

Advanced data visualization

Experiment-8

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Aim: To design interactive dashboards and create visual storytelling using D3.js on a dataset related to Environment/Forest cover, covering basic and advanced charts

Dataset: The dataset contains information about California fire incidents with the following key attributes:

1. **AcresBurned:** The total area affected by the fire in acres.
2. **Active:** Indicates if the fire is still active (True/False).
3. **AdminUnit:** The administrative unit responsible for managing the fire.
4. **AirTankers:** Number of air tankers used in firefighting (if applicable).
5. **ArchiveYear:** The year when the fire was archived.
6. **CalFireIncident:** Identifies if the incident was handled by CAL FIRE (True/False).
7. **CanonicalUrl:** The URL for detailed information about the incident.
8. **ConditionStatement:** Provides specific conditions during the fire, if available.
9. **ControlStatement:** Statement about containment and control efforts.
10. **Counties:** The county or counties affected by the fire.
11. **CountyIds:** The IDs corresponding to the counties affected.
12. **CrewsInvolved:** Number of firefighting crews involved.
13. **Dozers:** Number of bulldozers used during the incident.
14. **Engines:** Number of fire engines involved in managing the fire.
15. **Extinguished:** The date and time when the fire was extinguished.
16. **Fatalities:** Number of fatalities due to the fire.
17. **Featured:** Indicates if the fire incident was a featured event.
18. **Final:** Whether the incident's status is marked as final.
19. **FuelType:** Type of fuel (vegetation, etc.) involved in the fire.
20. **Helicopters:** Number of helicopters used in the fire response.
21. **Injuries:** Number of injuries reported.
22. **Latitude:** The latitude coordinate where the fire occurred.
23. **Location:** The location description of the fire.
24. **Longitude:** The longitude coordinate where the fire occurred.
25. **MajorIncident:** Specifies if the fire was classified as a major incident.

26. **Name:** The name of the fire incident.
27. **PercentContained:** The percentage of the fire that was contained.
28. **PersonnelInvolved:** The total number of personnel involved in the fire response.
29. **Public:** Whether the fire information is publicly accessible.
30. **SearchDescription:** A description for search purposes.
31. **SearchKeywords:** Keywords associated with the fire incident for search purposes.
32. **Started:** The date and time when the fire started.
33. **Status:** The current status of the fire (e.g., Finalized).
34. **StructuresDamaged:** The number of structures damaged by the fire.
35. **StructuresDestroyed:** The number of structures destroyed by the fire.
36. **StructuresEvacuated:** Number of structures evacuated during the fire.
37. **StructuresThreatened:** Number of structures under threat during the fire.
38. **Uniqueld:** A unique identifier for the fire incident.
39. **Updated:** The date and time when the incident information was last updated.
40. **WaterTenders:** Number of water tenders involved in the firefighting.

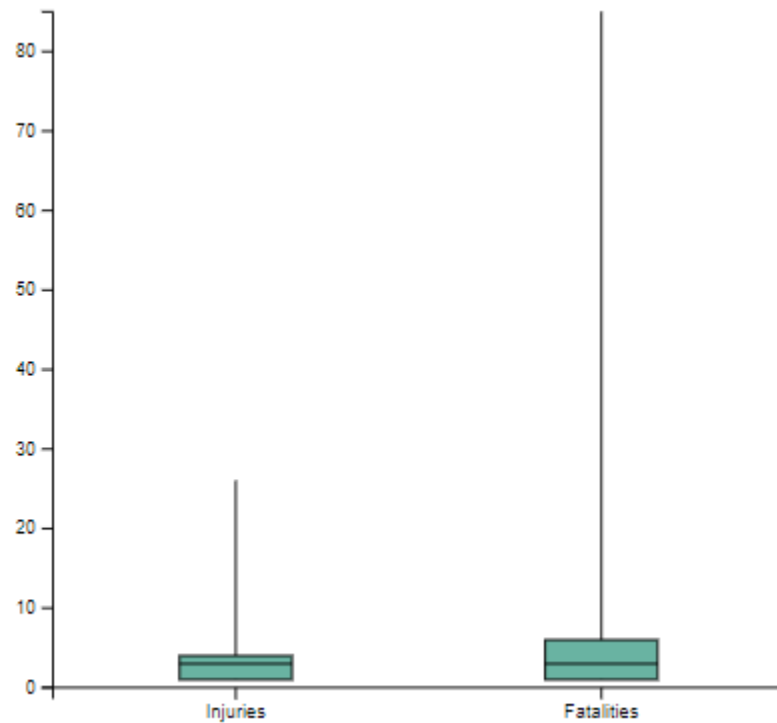
Charts and analysis:

1. Word Cloud of Counties:



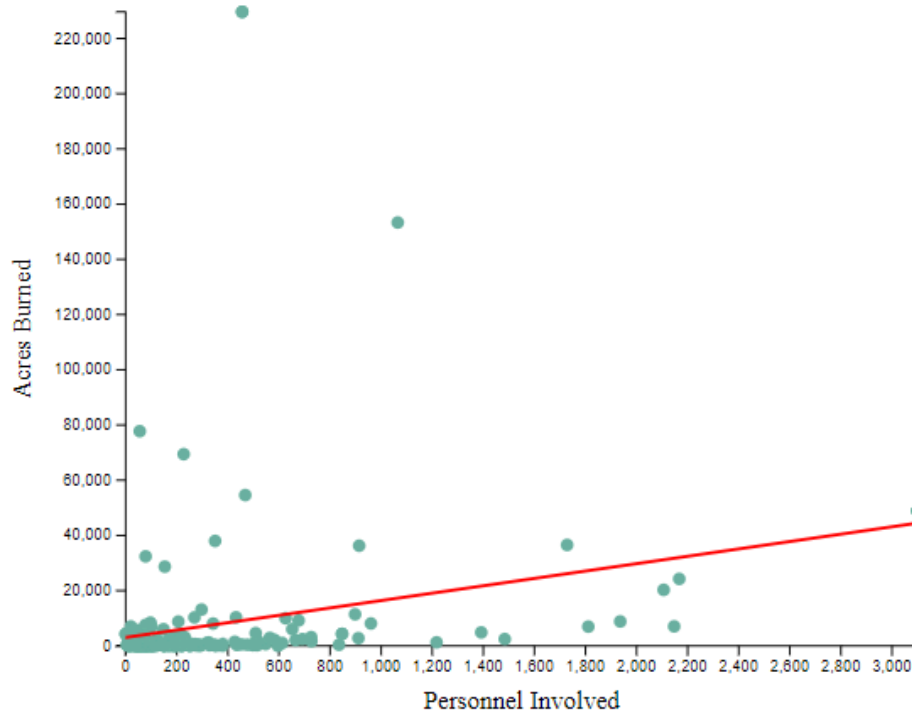
- This word cloud visualizes the names of counties affected by fire incidents. The size of the words indicates the frequency or prominence of fires within these counties.
- From the word cloud, we can infer that **Placer** and **San Joaquin** counties have been significantly affected by fire incidents, as these names appear larger compared to others like **Santa Cruz**, **Kings**, and **San Mateo**.
- This visualization is helpful for quickly identifying the most affected areas and could assist in focusing resources or further research on these high-risk regions.

2. Box Plot of Injuries and Fatalities:



- This box plot compares the distribution of injuries and fatalities caused by fires.
- The box plot shows that while the majority of both injuries and fatalities remain relatively low, there are notable outliers (as seen by the points above the whiskers), indicating extreme cases where a significantly higher number of injuries or fatalities occurred.
- The **median** for both injuries and fatalities is relatively low, suggesting that most fire incidents result in few casualties, but the range shows potential for much higher damage in certain cases.
- The presence of outliers indicates the need for more resources and attention to those exceptional fire incidents that result in a higher human toll.

3. Regression Plot of Acres Burned vs. Personnel Involved:



- This regression plot depicts the relationship between the number of personnel involved in firefighting efforts and the total acres burned in fire incidents.
- There is a slight positive trend (represented by the red regression line), suggesting that larger fires generally require more personnel to contain and manage. However, the data points are widely scattered, indicating that the relationship is not strictly linear.
- Some fires burned large areas (e.g., over 220,000 acres) with relatively fewer personnel involved, which could reflect the difficulty in mobilizing resources quickly or the location and conditions of the fire (e.g., remote areas).
- On the other hand, there are instances where a large number of personnel were involved in fires that affected smaller areas, possibly indicating more proactive measures or different strategies in fire management.
- This chart helps to understand the resource allocation in relation to fire size and could be useful for optimizing personnel deployment for future incidents.

Conclusion: In this lab, we created an interactive dashboard using D3.js for data visualization on an Environment/Forest cover dataset. We explored both basic and advanced chart types and built a storytelling dashboard to provide insights into forest cover trends and distributions. D3.js is a powerful library for creating dynamic, interactive data visualizations. By implementing various chart types, we could extract meaningful insights about forest cover, trends, and patterns.