

Mapping Research Outputs to the Sustainable

Development Goals:

A Case Study of Swinburne University of Technology

Dr Hui Yin

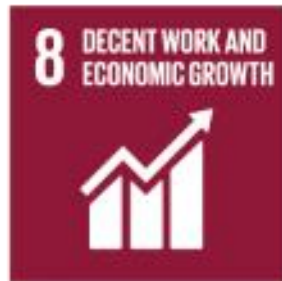
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SUSTAINABLE DEVELOPMENT GOALS



Motivation

- The goals foster global cooperation and provide a framework for sustainable economic growth, social inclusion, and environmental protection.
- Academia, government, and industry all play a crucial role in promoting the realization of these goals.
- Researchers benefit from SDG-related publications, which are large and growing daily, to understand the current state of research, plan future projects and identify potential collaborators.
- Publications can provide information for reporting, communicating, and showcasing university/ research institutions contributions to SDGs.
- Publications are also an essential indicator for monitoring the progress of each country, region and institution in achieving the SDGs, and, when the literature is viewed critically, help to draw a picture on progress towards the SDGs

Methodology

1. Publication Extraction
2. Remove Irrelevant Publications
3. Publication Exploration
4. Apply GPT Model
5. Outputs Comparison
6. Hybrid Approach and Results

Step 1 Publication extraction from Swinburne Research Bank

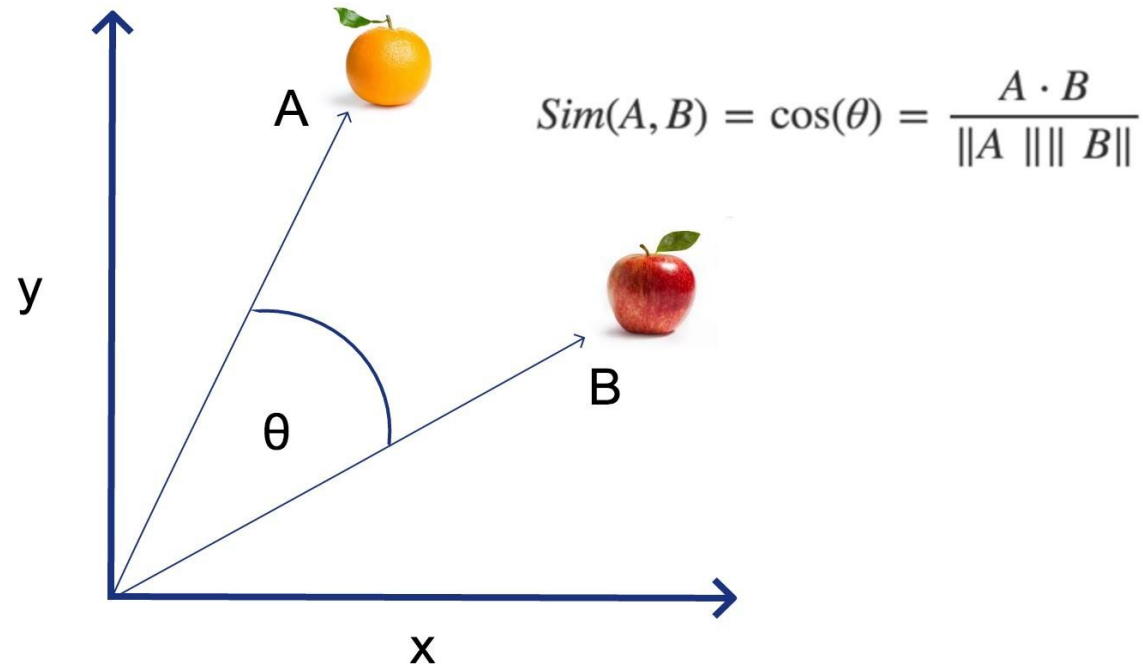
Table 1. Publication features.

id	timestamp	title	creator	location	description	publisher	date	type	identifier	source	rights
oai:researchbank.swinburne.edu.au:fef5bd4b-f266-4df8-ab82-dcd1d957a530/1	2023-05-05T03:32:08Z	For the greater good of all? How Australians view the integrity, competence and contribution of federal government	['Wilson, Sam', 'Wheeler, Melissa', 'Demsar, Vlad']	https://researchbank.swinburne.edu.au/items/fef5bd4b-f266-4df8-ab82-dcd1d957a530/1/	<p>In recent years, as chronicled in countless news stories and reports into trust, public integrity, accountability, transparency and corruption, our institutions of government have become widely seen as places of maladministration and misconduct, more concerned with serving self and vested interests ahead of the public interest. Although these concerns are expressed in relation to all levels of government, they are arguably most pronounced in relation to federal government.</p> <p>In this report, the Australian Leadership Index takes stock of the current state of federal government leadership for the greater good, as perceived by the Australian public. By examining public perceptions of government integrity, competence and contribution to public value, overall and against national benchmarks, the authors reveal the low esteem in which federal government is held and contextualise the results within Australia's wider institutional landscape.</p>	Swinburne University of Technology	2023	Report	['http://hdl.handle.net/1959.3/472170', 'https://doi.org/10.25916/c3b7-vq19']	Australian Leadership Index (May 2023), pp. 1-24	Copyright © 2023 the authors. This report is released subject to a Creative Commons BY-NC-ND licence (Licence).

Total: 82,649, Year: 1967~2023

Step 2 Remove irrelevant publications

Cosine Similarity



Clean Energy - Fossil Fuels + Renewable Sources = Sustainable Power



Decent Work - Exploitative Labor + Fair Employment Practices = Economic Growth

Similarity measure output example:

Table 2. The output of the similarity measure.

Newton, Peter W.	<p>Title: No sustainable population without sustainable consumption (2011)</p> <p>Abstract: In recent weeks, two major federal government strategy papers have been released: 'Our Cities, Our Future: A National Urban Policy for a Productive, Sustainable and Liveable Future' and 'Sustainable Australia—Sustainable Communities: A Sustainable Population Strategy for Australia'. In a growing and urbanising 21st century world it is an unsustainable and inequitable nexus.</p>	<p>Goal 11: 0.60; Goal 12: 0.55; Goal 8: 0.47; Goal 4: 0.46; Goal 6: 0.45; Goal 15: 0.45; Goal 13: 0.44; Goal 1: 0.44; Goal 3: 0.42; Goal 9: 0.41; Goal 14: 0.40; Goal 7: 0.40; Goal 10: 0.39 ; Goal 17: 0.37 ; Goal 2: 0.36 ; Goal 16: 0.36; Goal 5: 0.30</p>
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Step 3 Publication exploration

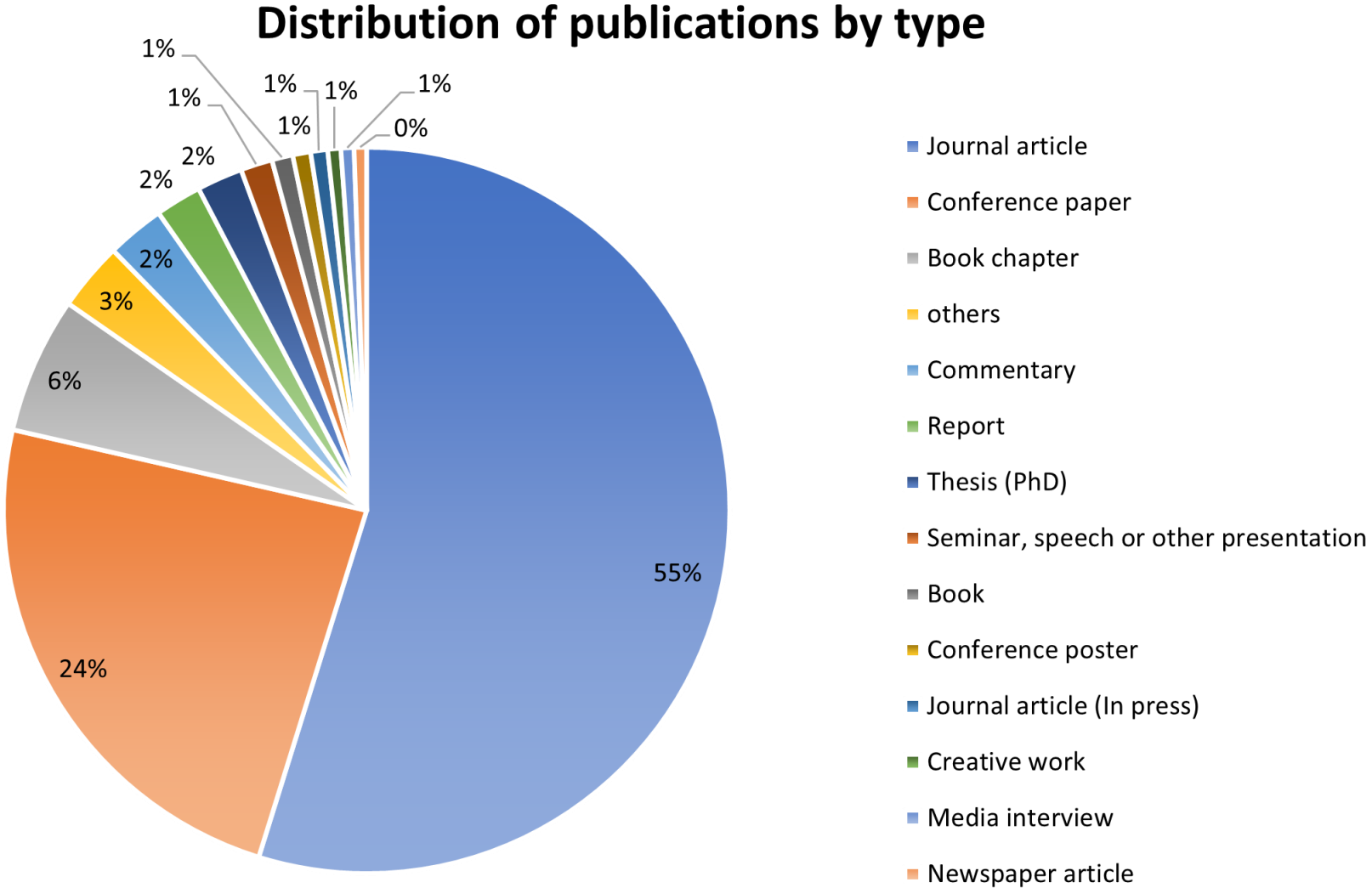


Figure 1: Distribution of publications by type in the case study, with a total of 6,467 publications.

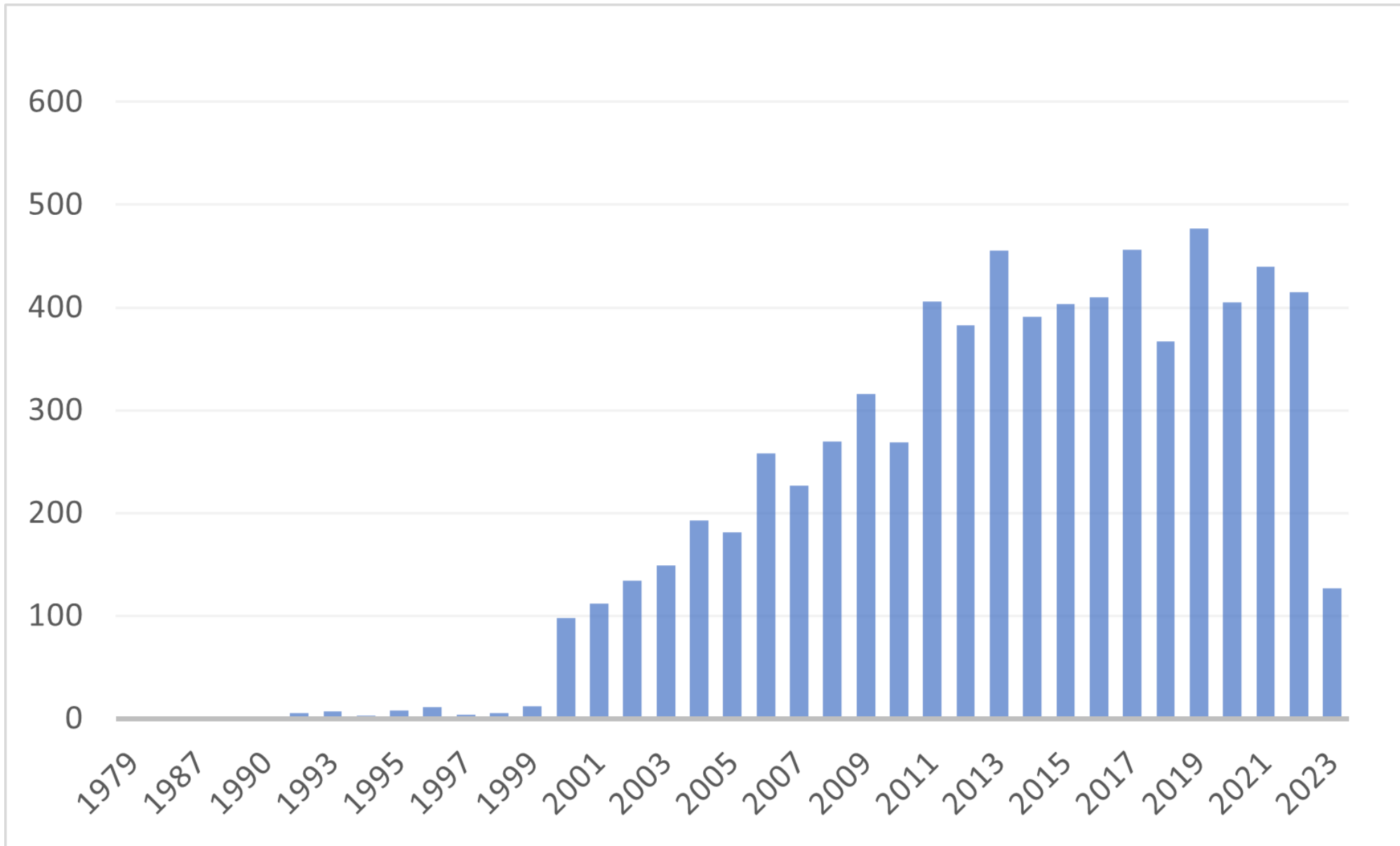


Figure 2: Number of publications by year in the case study.

Step 4 Apply GPT model

```
import openai
API_KEY = 'your API_KEY'
openai.api_key= API_KEY
openai.ChatCompletion.create(
model="gpt-3.5-turbo",
messages=[
    {"role": "user", "content": "Analyze the
    publication and determine the SDGs it
    aligns with..."}
], max_tokens=600
)
```

Figure 3: An example of API call.

Prompt: Analyze the publication and determine the SDGs that it aligned with, provide the confidence levels(%) for each assigned goal and the reason for assignment. Results listed the goals in descending order of confidence level, with the highest confidence goal listed first. Title:***. Abstract: ***.

GPT-3.5 Turbo models are capable and cost-effective.

`gpt-3.5-turbo` is the flagship model of this family and is optimized for dialog.

`gpt-3.5-turbo-instruct` is an Instruct model and only supports a 4K context window.

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Model	Input	Output
4K context	\$0.0015 / 1K tokens	\$0.002 / 1K tokens
16K context	\$0.003 / 1K tokens	\$0.004 / 1K tokens

Figure 4: OpenAI language model pricing.

Table 3. Error messages when running GPT API.

Formula	Explanation
Error 1	The server is overloaded or not ready yet.
Error 2	That model is currently overloaded with other requests. You can retry your request, or contact us through our help center at help.openai.com if the error persists.
Error 3	Bad gateway. {"error":{"code":502,"message":"Bad gateway."},"param":null,"type":"cf_bad_gateway"}} 502 {'error': {'code': 502, 'message': 'Bad gateway.', 'param': None, 'type': 'cf_bad_gateway'}} {'Date': 'Tue, 04 Jul 2023 05:23:06 GMT', 'Content-Type': 'application/json', 'Content-Length': '84', 'Connection': 'keep-alive', 'X-Frame-Options': 'SAMEORIGIN', 'Referrer-Policy': 'same-origin', 'Cache-Control': 'private, max-age=0, no-store, no-cache, must-revalidate, post-check=0, pre-check=0', 'Expires': 'Thu, 01 Jan 1970 00:00:01 GMT', 'Server': 'cloudflare', 'CF-RAY': '7e14e74a7df613f8-ORD', 'alt-svc': 'h3=":443"; ma=86400'}

```
current_index = 0
while current_index < len( content_list ):
    content = content_list[ current_index ]
    try:
        response = openai.ChatCompletion.create(
            model="gpt-3.5-turbo",
            messages=[{"role": "user", "content": content}])
        answer = response[ 'choices' ][0][ 'message' ][ 'content' ]
        answers.append( answer )
        writer.writerow( [ paper_list[ current_index ], answer ] )
        current_index += 1
    except Exception as e:
        print( e )
        print( " Sleeping ..... " )
        time.sleep( 60 )
```

Figure 5: Solution to errors that occur during API operations.

GPT model output example:

Table 4. The output of the GPT model.

Publication	Outputs
<p>Title: No sustainable population without sustainable consumption</p> <p>Abstract: In recent weeks, two major federal government strategy papers have been released: 'Our Cities, Our Future: A National Urban Policy for a Productive, Sustainable and Liveable Future' and 'Sustainable Australia—Sustainable Communities: A Sustainable Population Strategy for Australia'. In a growing and urbanising 21st century world it is an unsustainable and inequitable nexus.</p>	<p>The publication aligns with the following SDGs:1. Sustainable Cities and Communities (SDG 11) - 90% confidence level: The publication discusses the need for sustainable urban development and the importance of accommodating population growth in cities. It also mentions the international recognition of Australia's cities' liveability.2. Responsible Consumption and Production (SDG 12) - 80% confidence level: The publication highlights the unsustainable and inequitable levels of resource consumption in Australia's cities. It emphasizes the need for sustainable consumption practices to achieve a sustainable population. The goals are listed in descending order of confidence level, with SDG 11 listed first. The high confidence level for SDG 11 is based on the publication's explicit focus on sustainable urban development, the recognition of Australia's cities' liveability, and the mention of the need to accommodate population growth in cities. The confidence level for SDG 12 is slightly lower because while the publication acknowledges unsustainable levels of resource consumption, it does not provide specific recommendations for responsible consumption and production practices.</p>

Step 5 Output comparison

Table 5: Examples of mapping publications to SDGs using GPT and proposed method.

Title	Similarity measure	GPT
Linking scholarly articles to SDGs: an automated approach	Goal 17: 0.39, Goal 4: 0.39, Goal 12: 0.38, Goal 15: 0.37, Goal 9: 0.36	Goal 4: 0.95, Goal 9: 0.85, Goal 16: 0.7, Goal 1: 0.6
Dissemination of public health research to prevent non-communicable diseases: a scoping review	Goal 3: 0.38	Goal 3: 0.9
Transitioning cities and post-COVID planning	Goal 11: 0.60, Goal 13: 0.46, Goal 15: 0.40, Goal 3: 0.40, Goal 6: 0.38	Goal 11: 0.80, Goal 13: 0.70, Goal 9: 0.60
Everyday humanitarianism during the 2019/2020 Australian bushfire crisis	Goal 11: 0.44, Goal 13: 0.38, Goal 15: 0.37	Goal 11: 0.9, Goal 13: 0.85, Goal 1: 0.7, Goal 3: 0.65, Goal 15: 0.6
Data for Good Collaboration: research report	Goal 11: 0.39, Goal 4: 0.37, Goal 1: 0.36	Goal 4: 0.85, Goal 17: 0.8, Goal 9: 0.75, Goal 10: 0.7, Goal 3: 0.65, Goal 8: 0.6

Step 6 Hybrid approach to get a high confidence result

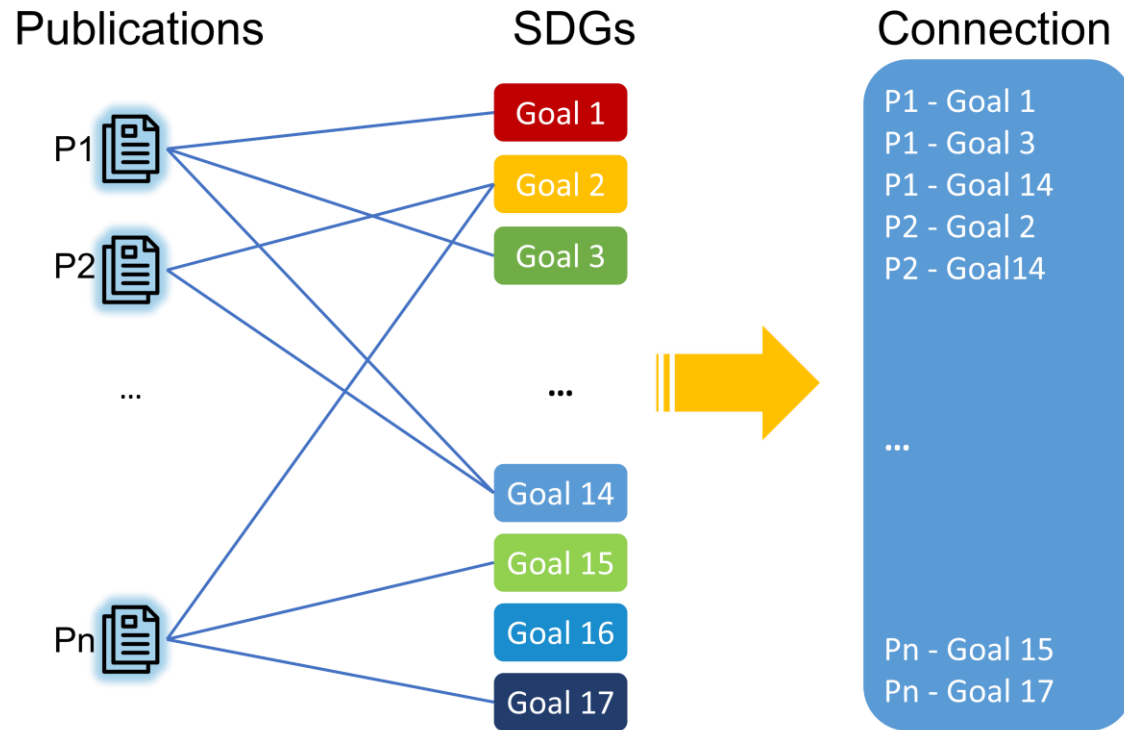


Figure 6: Construct connections between publications and SDGs.

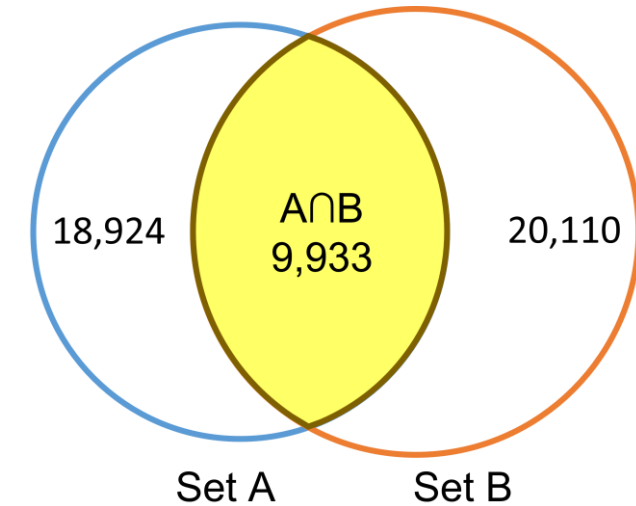


Figure 7: Intersection of sets using a Venn diagram. Set A corresponds to the outputs obtained by the similarity measure, while set B contains the outputs from the GPT model, the intersection is 9,933 connections.

Conclusion

- In this empirical study, we applied AI technology to map publications onto SDGs, which can assist public and private research institutions to identify their past and current research that relates to SDGs, find out their research strengths and research gaps.
- We applied this method the publications from Swinburne University of Technology researchers, identify the SDGs these publications belong to.
- We discuss methods, parameter settings, common errors and solutions for using the GPT API, and disadvantages of applying GPT for publication mapping tasks.
- we adopted a hybrid strategy that amalgamated the outputs of both approaches to effectively identify relevant Sustainable Development Goals (SDGs) for publications.

Predictions on publications without tags:

Trust and the market for technology

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*Melbourne Institute of Applied Economic and Social Research, and Intellectual Property Research Institute of Australia,
The University of Melbourne, VIC 3010, Australia*



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ABSTRACT

Conditional on the decision to enter the market for immature technology, we test for the effects that trust—proxied by the context in which the negotiating parties first met—has on the likelihood that these negotiations are successful. Using survey responses from 860 university–firm and firm–firm technology transactions, we find that trust matters: parties with high levels of trust (i.e. know each other from a previous business) are between 6 and 23 per cent more likely to conclude a transaction compared with those with low levels of trust (i.e. cold-callers). We also find that patents can effectively substitute for a lack of trust and that trust is more important in upstream stages (basic or applied science).

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GOAL 1: No Poverty

GOAL 2: Zero Hunger

GOAL 3: Good Health and Well-being

GOAL 4: Quality Education

GOAL 5: Gender Equality

GOAL 6: Clean Water and Sanitation

GOAL 7: Affordable and Clean Energy

GOAL 8: Decent Work and Economic Growth

GOAL 9: Industry, Innovation and Infrastructure

GOAL 10: Reduced Inequality

GOAL 11: Sustainable Cities and Communities

GOAL 12: Responsible Consumption and Production

GOAL 13: Climate Action

GOAL 14: Life Below Water

GOAL 15: Life on Land

GOAL 16: Peace and Justice Strong Institutions

GOAL 17: Partnerships to achieve the Goal

Original Article

Research Funding Mechanisms and Biomedical Research Outputs†

Julian Clark, Gabrielle Hirsch, Paul H. Jensen, Elizabeth Webster ✉

First published: 08 March 2016 | <https://doi.org/10.1111/1759-3441.12130> | Citations: 1

Abstract

We use scientist-level panel data in order to estimate the effect which the number, type and source of research grants has on subsequent commercial contracts, publications and patent outputs. In so doing, we control for time-invariant factors including individual researcher preferences, the nature of the work and the business model of the researcher's laboratory. We find that, whereas Fellowships and Project or program grants had a positive effect on whether the scientist subsequently signed a commercial contract, Equipment and Development grants had the largest impact per grant. Finally, we find that International grants were negatively associated with the number of commercial contracts signed. The data were drawn from 488 biomedical researchers at the Walter and Eliza Hall Institute over the period 2009–2012.

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GOAL 17: Partnerships to achieve the Goal

Celebrity endorsements, self-brand connection and relationship quality


Abhishek Dwivedi , Lester W. Johnson & Robert McDonald

Pages 486-503 | Received 29 Oct 2012, Accepted 01 Apr 2014, Published online: 13 May 2015

 Download citation


 <https://doi.org/10.1080/02650487.2015.1041632>

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Abstract

The extant literature on celebrity endorsement effects largely focuses on the endorsement effects on consumer evaluations of the endorsed brand. The current study extends the literature by assessing the impact of endorser credibility on two consumer-brand relationship-oriented outcomes – brand relationship quality and consumer self-brand connections. Additionally, the self-brand connection is positioned as a partial mediator of the effect of endorser credibility on relationship quality. A conceptual model is developed and estimated on a sample of 535 Generation Y (youth) consumers from India. The hypotheses are supported and the model demonstrates acceptable fit to the data. Overall, the present study introduces a relationship-building perspective to the celebrity endorsement literature. The results suggest that celebrity endorsers possess the ability to provide meaningful self-definitional benefits to consumers as well as cultivate enhanced relationship quality with the endorsed brands, thus contributing novel insights into celebrity endorsement dynamics.

Q Keywords: [celebrity endorser credibility](#) [self-brand connection](#) [relationship quality](#)

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GOAL 16: Peace and Justice Strong Institutions


GOAL 17: Partnerships to achieve the Goal


Get Serious

Gender and Constraints to Long-Distance Running

Christine E. Wegner , Lynn L. Ridinger, Jeremy S. Jordan & Daniel C. Funk

Pages 305-321 | Published online: 13 Dec 2017

 Download citation

 <https://doi.org/10.1080/00222216.2015.11950362>



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 Supplemental

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Abstract

While there has been tremendous growth in participation rates of women in distance running, the percentage of women participating in full marathons has plateaued. This study investigated this phenomenon by exploring whether differences in constraints and constraint negotiation across gender within this serious leisure activity can explain this difference. Survey research was used to collect data from 3,453 marathon and half-marathon finishers. Comparisons found different barriers across both gender and distance. Additional findings suggest, however, that constraints associated with women in leisure in general do not adequately explain the participation differences, and that women may merely define the parameters of serious leisure within distance running differently than men.

Q Keywords: [constraints](#) [negotiation-efficacy](#) [gender](#) [serious leisure](#) [distance running](#)

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GOAL 15: Life on Land



GOAL 16: Peace and Justice Strong Institutions


GOAL 17: Partnerships to achieve the Goal

Who influences USPTO patent examiners?

Patrick Doran ^a, Elizabeth Webster ^b  

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<https://doi.org/10.1016/j.wpi.2019.01.005> 

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Referred to by [Erratum regarding missing Declaration of Competing Interest statements in previously published articles – Part 3](#)

World Patent Information, Volume 71, December 2022, Pages 102137



Abstract

We test for evidence that the patent attorney has an extra-ordinary influence on the patent examiner using data on examiner citations of 93 608 patent applications to the USPTO. We find that examiners cite patents from the same patent attorney (as used for the focal application) at an abnormally high rate. This evidence is consistent with the view that attorneys are influencing the examiners reports. Coupled with new evidence that non-blocking examiner citations have a positive effect on the grant decision, this suggest that the grant decision may be compromised.

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GOAL 16: Peace and Justice Strong Institutions

GOAL 17: Partnerships to achieve the Goal


House price cycles in Australia's four largest capital cities

Abbas Valadkhani^a  , Greg Costello^b, Ronald Ratti^c

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<https://doi.org/10.1016/j.eap.2016.07.003>

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Abstract

The aims of this paper are twofold. First, we propose a threshold cube equation, augmented with the optimal number of autoregressive terms, to model the likely future path of house prices in Australia's four major capital cities. The proposed framework can be adopted to simulate house prices in other cities experiencing similar price cycles (spirals) such as London and Vancouver. Second, using a proprietary dataset not publicly available (1995m12–2015m10), we use the proposed model to simulate house prices in Brisbane, Melbourne, Perth and Sydney, which have been on a steep upward trajectory since 2013. To check the sensitivity and robustness of our results, we evaluate the model in terms of the out-of-sample accuracy for two separate 12-month periods. We find that the forecasting performance of the model appears to be reasonable. Then we use the model to provide the ex ante future path of house prices during the next twelve months (2015m11–2016m10). Although we do not seek to forecast all see-saw changes in property prices, based on the historical length of boom and bust cycles in the past, some interesting overall price paths are detected. It is observed that during the next year house prices in all capital cities will start plateauing with some likely moderate falls. This downward price adjustment is particularly more noticeable in Perth.

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