Supporting reputational excellence through visual analytics, machine learning, and AI

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Overview

2. Overview of VT’s approach to supporting reporting and visibility efforts via an analytic framework.
3. Discussion of project to expand and enrich efforts to identify, document and publicize research supporting SDGs.
What are the Impact Rankings?

The Times Higher Education (THE) Impact Rankings assess universities against the United Nation’s Sustainable Development Goals (SDGs).

Calibrated indicators are used to compare universities across four areas of activity within each SDG: research, stewardship, outreach, and teaching.
Impact Rankings 2023

The *Times Higher Education* Impact Rankings are the only global performance tables that assess universities against the United Nations' Sustainable Development Goals (SDGs). We use carefully calibrated indicators to provide comprehensive and balanced comparison across four broad areas: research, stewardship, outreach and teaching.

The 2023 Impact Rankings is the fifth edition, and the overall ranking includes 1,705 universities from 115 countries and regions.

Read more...

**EXPLORE IMPACT RANKINGS FOR INDIVIDUAL SDGS**

1. **No Poverty**
2. **Zero Hunger**
3. **Good Health and Well-Being**
4. **Quality Education**
5. **Gender Equality**
6. **Clean Water and Sanitation**
7. **Affordable and Clean Energy**
8. **Decent Work and Economic Growth**
9. **Industry Innovation and Infrastructure**
10. **Reduced Inequalities**
11. **Sustainable Cities and Communities**
12. **Responsible Consumption and Production**
13. **Climate Action**
14. **Life Below Water**
15. **Life on Land**
16. **Peace, Justice and Strong Institutions**
17. **Partnerships for the Goals**
The following are a few ways faculty, staff, and students are distinguishing themselves through research, teaching, and outreach:

- University health researchers are collaborating with experts from Children’s National and Columbia University to **explore new tactics to fight lethal childhood brain cancer**.
- With faculty, graduate students are using data modeling to make breakthroughs in water treatment that will **provide clean water** for students in India, one of the most economically disadvantaged regions on the **planet**.
- Virginia Tech faculty revolutionized curriculum in effort to educate, train, and **develop the future workforce** that will support the national goal of onshoring the manufacturing of semiconductors. They are pushing the boundaries of semiconductor and related research in addition to leading state-wide initiatives.
- University faculty also produce the annual **Global Agricultural Productivity Report**, which offers an important perspective on **critical issues facing agricultural systems** in the U.S. and around the world.
- Researchers are collaborating with the U.S. Department of Agriculture’s Forest Service, the National Science Foundation’s National Ecological Observatory Network, and other universities to **unearth the impact of moisture on soil carbon processes** that have implications for the environment.
- Virginia Tech, the Government of Botswana and the Centre for African Resources: Animals, Community, and Land Use are engaged in a substantive initiative to establish a partnership in Kasane, Botswana, focused on **protection of wildlife resources and emerging animal and human pathogens**.
Overview


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SDG 02: Zero Hunger
United Nations Goal: End hunger, achieve food security and improved nutrition and promote sustainable agriculture
THE Impact Ranking Top 25

Methodology

Research Data: Articles, Conference Proceedings, Citations, and Grants

Data displayed in the Research Sections of the dashboard is derived from Academic Analytics. The methodology is based on supportive data provided with queries created by Elsevier, used under a Creative Commons Attribution 4.0 International license. See the full United Nations Sustainable Development Goals query list.

Institution-level counts are provided using the entire population of Institution faculty. College and department-level counts are restricted to faculty who have at least one department affiliation in Academic Analytics database. Works from faculty affiliated with the institution but not having a department affiliation are included in the overall institutional counts listed for both college and unit.

Teaching Data: Courses

Data displayed in the Teaching Sections of the dashboard is derived from related key concepts which were created using the United Nations description of the Sustainable Development Goals. Course descriptions were reviewed for related key concepts to assign to a SDG or multiple SDGs. See the full United Nations Sustainable Development Goals key concepts list.

Abbreviations

SDG = Sustainable Development Goal
CALS = College of Agriculture and Life Sciences
AAD = College of Architecture, Arts, & Design
POCB = Pungolin College of Business
COE = College of Engineering
CLAHS = College of Liberal Arts and Human Sciences
CSS = College of Science
CVM = College of Veterinary Medicine

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SDG 02: Zero Hunger

United Nations Goal: End hunger, achieve food security and improved nutrition and promote sustainable agriculture

THE Impact Ranking Top 25

Teaching

SDG-Related Courses

SDG03 Related Concepts
Clean Water
Dairy Science
Diet
Dietetics
Famine
Food Access
Food Banks
Food Deserts
Food Policy
Food Science
Food Security
Food Supply Management
Foodborne Disease
Healthy Diet
Hunger
Malnutrition
Nutrition
Organic Gardening
Plantation Management
Sanitation

SDG03 Related Courses Delivery by Colleges (Course Book 2021-2022)

GALS 92%
CVM 0.66%
CNRE 0.69%
CDS 3.9%

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SDG 02: Zero Hunger
United Nations Goal: End hunger, achieve food security and improved nutrition and promote sustainable agriculture
THE Impact Ranking Top 25

Global Impact

Global Impacts Linked SDGs

Virginia Tech demonstrates impact as a global land-grant in research, teaching, outreach, and stewardship by progressing sustainability in our community, through the Commonwealth of Virginia, and around the world. To view ways on how Virginia Tech is making an impact, click below:

Zero Hunger

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Al-powered app helps farmers in Bangladesh detect and manage pests

Jun 26, 2024

Utilizing artificial intelligence for real-time pest and disease detection, the app aims to improve access to integrated pest management strategies for Bangladeshi farmers, helping them protect their crops and livelihoods while reducing reliance on chemical pesticides.

Venkat Sridhar to support global food and water security as a National Academies Jefferson Science Fellow

Jun 24, 2024

Sridhar will share his expertise in global water resource management to impact federal policy through a fellowship awarded by the National Academies of Sciences, Engineering, and Medicine.
SDG 02: Zero Hunger
United Nations Goal: End hunger, achieve food security and improved nutrition and promote sustainable agriculture

THE Impact Ranking Top 25

SDG-Related Articles

SDG02 Articles Published by Colleges (2016-2021)

Number of SDG02 Articles Published by Colleges

CALS 57%
PCOB 0.31%
CNRE 9.8%
COE 3.7%
CVM 8.3%
COS 8.3%

SDG-Related Conference Proceedings

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Joining Forces

Exploring LLMs

Promote SDG Research

Promote Student Research (ETDs)
Acronym Review

1. **LLM** – Large Language Models (e.g ChatGPT)
2. **SDG** – UN Sustainable Development Goals
3. **ETD** – Electronic Theses and Dissertations
Research on SDG 1 - No Poverty

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Pipeline

1. ETDs

2. SDG Classifier

3. ETD DB

4. Summarizer LLM

5. End User
Project Overview

Phase 1 – SDG Classification

Phase 2 – Contextual Summarization
Phase 1 – SDG Classification
Data Sources

- ~30000 Human Labeled Text Fragments
- Use as final model testing

- Pulled with Elsevier queries
- 20000 abstracts per SDG

Image Credits
1. https://osdg.ai/about
Baseline Models

Existing Mappings
SDG Mappings from Elsevier

Baseline Models
Text Classification Models
(Logistic Regression and Boosted Trees)

Image Credits
Language Models

Previous class of language models (BERT)

Large Language Models
Open Source LLMs (Llama 3)

Image Credits
LLM Prompts

1. Zero-Shot Prompting
2. Few-Shot Prompting
3. Ontology-Assisted Prompting
## Ontology-Assisted Prompting

### Ontologies – Keywords/Concepts related to SDG

<table>
<thead>
<tr>
<th>SDG Type</th>
<th>Related Concepts</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDG01</td>
<td>Poverty Eradication</td>
</tr>
<tr>
<td>SDG01</td>
<td>Poverty Reduction</td>
</tr>
<tr>
<td>SDG01</td>
<td>Anti-Poverty</td>
</tr>
<tr>
<td>SDG01</td>
<td>Economic Development</td>
</tr>
<tr>
<td>SDG01</td>
<td>Microfinance</td>
</tr>
<tr>
<td>SDG01</td>
<td>Sustainable Development</td>
</tr>
<tr>
<td>SDG01</td>
<td>Vulnerability Reduction</td>
</tr>
<tr>
<td>SDG01</td>
<td>Root Causes of Poverty</td>
</tr>
<tr>
<td>SDG01</td>
<td>Entrepreneurship</td>
</tr>
<tr>
<td>SDG01</td>
<td>International Humanitarian Aid</td>
</tr>
<tr>
<td>SDG01</td>
<td>Nonprofit Management</td>
</tr>
<tr>
<td>SDG01</td>
<td>Nonprofit Development</td>
</tr>
</tbody>
</table>

Source: [https://docs.google.com/spreadsheets/d/1FUReBd-rKCrnxl8f25m7gF-Xm8ZNPFL5C/edit#gid=825822306](https://docs.google.com/spreadsheets/d/1FUReBd-rKCrnxl8f25m7gF-Xm8ZNPFL5C/edit#gid=825822306)
Training vs. Asking

Traditional machine learning models get *trained*

LLMs get *prompted*, as they have already been *pre-trained*
Results

- Baseline Models
- Elsevier Queries
- Language Models
- LLMs
Phase 2 – Contextual Summarization
Possible Approach

- Largely a challenge of prompt tuning and model ability
Conclusion: Bringing AI to the Table
Questions?