NORTHEASTERN UNIVERSITY
ITC 6040 Winter 2024

Signature Assignment 1 (Team Final Project Report)

By Team 2-2

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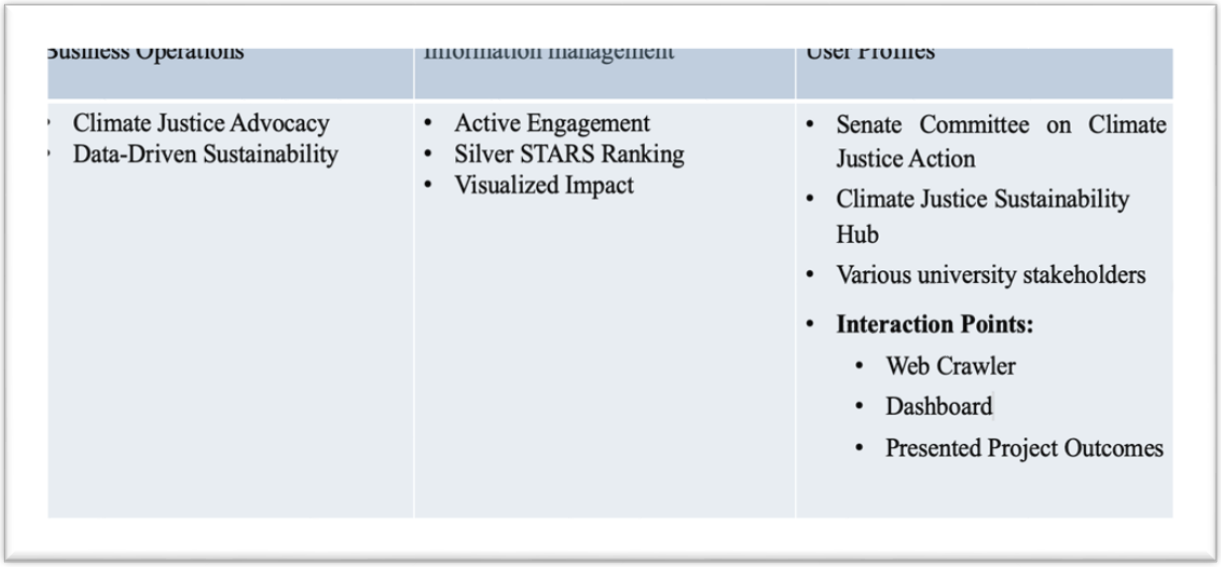
SECTION 1 (PROJECT REQUIREMENT, METHODS, AND GOALS)

- **Background of the project (A simple description of what your sponsor's public profile, business model, stakeholders, and business operations)**

Mikhail Oet is an Associate Teaching Professor at Northeastern University, holding a Ph.D. in Designing Sustainable Systems. With diverse degrees from Yale and Harvard in Architecture, Cooper Union in Engineering, and New York University in Finance, he brings extensive expertise to his role in commerce, economic development, and sustainable systems.

Megan Curtis-Murphy, Northeastern University's Sustainability Manager since December 2021, previously spearheaded climate initiatives as the Senior Sustainability Coordinator for the City of Issaquah, WA. With a background in political science and public administration, she is dedicated to advancing climate justice and sustainability within the Northeastern community.



Business Operations	Information Management	User Profiles

• Climate Justice Advocacy
• Data-Driven Sustainability
	• Active Engagement
	• Silver STARS Ranking
	• Visualized Impact
		• Senate Committee on Climate Justice Action
		• Climate Justice Sustainability Hub
		• Various university stakeholders
		• **Interaction Points:**
		  • Web Crawler
		  • Dashboard
		  • Presented Project Outcomes

- **Project requirement, IT (Information Technology) issues and problems identified (Describe what your sponsors' requirements are like, and what IT issues and problems you have observed)**

Project Requirement:

The primary requirement is to develop an interactive dashboard that visually represents the interconnectedness of course syllabi and course catalog related to sustainability and climate justice at Northeastern University. This dashboard should provide users with a clear understanding of how these elements are linked and their impact on the university's sustainability initiatives.

IT Issues and Problems Identified:

1. Formatting Issue: One of the major IT issues observed is related to formatting discrepancies due to variations in timelines and file formats. This poses a challenge in integrating data from different sources into the dashboard seamlessly. For example, data from different time periods and in different file formats (e.g., CSV, Excel, PDF) needed to be incorporated, it led to inconsistencies and difficulties in data processing.

2. Data Volume and Cleaning: Handling a large volume of data is another challenge, with approximately 2500 PDFs and data spanning over 20 semesters. This requires robust data cleaning processes to ensure consistency and accuracy in the dashboard visualization.

3. Inconsistent Data: Inconsistent data across various sources poses a significant problem in data analysis and visualization. This inconsistency could stem from differences in data collection methods, terminology, or categorization. Resolving these inconsistencies is crucial to ensure the reliability and validity of the information presented in the dashboard.

Addressing these IT issues and problems was essential to ensure the successful development and implementation of the interactive dashboards as per the project requirements. This involved employing data integration techniques, robust data cleaning algorithms, and effective data validation processes to handle the challenges posed by formatting issues, data volume, and inconsistency.

- **Research and technical methods you employed (Please specify with details about what exactly the research methods you used, and ALL technical tools you have adopted to get the final results, considering this report as a written document you will pass this project to next new team to carry on)**

We used a thorough strategy that included course catalogs from 2022 in addition to syllabi in our effort to examine data from Northeastern CPS (College of Professional Studies). We sought to identify themes, patterns, and thematic emphases in the curriculum landscape using a combination of technical tools and research methodologies. This report outlines our approach, which included analyzing course catalogues, identifying keywords, and utilizing Tableau to create interactive visuals.

Research Methods:

We used a qualitative approach to analyze the course catalogs that Northeastern CPS offered. To find recurring themes, important subjects, and areas of interest in various courses and programs, we performed content analysis. We also looked at program offerings, enrollment patterns, and institutional priorities as they were represented in the course catalogues. We made use of a variety of technological tools and libraries in order to carry out our analysis efficiently, including:

- Web scraping: To methodically gather PDF files with course catalogs from the Northeastern CPS website, we utilized web scraping techniques. This automated method made it easier to collect a large amount of data for analysis.

- PDF Text Extraction: To parse through the material and extract pertinent information, like course titles, descriptions, and program data, we retrieved text from the PDF course catalogues using libraries like pdfplumber.

- Regular Expressions: The course catalogues' text was searched for and flagged for keywords using regular expressions. This gave us the opportunity to perform keyword research and learn more about the curriculum's main themes, which include social justice, sustainability, and the environment.

- Data structuring: Course titles, descriptions, program names, program levels, and metadata were included into a dataset consisting of defined columns and rows derived from the extracted data from the course catalogues. Subsequent analysis and visualization were made easier by this methodical approach.

- Tableau: By combining data from course catalogs and syllabi, we were able to generate dynamic dashboards and interactive visuals. A thorough picture of the curricular landscape's thematic emphasis, program offers, and enrollment trends was given by these visualizations.

Creating a Tableau Dashboard:

Several crucial processes were required in creating Tableau dashboards:

- Data Connection: We established a connection between Tableau and the structured dataset that had the data that was taken out of course catalogs and syllabi. This dataset contained details from both sources, including program details, course titles, descriptions, and keyword analysis findings.

- Dashboard Design: To illustrate several parts of the combined data, such as enrollment trends, program options, and thematic emphases, interactive dashboards were created using Tableau. Stakeholders may interactively examine the data thanks to the dynamic and user-friendly design of these dashboards.

Integration of CSV Files:

We used a similar procedure to add CSV files in Tableau as we did with the PDF data:

- Data Connection: Tableau was linked to the CSV files that held extra information, like the outcomes of keyword analyses or metadata from course catalogs and syllabi.

- Data Blending: The extracted syllabi and course catalogue data were combined with the CSV files to create the primary dataset. This improved the breadth and depth of our analysis by enabling us to effortlessly integrate several data sources within Tableau.

- Visualization Integration: We included the extra data into our dashboards and visualizations after connecting the CSV files to Tableau. This made it possible for us to include findings from keyword research and other studies in the data's overall presentation.

SECTION 2 (PROJECT OUTCOME)

- **Present your research findings, website design, algorithm test results.**

Research Findings

In the context of visualizing sustainability and climate justice efforts within a university setting, our research endeavors focused on extracting syllabi data and developing a dashboard to showcase the university's initiatives in these areas.

Methodology

We employed a systematic approach to extract relevant data from PDF syllabi using Python. The algorithmic process involved:

Reading PDF Files: Leveraging Python libraries such as PyPDF2 or pdfplumber to extract text from PDF syllabi files.

Keyword Matching: Defining a list of keywords related to sustainability and climate justice efforts.

Search Algorithm: Implementing a search algorithm to scan through syllabi text and identify instances of the specified keywords.

Extracting Relevant Data: For each syllabus, extracting sections of text containing the identified keywords and surrounding context.

Aggregating Data: Aggregating the extracted data into a structured format (e.g., CSV file) for further analysis and visualization.

Findings and Recommendations

Based on the data collected, we found:

Descriptive Analytics: Historical data provided insights into past sustainability efforts at the university. Visualizations included bar charts, line graphs, and pie charts, showcasing trends and distributions over time.

Diagnostic Analytics: Examination of data revealed causal relationships between different sustainability metrics. Heat maps and correlation matrices were employed to visualize these relationships effectively.

Dashboard Design

Our dashboard design incorporated interactive elements tailored to the needs of the Senate Committee on Climate Justice Action and the Climate Justice and Sustainability Hub, as well as potential users.

Key features include:

Filters: Users can view data by courses, matching keywords, and the count of keywords, enhancing flexibility in data exploration.

Drill-down Capabilities: Interactive elements allow users to click on visualization components to access more detailed data, facilitating deeper analysis.

Recommendations

In designing the dashboard and selecting analytics models, we prioritized alignment with the university's mission towards sustainability and climate justice. Additionally, we ensured that the chosen methodologies support the university's aspirations for higher rankings in global sustainability assessments like STARS (Sustainability Tracking, Assessment & Rating System).

By implementing these findings and recommendations, the university can effectively showcase its commitment to sustainability and climate justice through a visually engaging and informative dashboard.

- **If your team designed a website (including prototype), dashboard, web tools, or other type of the information product, please include a link and representative screen shots in your final documents.**

Dashboard

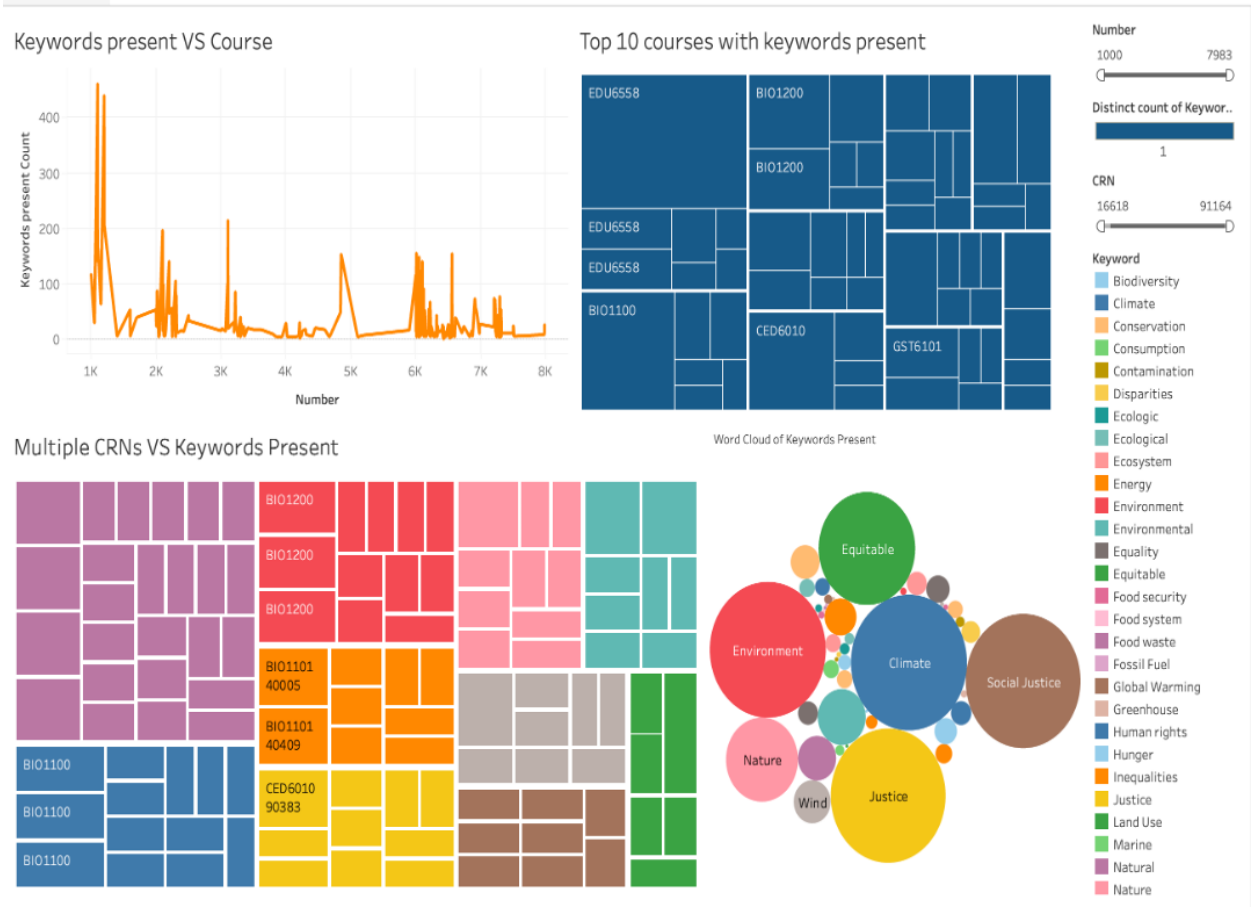


Fig.1: Course Syllabi Dashboard

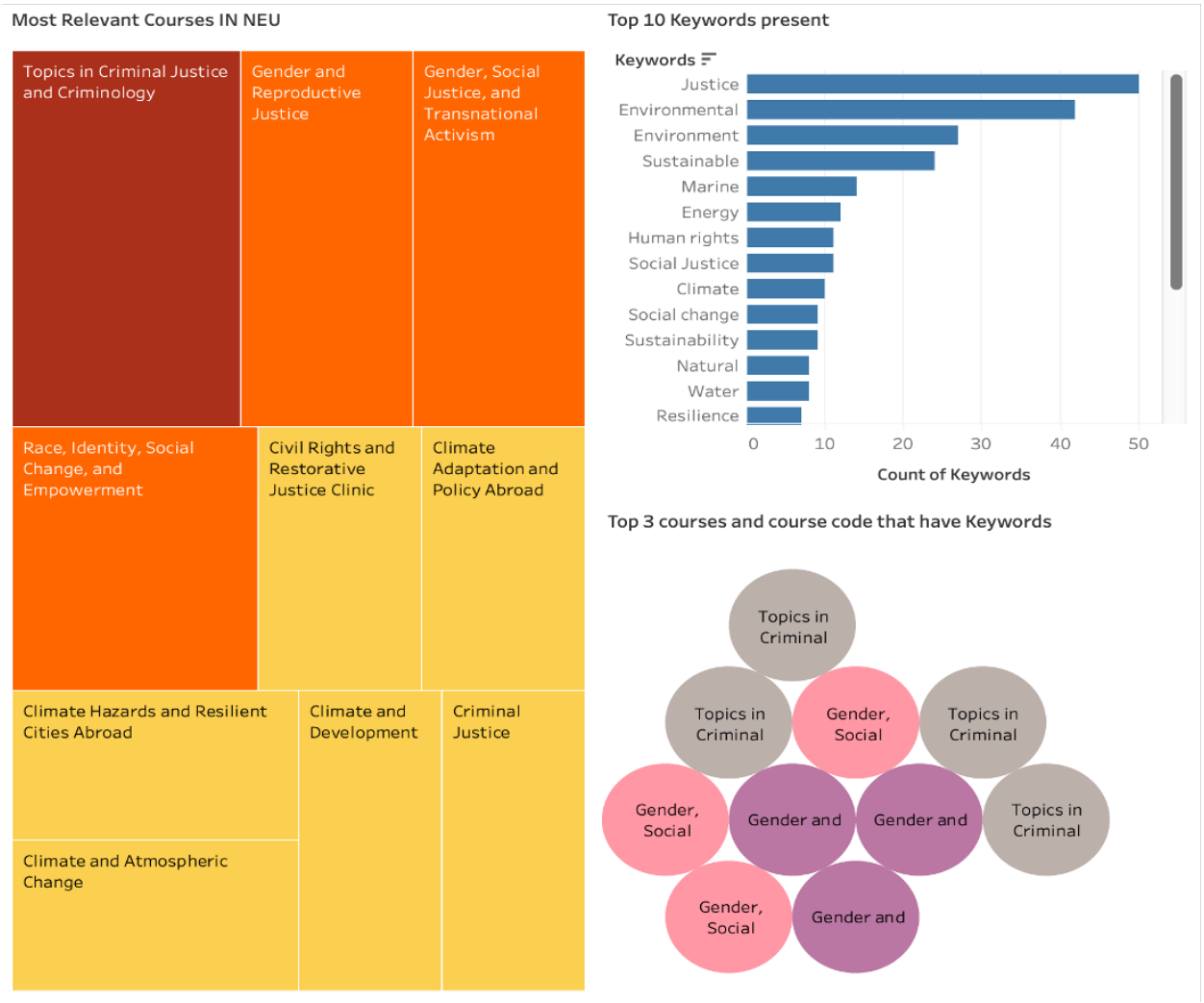


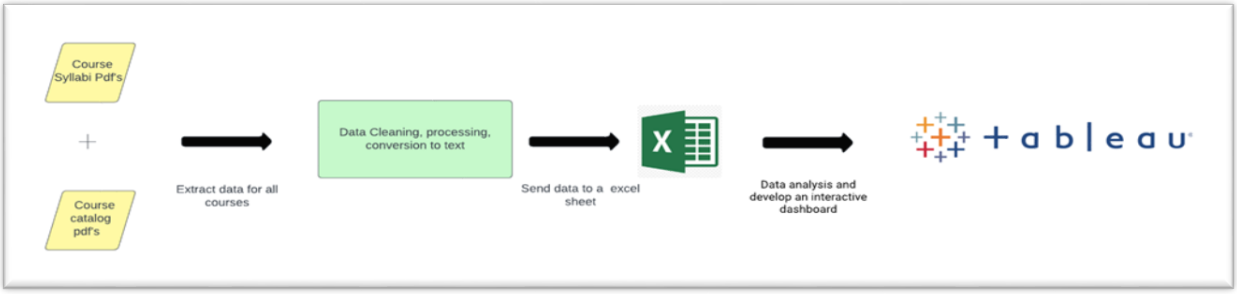
Fig.2: Course Catalog Dashboard

- **If your team collected data and conducted analysis, write about your research findings.**

Research Methods

- Extracting PDFs: Utilizing programming scripts to retrieve data and information from PDF documents, enabling access to text and metadata contained within these files for further analysis.
- Working with text files: Engaging in tasks involving manipulation, processing, or analysis of textual data stored in text file formats, which may include parsing, cleaning, or transforming text-based information for various purposes such as data mining or natural language processing.

- Writing code with best time complexity: Developing software code or algorithms with a focus on optimizing time efficiency, aiming to minimize computational resources and execution time required for performing tasks, ultimately enhancing performance and scalability.
- Visualizing data: Creating graphical representations of data sets using visualization tools like Tableau allows for easier interpretation, analysis, and communication of complex data patterns, trends, or relationships.
- Fulfilling sponsor expectations: Meeting and exceeding the requirements, goals, and objectives set forth by the project sponsor, ensuring that deliverables and outcomes align with their vision and contribute effectively to addressing their needs or challenges.



- **If your team worked on testing algorithm, present your test results, and how you have adjusted each algorithm.**

Algorithm Testing and Adjustments

PDF Syllabi Data Extraction Algorithm

Test Results: We tested our PDF syllabi data extraction algorithm to ensure it accurately identifies relevant information about sustainability and climate justice efforts from course documents.

Here are our findings:

Read PDF Files: The Python libraries PyPDF2 and pdfplumber effectively extracted text from PDF syllabi files with a high degree of accuracy.

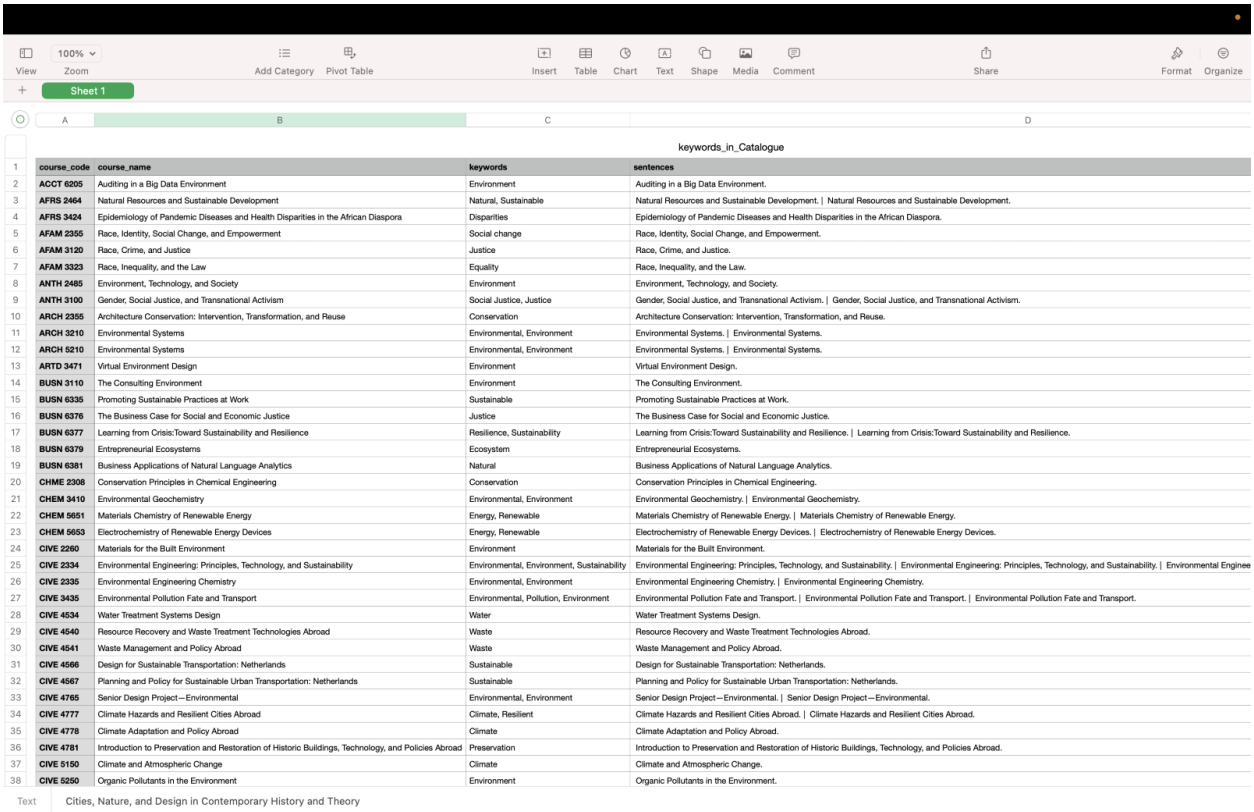
Keyword Matching: Our defined list of keywords related to sustainability and climate justice, such as "sustainability," "climate change," and "environmental justice," successfully identified relevant sections within the syllabi.

Search Algorithm: The implemented search algorithm efficiently scanned through syllabi text to locate instances of the specified keywords, ensuring comprehensive coverage.

Extracted Data: We successfully extracted sections of text containing the identified keywords, along with surrounding context, to provide meaningful insights into the university's initiatives.

Adjustments: Based on our test results, we made the following adjustments to optimize the algorithm's performance:

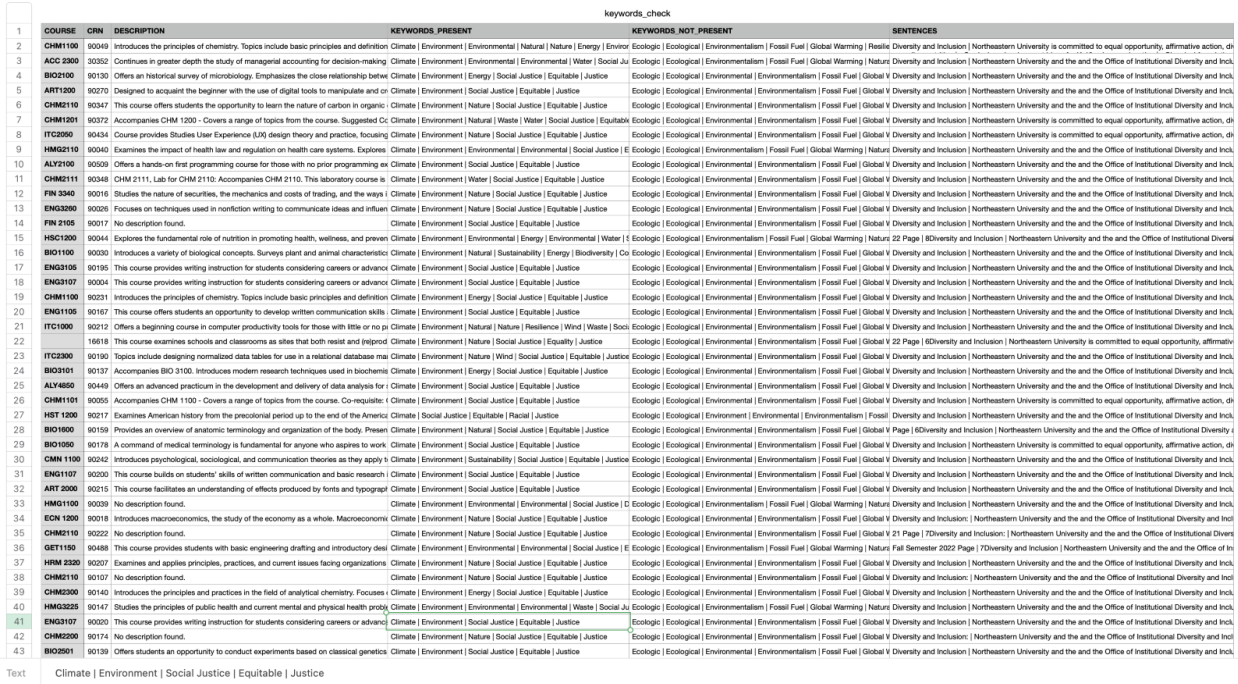
Refinement of Keyword List: We expanded our list of keywords to include additional terms commonly associated with sustainability and climate justice efforts to enhance the algorithm's sensitivity.



keywords_in_Catalogue

	course_code	course_name	keywords	sentences
2	ACCT 6205	Auditing in a Big Data Environment	Environment	Auditing in a Big Data Environment.
3	AFRS 2464	Natural Resources and Sustainable Development	Natural, Sustainable	Natural Resources and Sustainable Development. | Natural Resources and Sustainable Development.
4	AFRS 3424	Epidemiology of Pandemic Diseases and Health Disparities in the African Diaspora	Disparities	Epidemiology of Pandemic Diseases and Health Disparities in the African Diaspora.
5	AFAM 2355	Race, Identity, Social Change, and Empowerment	Social change	Race, Identity, Social Change, and Empowerment.
6	AFAM 3120	Race, Crime, and Justice	Justice	Race, Crime, and Justice.
7	AFAM 3323	Race, Inequality, and the Law	Equality	Race, Inequality, and the Law.
8	ANTH 2485	Environment, Technology, and Society	Environment	Environment, Technology, and Society.
9	ANTH 3100	Gender, Social Justice, and Transnational Activism	Social Justice, Justice	Gender, Social Justice, and Transnational Activism. | Gender, Social Justice, and Transnational Activism.
10	ARCH 2355	Architecture Conservation: Intervention, Transformation, and Reuse	Conservation	Architecture Conservation: Intervention, Transformation, and Reuse.
11	ARCH 3210	Environmental Systems	Environmental, Environment	Environmental Systems. | Environmental Systems.
12	ARCH 5210	Environmental Systems	Environmental, Environment	Environmental Systems. | Environmental Systems.
13	ARTD 3471	Virtual Environment Design	Environment	Virtual Environment Design.
14	BUSN 3110	The Consulting Environment	Environment	The Consulting Environment.
15	BUSN 6335	Promoting Sustainable Practices at Work	Sustainable	Promoting Sustainable Practices at Work.
16	BUSN 6376	The Business Case for Social and Economic Justice	Justice	The Business Case for Social and Economic Justice.
17	BUSN 6377	Learning from Crisis:Toward Sustainability and Resilience	Resilience, Sustainability	Learning from Crisis:Toward Sustainability and Resilience. | Learning from Crisis:Toward Sustainability and Resilience.
18	BUSN 6379	Entrepreneurial Ecosystems	Ecosystem	Entrepreneurial Ecosystems.
19	BUSN 6381	Business Applications of Natural Language Analytics	Natural	Business Applications of Natural Language Analytics.
20	CHME 2308	Conservation Principles in Chemical Engineering	Conservation	Conservation Principles in Chemical Engineering.
21	CHEM 3410	Environmental Geochemistry	Environmental, Environment	Environmental Geochemistry. | Environmental Geochemistry.
22	CHEM 5651	Materials Chemistry of Renewable Energy	Energy, Renewable	Materials Chemistry of Renewable Energy. | Materials Chemistry of Renewable Energy.
23	CHEM 5653	Electrochemistry of Renewable Energy Devices	Energy, Renewable	Electrochemistry of Renewable Energy Devices. | Electrochemistry of Renewable Energy Devices.
24	CIVE 2260	Materials for the Built Environment	Environment	Materials for the Built Environment.
25	CIVE 2334	Environmental Engineering: Principles, Technology, and Sustainability	Environmental, Environment, Sustainability	Environmental Engineering: Principles, Technology, and Sustainability. | Environmental Engineering: Principles, Technology, and Sustainability. | Environmental Enginee
26	CIVE 2335	Environmental Engineering Chemistry	Environmental, Environment	Environmental Engineering Chemistry. | Environmental Engineering Chemistry.
27	CIVE 3435	Environmental Pollution Fate and Transport	Environmental, Pollution, Environment	Environmental Pollution Fate and Transport. | Environmental Pollution Fate and Transport. | Environmental Pollution Fate and Transport.
28	CIVE 4534	Water Treatment Systems Design	Water	Water Treatment Systems Design.
29	CIVE 4540	Resource Recovery and Waste Treatment Technologies Abroad	Waste	Resource Recovery and Waste Treatment Technologies Abroad.
30	CIVE 4541	Waste Management and Policy Abroad	Waste	Waste Management and Policy Abroad.
31	CIVE 4566	Design for Sustainable Transportation: Netherlands	Sustainable	Design for Sustainable Transportation: Netherlands.
32	CIVE 4567	Planning and Policy for Sustainable Urban Transportation: Netherlands	Sustainable	Planning and Policy for Sustainable Urban Transportation: Netherlands.
33	CIVE 4765	Senior Design Project—Environmental	Environmental, Environment	Senior Design Project—Environmental. | Senior Design Project—Environmental.
34	CIVE 4777	Climate Hazards and Resilient Cities Abroad	Climate, Resilient	Climate Hazards and Resilient Cities Abroad. | Climate Hazards and Resilient Cities Abroad.
35	CIVE 4778	Climate Adaptation and Policy Abroad	Climate	Climate Adaptation and Policy Abroad.
36	CIVE 4781	Introduction to Preservation and Restoration of Historic Buildings, Technology, and Policies Abroad	Preservation	Introduction to Preservation and Restoration of Historic Buildings, Technology, and Policies Abroad.
37	CIVE 5150	Climate and Atmospheric Change	Climate	Climate and Atmospheric Change.
38	CIVE 5250	Organic Pollutants in the Environment	Environment	Organic Pollutants in the Environment.

Text | Cities, Nature, and Design in Contemporary History and Theory



keywords_check

	COURSE	CRN	DESCRIPTION	KEYWORDS_PRESENT	KEYWORDS_NOT_PRESENT	SENTENCES
2	CHM1100	90049	Introduces the principles of chemistry. Topics include basic principles and definition	Climate | Environment | Environmental | Natural | Nature | Energy | Enviror	Ecologic | Ecological | Environmentalism | Fossil Fuel | Global Warming | Resilie	Diversity and Inclusion | Northeastern University is committed to equal opportunity, affirmative action, di
3	ACC 2300	30352	Continues in greater depth the study of managerial accounting for decision-making	Climate | Environment | Environmental | Environmental | Water | Social Ju	Ecologic | Ecological | Environmentalism | Fossil Fuel | Global Warming | Nature	Diversity and Inclusion | Northeastern University and the and the Office of Institutional Diversity and Incl
4	BIO2100	90130	Offers an historical survey of microbiology. Emphasizes the close relationship betwe	Climate | Environment | Energy | Social Justice | Equitable | Justice	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	Diversity and Inclusion | Northeastern University and the and the Office of Institutional Diversity and Incl
5	ART1200	90270	Designed to acquaint the beginner with the use of digital tools to manipulate and cr	Climate | Environment | Social Justice | Equitable | Justice	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	Diversity and Inclusion | Northeastern University and the and the Office of Institutional Diversity and Incl
6	CHM2110	90347	This course offers students the opportunity to learn the nature of carbon in organic	Climate | Environment | Nature | Social Justice | Equitable | Justice	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	Diversity and Inclusion | Northeastern University and the and the Office of Institutional Diversity and Incl
7	CHM1201	90372	Accompanies CHM 1200 - Covers a range of topics from the course. Suggested Cc	Climate | Environment | Natural | Waste | Water | Social Justice | Equitabl	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	Diversity and Inclusion | Northeastern University is committed to equal opportunity, affirmative action, di
8	ITC2050	90434	Course provides Studies User Experience (UX) design theory and practice, focusing	Climate | Environment | Nature | Social Justice | Equitable | Justice	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	Diversity and Inclusion | Northeastern University is committed to equal opportunity, affirmative action, di
9	HMG2110	90040	Examines the impact of health law and regulation on health care systems. Explores	Climate | Environment | Environmental | Environmental | Social Justice | E	Ecologic | Ecological | Environmentalism | Fossil Fuel | Global Warming | Nature	Diversity and Inclusion | Northeastern University and the and the Office of Institutional Diversity and Incl
10	ALY2100	90509	Offers a hands-on first programming course for those with no prior programming ex	Climate | Environment | Social Justice | Equitable | Justice	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	Diversity and Inclusion | Northeastern University and the and the Office of Institutional Diversity and Incl
11	CHM2111	90348	CHM 2111, Lab for CHM 2110: Accompanies CHM 2110. This laboratory course is	Climate | Environment | Water | Social Justice | Equitable | Justice	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	Diversity and Inclusion | Northeastern University and the and the Office of Institutional Diversity and Incl
12	FIN 3340	90016	Studies the nature of securities, the mechanics and costs of trading, and the ways	Climate | Environment | Nature | Social Justice | Equitable | Justice	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	Diversity and Inclusion | Northeastern University and the and the Office of Institutional Diversity and Incl
13	ENG3260	90026	Focuses on techniques used in nonfiction writing to communicate ideas and influen	Climate | Environment | Nature | Social Justice | Equitable | Justice	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	Diversity and Inclusion | Northeastern University and the and the Office of Institutional Diversity and Incl
14	FIN 2105	90017	No description found.	Climate | Environment | Social Justice | Equitable | Justice	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	Diversity and Inclusion | Northeastern University and the and the Office of Institutional Diversity and Incl
15	HSC1200	90044	Explores the fundamental role of nutrition in promoting health, wellness, and preven	Climate | Environment | Environmental | Energy | Environmental | Water | S	Ecologic | Ecological | Environmentalism | Fossil Fuel | Global Warming | Nature	22 Page | 8Diversity and Inclusion | Northeastern University and the and the Office of Institutional Diversi
16	BIO1100	90030	Introduces a variety of biological concepts. Surveys plant and animal characteristic	Climate | Environment | Natural | Sustainability | Energy | Biodiversity | Co	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	Diversity and Inclusion | Northeastern University and the and the Office of Institutional Diversity and Incl
17	ENG3105	90195	This course provides writing instruction for students considering careers or advanc	Climate | Environment | Social Justice | Equitable | Justice	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	Diversity and Inclusion | Northeastern University and the and the Office of Institutional Diversity and Incl
18	ENG3107	90004	This course provides writing instruction for students considering careers or advanc	Climate | Environment | Social Justice | Equitable | Justice	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	Diversity and Inclusion | Northeastern University and the and the Office of Institutional Diversity and Incl
19	CHM1100	90231	Introduces the principles of chemistry. Topics include basic principles and definition	Climate | Environment | Energy | Social Justice | Equitable | Justice	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	Diversity and Inclusion | Northeastern University and the and the Office of Institutional Diversity and Incl
20	ENG1105	90167	This course offers students an opportunity to develop written communication skills	Climate | Environment | Social Justice | Equitable | Justice	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	Diversity and Inclusion | Northeastern University and the and the Office of Institutional Diversity and Incl
21	ITC1000	90212	Offers a beginning course in computer productivity tools for those with little or no pi	Climate | Environment | Natural | Nature | Resilience | Wind | Waste | Soci	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	Diversity and Inclusion | Northeastern University and the and the Office of Institutional Diversity and Incl
22		16618	This course examines schools and classrooms as sites that both resist and (re)prod	Climate | Environment | Nature | Social Justice | Equality | Justice	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	22 Page | 6Diversity and Inclusion | Northeastern University is committed to equal opportunity, affirmativ
23	ITC2300	90190	Topics include designing normalized data tables for use in a relational database ma	Climate | Environment | Nature | Wind | Social Justice | Equitable | Justice	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	Diversity and Inclusion | Northeastern University and the and the Office of Institutional Diversity and Incl
24	BIO3101	90137	Accompanies BIO 3100. Introduces modern research techniques used in biochemis	Climate | Environment | Energy | Social Justice | Equitable | Justice	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	Diversity and Inclusion | Northeastern University and the and the Office of Institutional Diversity and Incl
25	ALY4650	90449	Offers an advanced practicum in the development and delivery of data analysis for	Climate | Environment | Social Justice | Equitable | Justice	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	Diversity and Inclusion | Northeastern University and the and the Office of Institutional Diversity and Incl
26	CHM1101	90055	Accompanies CHM 1100 - Covers a range of topics from the course. Co-requisite:	Climate | Environment | Social Justice | Equitable | Justice	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	Diversity and Inclusion | Northeastern University is committed to equal opportunity, affirmative action, di
27	HST 1200	90217	Examines American history from the precolonial period up to the end of the Americ	Climate | Social Justice | Equitable | Racial | Justice	Ecologic | Ecological | Environment | Environmental | Environmentalism | Fossil	Diversity and Inclusion | Northeastern University and the and the Office of Institutional Diversity and Incl
28	BIO1600	90159	Provides an overview of anatomic terminology and organization of the body. Presen	Climate | Environment | Natural | Social Justice | Equitable | Justice	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	Page | 6Diversity and Inclusion | Northeastern University and the and the Office of Institutional Diversity
29	BIO1050	90178	A command of medical terminology is fundamental for anyone who aspires to work	Climate | Environment | Social Justice | Equitable | Justice	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	Diversity and Inclusion | Northeastern University is committed to equal opportunity, affirmative action, di
30	CMN 1100	90242	Introduces psychological, sociological, and communication theories as they apply to	Climate | Environment | Sustainability | Social Justice | Equitable | Justice	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	Diversity and Inclusion | Northeastern University and the and the Office of Institutional Diversity and Incl
31	ENG1107	90200	This course builds on students' skills of written communication and basic research	Climate | Environment | Social Justice | Equitable | Justice	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	Diversity and Inclusion | Northeastern University and the and the Office of Institutional Diversity and Incl
32	ART 2000	90215	This course facilitates an understanding of effects produced by fonts and typograph	Climate | Environment | Social Justice | Equitable | Justice	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	Diversity and Inclusion | Northeastern University and the and the Office of Institutional Diversity and Incl
33	HMG1100	90039	No description found.	Climate | Environment | Environmental | Environmental | Social Justice | D	Ecologic | Ecological | Environmentalism | Fossil Fuel | Global Warming | Nature	Diversity and Inclusion | Northeastern University and the and the Office of Institutional Diversity and Incl
34	ECN 1200	90018	Introduces macroeconomics, the study of the economy as a whole. Macroeconomic	Climate | Environment | Nature | Social Justice | Equitable | Justice	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	Diversity and Inclusion: | Northeastern University and the and the Office of Institutional Diversity and Incl
35	CHM2110	90222	No description found.	Climate | Environment | Nature | Social Justice | Equitable | Justice	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	21 Page | 7Diversity and Inclusion: | Northeastern University and the and the Office of Institutional Divers
36	GET1150	90488	This course provides students with basic engineering drafting and introductory desi	Climate | Environment | Environmental | Environmental | Social Justice | E	Ecologic | Ecological | Environmentalism | Fossil Fuel | Global Warming | Nature	Fall Semester 2022 Page | 7Diversity and Inclusion | Northeastern University and the and the Office of In
37	HRM 2320	90207	Examines and applies principles, practices, and current issues facing organizations	Climate | Environment | Nature | Social Justice | Equitable | Justice	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	Diversity and Inclusion | Northeastern University and the and the Office of Institutional Diversity and Incl
38	CHM2110	90107	No description found.	Climate | Environment | Nature | Social Justice | Equitable | Justice	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	Diversity and Inclusion: | Northeastern University and the and the Office of Institutional Diversity and Incl
39	CHM2300	90140	Introduces the principles and practices in the field of analytical chemistry. Focuses	Climate | Environment | Energy | Social Justice | Equitable | Justice	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	Diversity and Inclusion | Northeastern University and the and the Office of Institutional Diversity and Incl
40	HMG3225	90147	Studies the principles of public health and current mental and physical health probl	Climate | Environment | Environmental | Environmental | Waste | Social Ju	Ecologic | Ecological | Environmentalism | Fossil Fuel | Global Warming | Nature	Diversity and Inclusion | Northeastern University and the and the Office of Institutional Diversity and Incl
41	ENG3107	90020	This course provides writing instruction for students considering careers or advanc	Climate | Environment | Social Justice | Equitable | Justice	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	Diversity and Inclusion | Northeastern University and the and the Office of Institutional Diversity and Incl
42	CHM2200	90174	No description found.	Climate | Environment | Nature | Social Justice | Equitable | Justice	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	Diversity and Inclusion: | Northeastern University and the and the Office of Institutional Diversity and Incl
43	BIO2501	90139	Offers students an opportunity to conduct experiments based on classical genetics	Climate | Environment | Social Justice | Equitable | Justice	Ecologic | Ecological | Environmental | Environmentalism | Fossil Fuel | Global V	Diversity and Inclusion | Northeastern University and the and the Office of Institutional Diversity and Incl

Text | Climate | Environment | Social Justice | Equitable | Justice

Enhanced Search Algorithm: We fine-tuned our search algorithm to improve its accuracy and efficiency in identifying relevant content within syllabi text.

Contextual Data Extraction: We refined the data extraction process to capture not only instances of keywords but also additional contextual information surrounding them, providing richer insights into the university's activities.

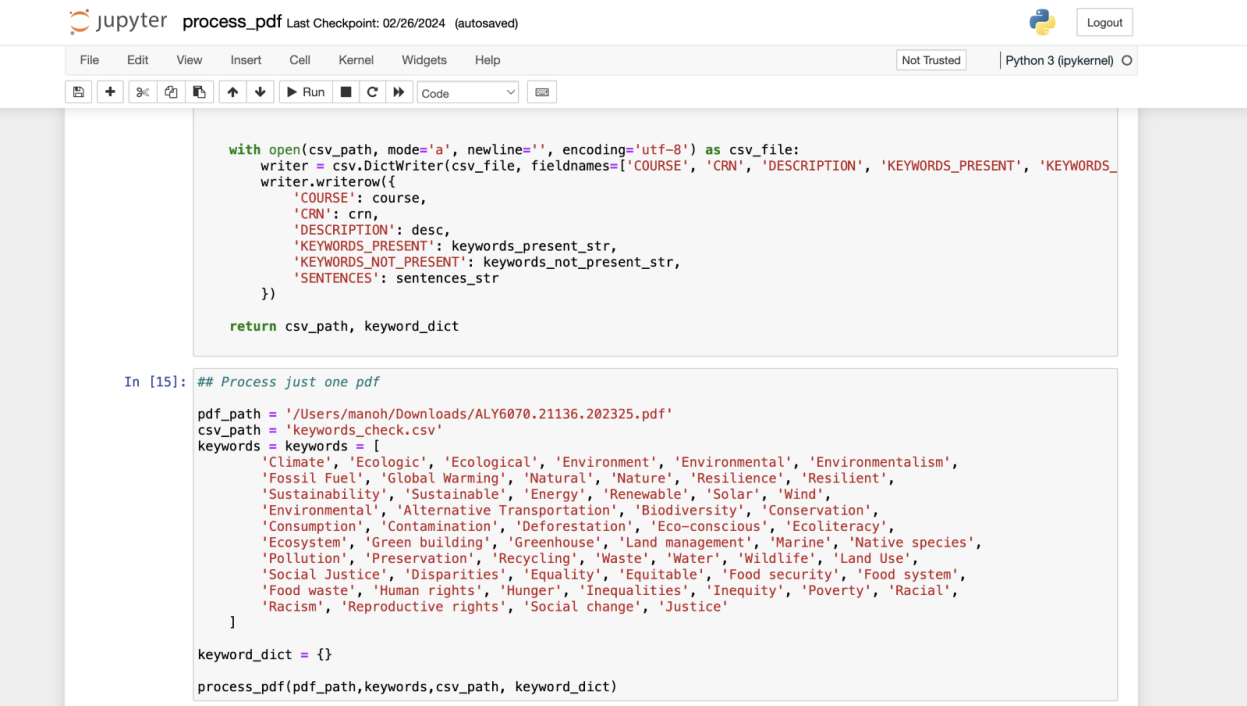


Tableau Data Visualization Algorithm

Test Results: For our data visualization in Tableau, we tested various visualization techniques to represent sustainability and climate justice efforts effectively. Here are our findings:

Descriptive Analytics: Bar charts, line graphs, and pie charts provided clear visualizations of historical data, illustrating trends and distributions over time.

Diagnostic Analytics: Heat maps and correlation matrices helped uncover relationships between different sustainability metrics, allowing for deeper analysis of causal factors.

Adjustments: To improve the effectiveness of our data visualization algorithm, we made the following adjustments:

Enhanced Visualizations: We refined our visualization techniques to ensure they accurately represent the complexity of sustainability and climate justice efforts, providing meaningful insights to stakeholders.

Interactive Elements: We incorporated interactive elements such as filters and drill-down capabilities to empower users to explore data more dynamically and extract deeper insights from the dashboard.

By implementing these adjustments based on our test results, we optimized both our PDF syllabi data extraction algorithm and Tableau data visualization algorithm to better serve the objectives of showcasing the university's sustainability and climate justice initiatives.

SECTION 3 (TIPS TO PASS ALONG TO NEXT TEAM)

- **What are the important points do you want the next team to know?**

As the next team takes the reins of our project, it's crucial to highlight key considerations for a successful journey ahead. From understanding project objectives to prioritizing user experience and technical infrastructure, these points will serve as a compass guiding the team through challenges and towards project success. (L.D, 2010) Let's explore these essential aspects that will shape our next steps.

1. Project Scope and Objectives: It's crucial for the next team to have a clear understanding of the project's scope and objectives. This includes knowing what deliverables are expected, the timeline for completion, and any specific requirements outlined by stakeholders.

2. Stakeholder Engagement: Engage with stakeholders regularly to ensure alignment with their expectations and requirements. This involves gathering feedback, addressing concerns, and keeping stakeholders informed of progress throughout the project lifecycle.

3. Data Sources and Quality: Familiarize themselves with the data sources being utilized for the project and assess the quality of the data. This may involve conducting data audits, identifying potential issues or inconsistencies, and implementing strategies for data cleansing and validation.

4. Technical Infrastructure: Understand the technical infrastructure required for developing and deploying the interactive dashboards. This includes selecting appropriate tools and technologies, setting up databases or data warehouses, and ensuring scalability and performance optimization.

5. Documentation and Knowledge Sharing: Document all aspects of the project, including technical specifications, design decisions, and implementation details. This documentation serves as a valuable resource for knowledge sharing within the team and future reference.

By keeping these points in mind, the next team can effectively navigate the project challenges and deliver high-quality interactive dashboards that meet the needs of stakeholders and end-users.

- **If your team is given a chance to restart the project, what are those things you will still do the same, what will you try in a different method, tool, etc.**

If our team is given the chance to restart the project, there are certain aspects that we would approach similarly, while exploring different methods, tools, or techniques in other areas. Here's a breakdown of what we would maintain and what we might change:

Things we would still do the same:

1. **Effective Project Planning**: We would continue to emphasize the importance of detailed project planning, setting clear milestones, and establishing a timeline for successful execution. Proper planning laid the foundation for our progress and ensured that we stayed on track throughout the project.

2. **Stakeholder Engagement**: We would maintain our approach of actively engaging with stakeholders, such as sponsors, mentors, and end-users. Their feedback and insights were invaluable in shaping the project's direction and ensuring that our efforts aligned with their needs and expectations.

3. **Collaborative Teamwork**: Our team dynamic and collaborative approach worked well, with each member contributing their unique skills and perspectives. We would continue to foster an environment of open communication, mutual respect, and shared responsibility to achieve project goals.

Things we would try differently:

1. **Data Collection Methodology**: While web scraping and manual downloading of PDF files served our initial needs, we might explore more advanced data collection techniques. This could involve utilizing APIs (Application Programming Interfaces), web crawlers, or specialized tools designed for extracting data from academic repositories or institutional databases.

2. **Automated Data Processing**: Instead of relying solely on manual data extraction and keyword matching, we might investigate the use of natural language processing (NLP) techniques and machine learning models for automated text analysis and keyword identification. This could streamline the data processing pipeline and potentially uncover more nuanced insights.

3. **Expanded Data Sources**: In addition to syllabi, we might consider incorporating other relevant data sources, such as course catalogs, program descriptions, faculty research interests, and student projects, to gain a more comprehensive understanding of sustainability integration across the university.

4. **Cloud-based Infrastructure**: To enhance collaboration, scalability, and accessibility, we might consider leveraging cloud-based services or platforms for data storage, processing, and visualization. This could facilitate real-time updates, remote access, and potentially enable integration with other institutional systems or databases.

5. **Sustainability Benchmarking**: To better contextualize Northeastern's efforts, we might incorporate benchmarking data from other institutions, particularly those with high sustainability rankings or recognized as leaders in this field. This could help identify best practices, set realistic targets, and measure Northeastern's progress relative to its peers.

By maintaining the effective practices that contributed to our project's success and experimenting with different methods, tools, and techniques in areas where improvements can be made, our team can enhance the project's impact, efficiency, and overall value to Northeastern University and its stakeholders.

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