic sources** such as official election commissions, international election databases, or trusted research organizations.

### 3. Data Structure Design

Design a **custom data structure** that effectively models and manages the election dataset. Define clear and efficient operations to:

- Insert, update, and retrieve election records
- Compute total votes, turnout, and party-wise vote shares
- Perform comparative analysis between elections
- Generate rankings, trends, and seat allocations

Include an analysis of **time and space complexity** for all implemented operations.

### 4. Implementation in C++

Implement the proposed data structure using **C++17 or later**, ensuring:

- Modular, readable, and well-documented code
- Proper use of OOP principles
- Handling of datasets via structured input (CSV, JSON, or text)
- Unit tests verifying correctness for various scenarios

### 5. Analytical Report in LaTeX

Prepare a **one-page analytical report** in LaTeX, summarizing:

- The two countries analyzed
- The structure and algorithms used
- Core operations and their complexities
- Key results or performance findings (execution time, comparisons, etc.)
- A figure or table illustrating your data structure or analytical results

The report must follow the **prescribed format** and will serve as your final written deliverable.

### 6. Google Scholar Publication (Mandatory)

Each student is **required to publish** their final one-page LaTeX report as part of a **Google Scholar-indexed collection** curated under the course repository.

- The instructor will compile all student reports into a **publicly accessible digital proceedings**, enabling Google Scholar indexing.
- Each report must meet **academic publishing standards** (authorship, abstract, keywords, references, and formatting).
- Students must ensure originality, accuracy, and verifiable citations before submission.
- Reports failing to meet publication quality or citation integrity will not be included and will receive **zero marks for the report component**.
- The final repository link will be shared with the class once indexing is complete.

**Publishing the LaTeX report on the Google Scholar page is mandatory for passing this project.**

### **Final Deliverables:**

- Complete C++ project (source code and build files)
- Research summary report (PDF, 1–2 pages)
- One-page LaTeX analytical report (camera-ready, PDF)
- Confirmation of inclusion in **Google Scholar proceedings**

### **Assessment Criteria:**

Your project will be evaluated based on the following criteria:

- Correctness and efficiency of data structure implementation
- Code structure, clarity, and documentation quality
- Relevance and accuracy of research findings
- Analytical insight in results and performance discussion
- Quality and completeness of the LaTeX report
- Compliance with publication requirements
- Creativity and originality of approach
- Successful publication of the final report on Google Scholar proceedings (Mandatory)

### **Submission Guidelines:**

- Submit a single ZIP file containing:
  - src/ and include/ directories (C++ code)
  - Research summary PDF
  - LaTeX report PDF
- Each file must include your name, student ID, and assigned countries.
- The **LaTeX report must be formatted for publication** and uploaded to the **Google Scholar proceedings repository** by the specified deadline.

### **Important Deadlines:**

<b>Country Assignment:</b>	20 <sup>th</sup> October 2025
<b>Country Wise Election Research Summary Submission:</b>	30 <sup>th</sup> October 2025
<b>Code Implementation &amp; Report Submission:</b>	17 <sup>th</sup> December 2025
<b>Google Scholar Publication:</b>	4 <sup>th</sup> Week of December

## **List of 120 Democratic Countries**

1. Albania
2. Argentina
3. Armenia
4. Australia
5. Austria
6. Bangladesh
7. Barbados
8. Belgium
9. Belize
10. Benin
11. Bhutan
12. Bolivia
13. Botswana
14. Brazil
15. Bulgaria
16. Cabo Verde
17. Canada
18. Chile
19. Colombia
20. Costa Rica
21. Croatia
22. Cyprus
23. Czech Republic
24. Denmark
25. Dominican Republic
26. Ecuador
27. El Salvador
28. Estonia
29. Fiji
30. Finland
31. France
32. Georgia
33. Germany
34. Ghana
35. Greece
36. Guatemala
37. Guyana
38. Honduras
39. Hungary
40. Iceland
41. India
42. Indonesia
43. Ireland
44. Israel
45. Italy
46. Jamaica
47. Japan
48. Jordan
49. Kenya

50. Kiribati
51. Kuwait
52. Kyrgyzstan
53. Latvia
54. Lebanon
55. Lesotho
56. Liberia
57. Lithuania
58. Luxembourg
59. Madagascar
60. Malawi
61. Malaysia
62. Maldives
63. Mali
64. Malta
65. Mauritius
66. Mexico
67. Micronesia
68. Moldova
69. Mongolia
70. Montenegro
71. Namibia
72. Nauru
73. Nepal
74. Netherlands
75. New Zealand
76. Nicaragua
77. Nigeria
78. North Macedonia
79. Norway
80. Pakistan
81. Palau
82. Panama
83. Papua New Guinea
84. Paraguay
85. Peru
86. Philippines
87. Poland
88. Portugal
89. Romania
90. Samoa
91. Senegal
92. Serbia
93. Seychelles
94. Sierra Leone
95. Singapore
96. Slovakia
97. Slovenia
98. Solomon Islands
99. South Africa
100. South Korea
101. Spain

102. Sri Lanka
103. Suriname
104. Sweden
105. Switzerland
106. Taiwan
107. Tanzania
108. Thailand
109. Timor-Leste
110. Togo
111. Tonga
112. Trinidad and Tobago
113. Tunisia
114. Turkey
115. Ukraine
116. United Kingdom
117. United States
118. Uruguay
119. Vanuatu
120. Zambia