ACCESS TO TECHNOLOGY

Knoxicle: AccessGuru - Accessibility Insights

Analyzing Web Accessibility Violations (WCAG 2.1)

Total Violations	Unique Pages	Critical Errors	Avg Severity
3524	591	475	3.55

By Knoxicle (Kannika Armstrong)

DUBSTECH Information School APPLIED ANALYTICS
DATATHON
the 7th data hackathon

Machine Learning & Risk Modeling

Model Accuracy: **97.4%**

Margin of Error: **±0.3%**

How the AI Model Works (The Pipeline)

Predict Violation Impact

Select attributes to estimate how severe a web accessibility violation will be.

Industry/Domain: e-commerce

Violation Category: Layout

Specific Violation: avoid-inline-spacing

Run AI Prediction

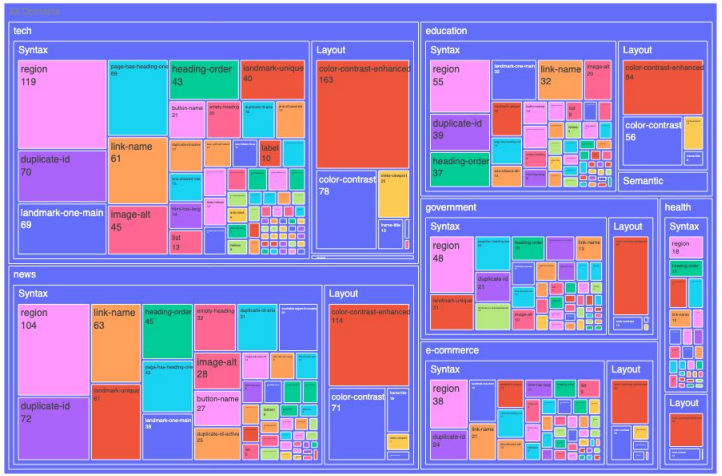
Prediction Result: SERIOUS

Analysis Summary:

- **Domain:** e-commerce
- **Violation Category:** Layout
- **Violation Name:** `avoid-inline-spacing`

The AI model determined that this specific configuration typically results in a **serious** impact on digital accessibility.

Hierarchical View of Accessibility Failures



Projects Agendas

- Data Analytics and Data Visualization
- Machine Learning / Predictive Modeling

Live Demo: https://accessguru-knoxicle.streamlit.app/

GitHub Repo: https://github.com/A-Kannika/DubsTech-Datathon-2026-Knoxicle

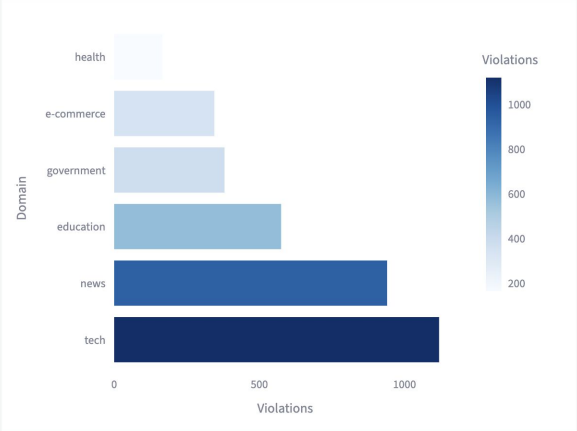
Answering questions: Data Analytics and Data Visualization (1)

Q: Which domains have the highest number of accessibility violations?
A: Tech domain.

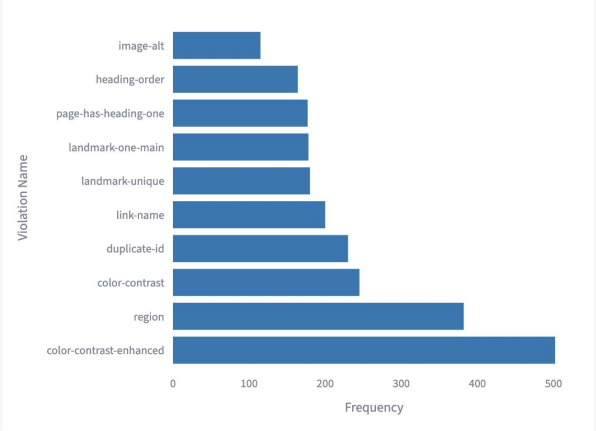
Q: What violation types are most common across sites or domains?
A: Syntax.

Q: Are there patterns in violations by violation category?
A: Yes.

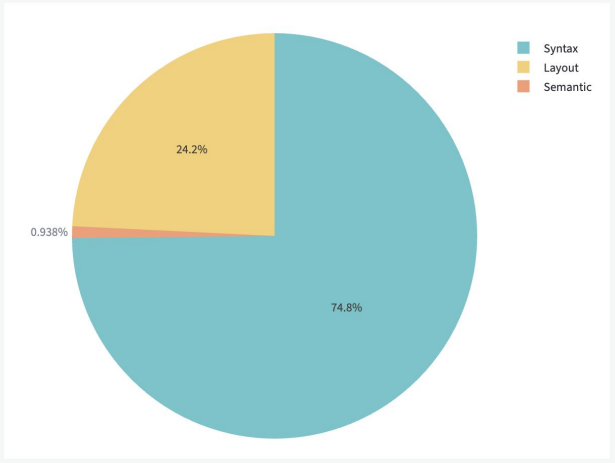
Violations by Domain



Most Frequent Violation Types



Violation Category Split



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Answering questions: Data Analytics and Data Visualization (2)

Q: Identify websites/pages with the most severe accessibility issues.
A: https://www.pluralsight.com/.

Q: Examine invisible barriers: e.g., are certain violations more common on government sites than on e-commerce sites?

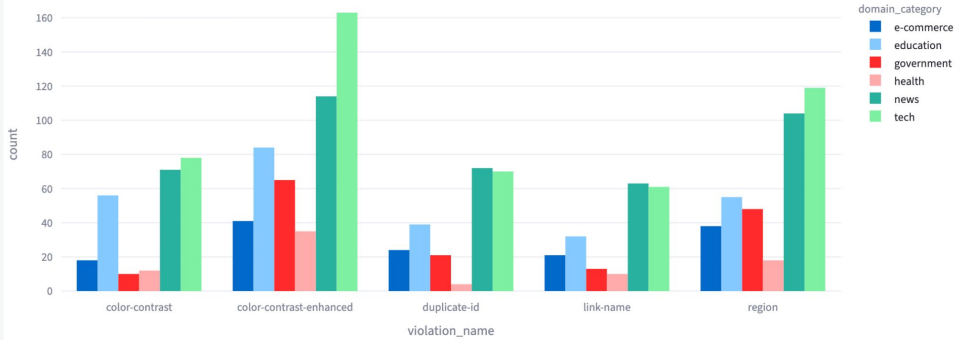
Top 10 Inaccessible Pages

Rank	web_URL	total_severity	error_count
1	https://www.pluralsight.com	258	69
2	https://www.coursera.org	153	45
3	https://www.edx.org	153	39
4	https://arstechnica.com/health/	124	36
5	https://arstechnica.com/science/	124	36
6	https://arstechnica.com/gadgets/	124	36
7	https://www.geeksforgeeks.org	96	28
8	https://www.spss.com	70	18
9	https://www.cloudacademy.com	66	17
10	https://www.tampabay.com	58	16

Compare Invisible Barriers

Pick domains to compare side-by-side:

government × news × tech × e-commerce × education × health ×



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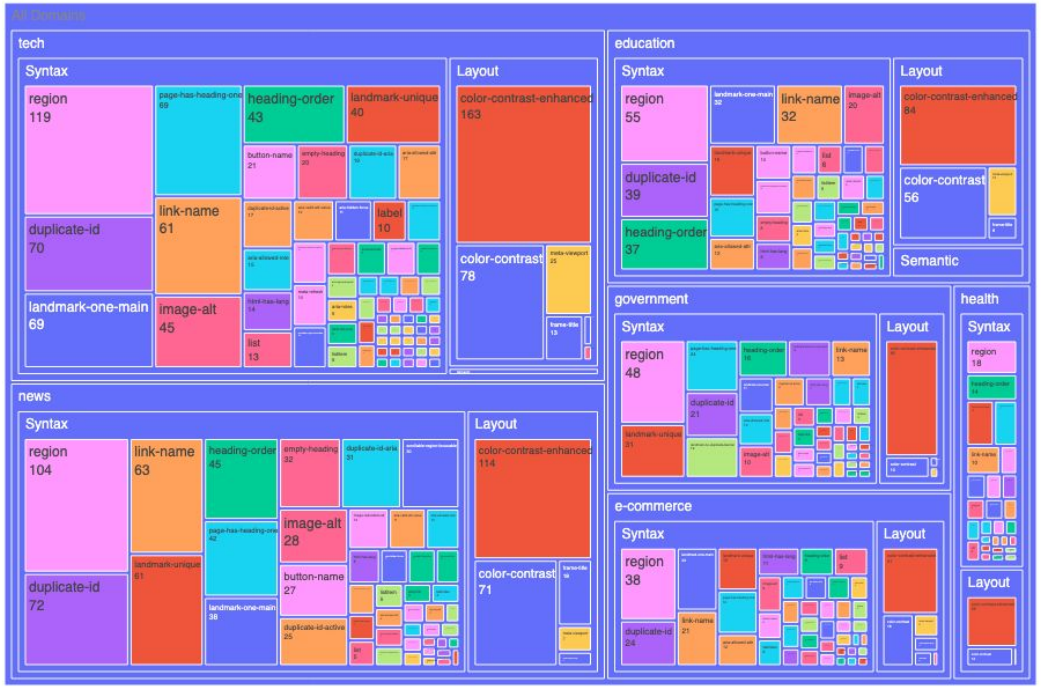
Answering questions: Data Analytics and Data Visualization (3)

Q: Create visualizations showing where technology fails: heatmaps of violations, bar charts by domain, or trend analyses.

Violation Density Heatmap

Hierarchical View of Accessibility Failures



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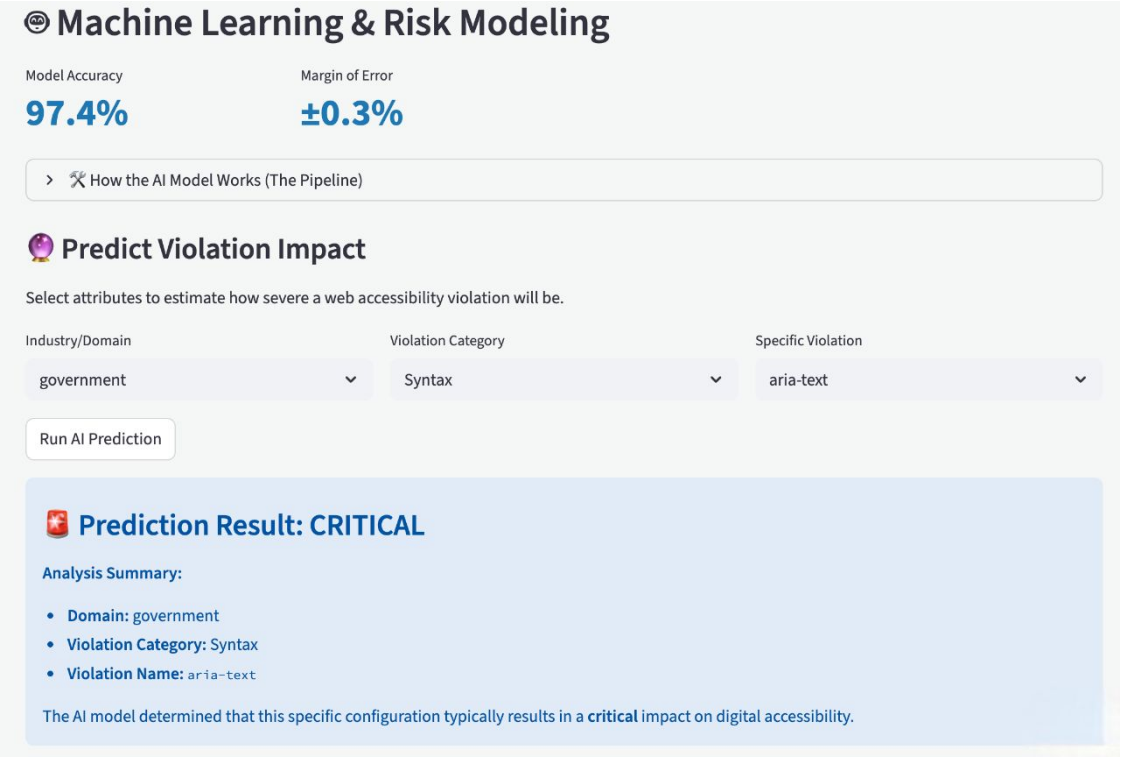
Machine Learning / Predictive Modeling (1)

📉 Model Performance & Validation

To ensure the reliability of our accessibility risk predictions, we validated the model using an 80/20 train-test split:

- Algorithm: Random Forest Classifier (100 Estimators)
- Model Accuracy: 97.4% (Calculated via Mean Accuracy on unseen test data)
- Margin of Error: ±0.3%
- Validation Method: Hold-out validation to prevent overfitting and ensure the model generalizes well to new, unseen websites.

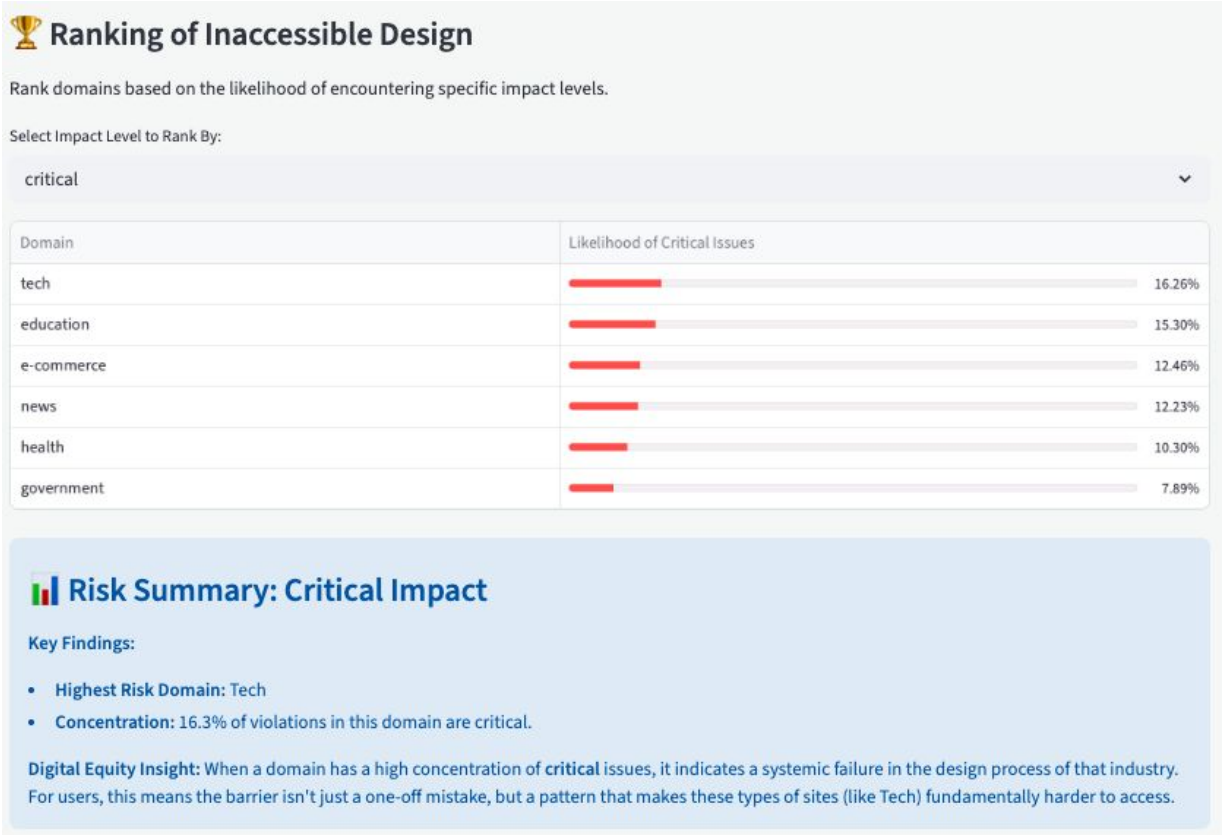


Machine Learning / Predictive Modeling (2)

Q: Cluster websites based on similarity in violation patterns to identify “high-risk” domains.

Machine Learning / Predictive Modeling (3)

Q: Rank domains or pages by likelihood of inaccessible design.



Ranking of Inaccessible Design

Rank domains based on the likelihood of encountering specific impact levels.

Select Impact Level to Rank By:

critical

Domain	Likelihood of Critical Issues
tech	16.26%
education	15.30%
e-commerce	12.46%
news	12.23%
health	10.30%
government	7.89%

Risk Summary: Critical Impact

Key Findings:

- **Highest Risk Domain:** Tech
- **Concentration:** 16.3% of violations in this domain are critical.

Digital Equity Insight: When a domain has a high concentration of **critical** issues, it indicates a systemic failure in the design process of that industry. For users, this means the barrier isn't just a one-off mistake, but a pattern that makes these types of sites (like Tech) fundamentally harder to access.