

# The influence of AI on scientific writing

52<sup>nd</sup> Scientific Meeting of BSRM

Ghent, Belgium

Friday 29 November 2024



## About me

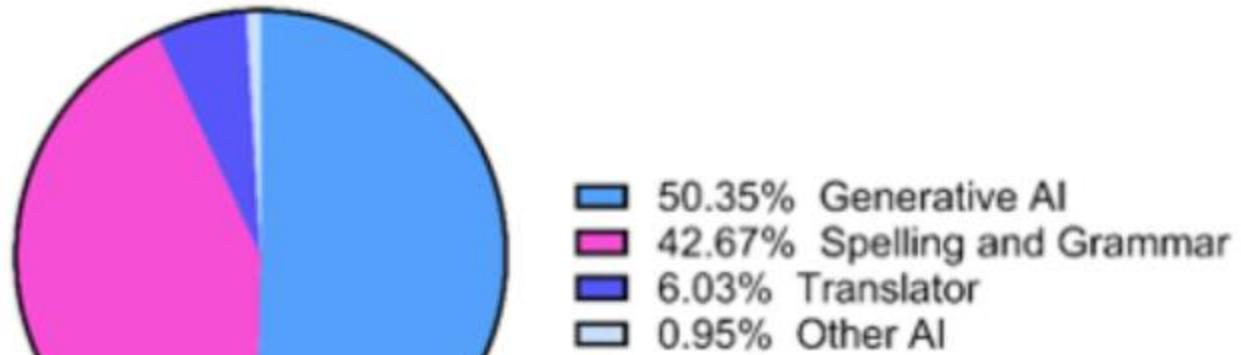
- Medical writer for over 18 years
- Founded Green Pen Solutions in 2019
- Mixture of writing for clients, and training/mentoring other writers



# Will AI replace medical writers?

*Medical writers using AI will replace medical writers who don't use AI*

# 2024 survey of STEM students



**Total=846**

*Figure 1. Pie chart showing AI tools divided into categories. Generative AI was the most commonly used tool, followed by spelling and grammar, and translator tools. Responses that disclosed the use of AI but did not mention specific software were classified as Other AI.*

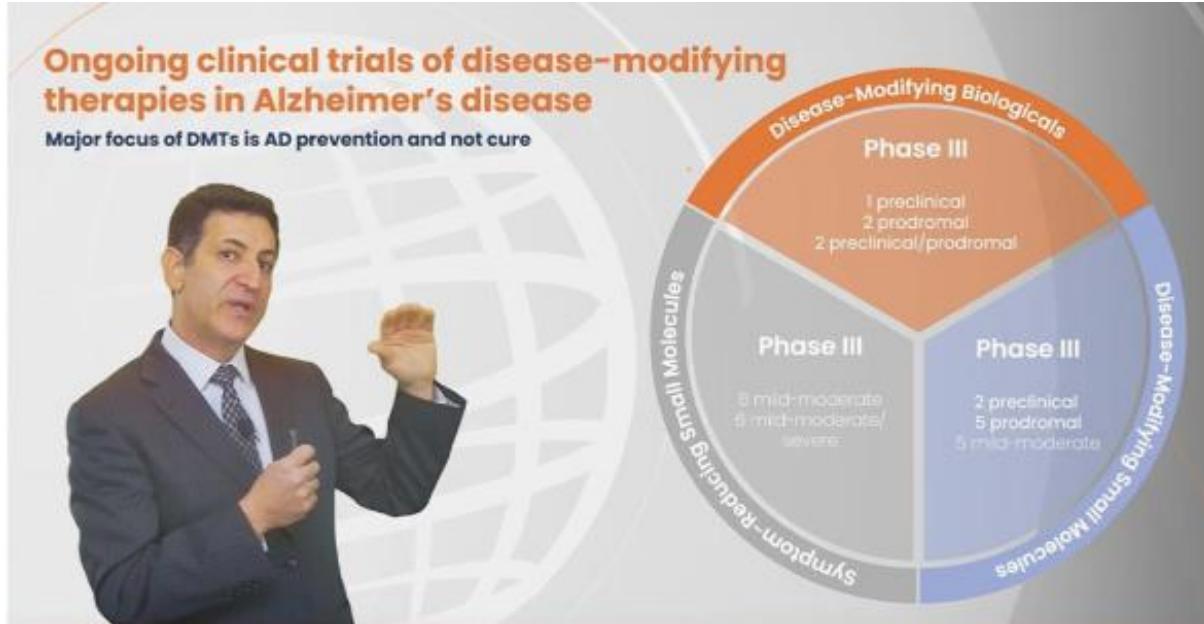
# Medical writing: A definition



“

*Medical writing involves the development of print or digital documents that deal specifically with medicine or healthcare*

# Examples of deliverables



# Patient collaboration uncut!

5th November 2019  
British Academy, London

The beautiful British Academy in London hosted the 2019 PM Society patient engagement event. An audience of over 70 representatives from the pharmaceutical industry, healthcare communications agencies and patients convened to hear the latest thinking on patient collaborations between pharma, agencies, patient advocates and charities.

Caroline Vernon, Chair of the PM Society Patient Engagement Interest Group (PEIG), opened the meeting setting out the objectives of the event:

- to provide practical tips for delegates to take away and use and
- to encourage involvement of patients in healthcare communications and pharma initiatives for the benefit of all patients.

The meeting report summarises each of the sessions and key messages, as well as questions and answers from the audience and speakers, respectively.

Part of the PM Society Patient Engagement Interest Group (PEIG) series of events.

ABPI Sourcebook: Your questions answered – Jill Pearcey (ABPI)

Coming fresh to the pharmaceutical industry just two years ago, Jill Pearcey observes that the ABPI Code of Practice was largely seen as an obstacle to collaborations between industry and patient groups; its formal language created misunderstandings and friction.

The 'Code is being used as a weaponised tool' during the things we need to do.

Independent research was conducted with a variety of stakeholders to derive deeper into perceptions of the Code. Responses revealed that a desire for more engagement between industry and patients is hampered by practicality and compliance issues.

The Sourcebook was created to meet the clear need for interpretation of the ABPI Code. It does not replace the Code, but explains in practical terms how it, and other existing resources, can be interpreted to encourage compliant patient collaboration.

Based on the PM Society Patient Engagement Interest Group (PEIG) series of events.



Forgotten Patients  
Overlooked Diseases

# MEDICALLY UNEXPLAINED SYMPTOMS

## A Multidisciplinary Conference Addressing the Challenges of Medically Unexplained Symptoms

Hosted by  
**The Forgotten Patients, Overlooked Diseases Charity and  
Members of the General Practice and Primary Care Section at the Royal Society of Medicine**

Wednesday 1st May 2024

Royal Foundation of St Katherine, London

### Keynote Presentation:

#### Where does the consultation go wrong?

A further study on language and interactions was discussed\*. This involved a systematic review of 18 publications, which identified linguistic and interactional features that are problematic in consultations with people with MUS:

- 1. Symptom recognition:** When doctors cannot validate and legitimize the patients' symptoms.
- 2. Double trouble potential:** When the doctor and the patient differ in their knowledge domain.
- 3. Failed negotiation and persuasion:** Disagreement about the problem and management plan.

Summarising the issue, Prof. Easton said: "Patients want a patient-centred approach, taking into account the patient's preferences, thinking of them as a whole person and not a body part or a condition, and asking them to get involved in decisions and management plans."

#### In summary:

- Consultations relating to MUS can be challenging for both the doctor and the patient.
- A mismatched agenda can occur when the doctor does not consider the patient's ideas, concerns, and expectations.
- A successful consultation involves co-creating a mutually acceptable account by trusting adults.

**“When a biomedical approach doesn't seem to have all the answers, communication in the consultation becomes absolutely vital to relationship management.”**



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### Exploring Solutions

#### AI and MUS – Dr GPT will see you now



**Dr Keith Grimes** began his talk by defining generative artificial intelligence (AI) and how it has evolved into a powerful general purpose tool that can answer questions, summarise information, infer, and reason. With these capabilities in mind, generative AI can potentially help solve a number of challenges faced by people with MUS:

- Limited time available for patients to tell their story and for physicians to collate and understand the story.
- A lack of understanding on the part of the clinician concerning the patient and their families.
- The time and effort devoted by patients in researching their symptoms which is then dismissed by the clinician.

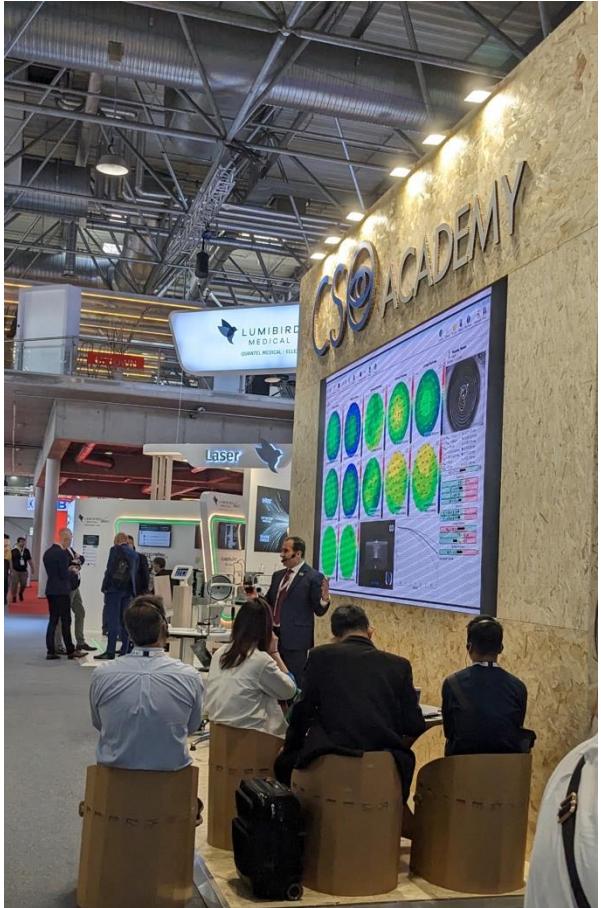
Generative AI can solve these problems by transcribing, summarising, and making sense of what the patient and physician are saying during a consultation. This will enable the doctor to focus on the patient and actively listen to their story.



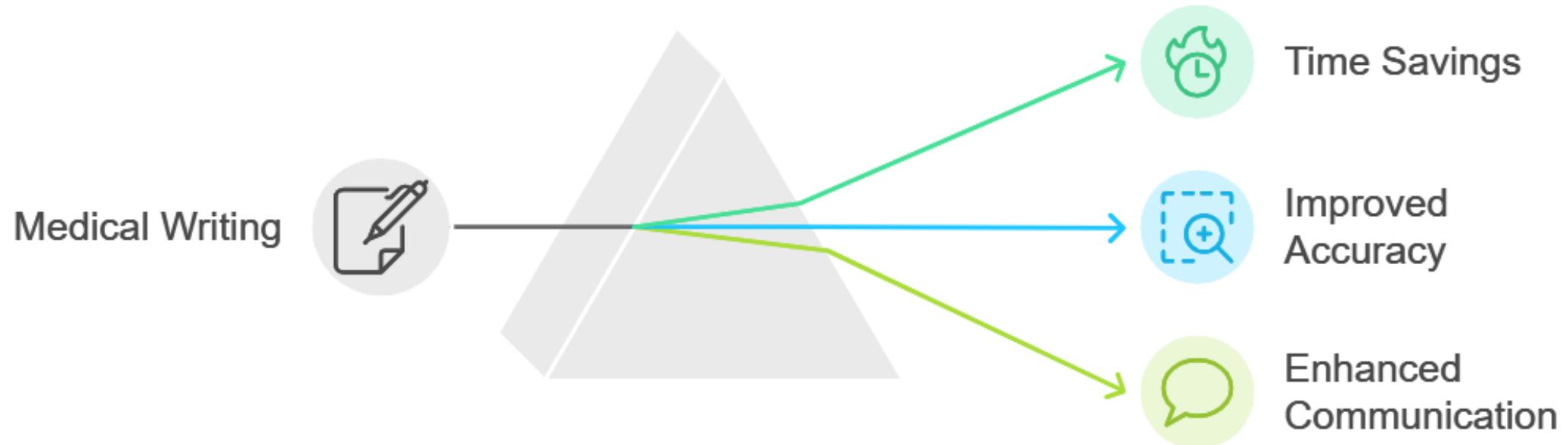
Generative AI can summarise the information in a way that patients want, in any language and in a form they can share with their family, as well as summarising medical information in a way that a lay person, i.e., the patient, can easily understand. These summaries can then be used by patients with MUS to reflect on what's going on in a way that makes best use of their time with the clinicians. Patients can also ask generative AI to explain complicated scientific terms.

However, it is important to be aware of the risks of using generative AI. Large language models tend to 'hallucinate', giving seemingly plausible answers that are incorrect. Generative AI can also produce biased results if they are not trained on representative medical data. Therefore, it is crucial to use the best possible AI model and keep the human in the loop.

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# The multifaceted benefits of medical writing



# What do medical writers do?



Take client  
brief



Research  
topic(s)



Plan and  
write content



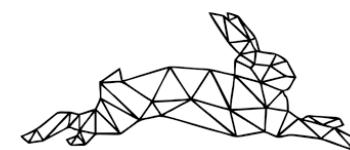
Create  
visuals



Fact  
checking



Editing  
(copy/style)



NotebookLM

perplexity



Napkin

grammarly



# Useful resources

## Lit reviews



AI Just Made Literature Review a Piece of Cake



## Writing



Best AI Writers for Academics and Research [Start for FREE!]



Andy Stapleton

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Teaching you the insider secrets of academia to make it work for YOU. [...more](#)

[academiainsider.com/product/ebook-bundle](#) and 3 more links

Subscribe

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# How do we use AI tools today?

Quickly learn about new  
topics



# What are the BELRAP data and what is the relevance to BSRM?

The **Belgian Register for Assisted Procreation (BELRAP)** collects and publishes data on assisted reproductive technology (ART) cycles in Belgium <sup>1</sup>. This data includes information on the number of ART cycles performed, the types of cycles, outcomes, and various factors that contribute to the success and quality of ART treatments <sup>2</sup>.

The **media publication** of BELRAP data typically involves releasing annual reports and summaries that provide insights into ART practices and outcomes in Belgium <sup>2</sup>. These reports are often used by healthcare professionals, researchers, and policymakers to understand trends, improve practices, and make informed decisions.

Regarding the **relevance to the Belgian Society for Reproductive Medicine (BSRM)**, BELRAP data is crucial for several reasons:

- 1. Quality Control:** The data helps BSRM monitor and improve the quality of ART treatments by identifying trends and areas for improvement <sup>3</sup>.
- 2. Research and Development:** Researchers use BELRAP data to conduct studies and develop new techniques and protocols to enhance ART success rates <sup>3</sup>.
- 3. Policy Making:** Policymakers rely on BELRAP data to create regulations and guidelines that ensure the safety and effectiveness of ART treatments <sup>3</sup>.
- 4. Public Awareness:** Publishing this data raises public awareness about ART and helps patients make informed decisions about their reproductive health.

Does this help clarify things for you?

<sup>1</sup> [www.belrap.be](http://www.belrap.be)

<sup>2</sup> [www.belrap.be](http://www.belrap.be)

<sup>3</sup> [academic.oup.com](http://academic.oup.com)



# What AI tools are most useful for medical writers and what are they used for?

AI tools have become invaluable for medical writers, helping to streamline various aspects of their work. Here are some of the most useful AI tools and their applications:

- 1. Jasper AI:** Ideal for creating medical blog posts and articles. It helps generate well-researched, SEO-optimized content, ensuring accuracy and readability<sup>1</sup>.
- 2. ContentBot.ai:** Useful for preparing regulatory documents. It automates the creation of detailed reports and submissions, saving time and reducing errors<sup>1</sup>.
- 3. Simplified:** Great for pharmaceutical marketing and promotional writing. It simplifies complex medical jargon into clear, engaging content<sup>2</sup>.
- 4. ChatGPT:** Excellent for producing educational materials. It can generate comprehensive explanations and summaries, making complex topics more accessible<sup>3</sup>.
- 5. Grafi.ai:** Helps in developing medical course content and curricula. It offers tools for creating accurate citations and visual aids like graphs and charts<sup>2</sup>.
- 6. Dezzai:** Assists in generating outlines, researching topics, and drafting articles. It uses natural language processing to streamline the writing process<sup>2</sup>.

# Perform literature searches



Analyze research papers at  
superhuman speed

# Find papers on 'assisted reproductive technology'

Paper	Abstract summary	Summary	Main findings
<input type="checkbox"/> <a href="#">Multi-scale computational models of the airways to unravel the pathophysiological mechanisms in asthma and chronic obstructive pulmonary disease (AirPROM)</a>  K. Burrowes +10  Interface Focus 2013 · 47 citations  DOI 	The AirPROM consortium is developing an integrated multi-scale model of the airways to unravel the pathophysiological mechanisms in asthma and COPD.	The paper presents an overview of the AirPROM project, which aims to develop an integrated multi-scale computational model of the airways to unravel the complex pathophysiological mechanisms occurring in the diseases asthma and chronic obstructive pulmonary disease (COPD).	<ul style="list-style-type: none"><li>- The AirPROM consortium is developing an integrated multi-scale computational model of the airways to better understand the complex pathophysiology of asthma and COPD.</li><li>- The model will integrate data and models across multiple biological scales, from genes and cells to the whole organ level.</li><li>- The goal is to improve patient phenotyping and enable personalized treatment approaches.</li></ul>
<input type="checkbox"/> <a href="#">An integrative systems biology approach to understanding pulmonary diseases</a>  C. Auffray +5  Chest 2010 · 157 citations  DOI 	The paper proposes an integrative systems biology approach to understand pulmonary diseases like asthma and COPD using multiscale models.	The summary of this paper is that it proposes an integrative systems biology approach to understanding pulmonary diseases like COPD and asthma, involving collecting and integrating global data sets to inform predictive models and test hypotheses through perturbation experiments.	<ul style="list-style-type: none"><li>- The main goal of the study is to use an integrative systems biology approach to understand the mechanisms and pathways involved in severe asthma.</li><li>- The study uses a multi-omics approach, integrating data from various biological levels, to develop predictive models of severe asthma.</li><li>- The study uses an iterative process of hypothesis testing, model refinement, and experimental validation to better understand the mechanisms and pathways involved in severe asthma.</li></ul>
<input type="checkbox"/> <a href="#">Assessment of the predictive capability of modelling and simulation to determine bioequivalence of inhaled drugs: A systematic review</a>  J. Rebello +2  DARU Journal of Pharmaceutical Sciences 2022 · 2 citations  DOI 	This review identifies various multiscale modeling techniques, including aerosol deposition, population PK, and PBPK models, that have been used for inhaled drugs in asthma and COPD, and assesses the applicability of these models to evaluate bioequivalence of orally inhaled products.	The summary of this paper is that it conducts a systematic review of published mathematical models used for inhaled drugs in asthma and COPD, and assesses the applicability of these models to evaluate bioequivalence of orally inhaled products.	<ul style="list-style-type: none"><li>- The review identified 22 articles on in silico aerosol deposition models, 20 articles on population pharmacokinetics, and 8 articles on physiologically based pharmacokinetic (PBPK) modeling for inhaled drugs in asthma and COPD.</li><li>- Among the aerosol deposition models, computational fluid dynamics (CFD) simulations are the most promising for predicting regional deposition of inhaled drugs in the respiratory tract.</li></ul>



Create a search string to retrieve articles from PubMed on the following topics [x, y, z]



To create an effective search string for PubMed, use Boolean operators and keywords related to your topic. Here's a suggested search string:

arduino

 Copy code

`"assisted reproductive technology" OR "ART" OR "in vitro fertilization" OR "IVF" OR "ferti`

This will retrieve articles focusing on assisted reproductive technologies (ART) and closely related topics.

If you want to refine the search further (e.g., by date, subject area, or specific population groups), you can add filters like:

1. By Date: `AND ("2015"[Date - Publication] : "2024"[Date - Publication])`
2. By Population: `AND ("human"[MeSH Terms])`
3. By Study Type: `AND ("review"[Publication Type])`

**"assisted reproductive technology" OR "ART" OR "in vitro fertilization" OR "IVF" OR "fertility treatments" OR "reproductive assistance"**

**220,719 results**



# Refine the string to retrieve articles with these words only in the title or abstract



To ensure that PubMed retrieves articles where the specified terms appear only in the title or abstract, you can use the `[tiab]` field tag. Here's a refined search string:

arduino

Copy code

```
("assisted reproductive technology"[tiab] OR "ART"[tiab] OR "in vitro fertilization"[tiab])
```

**((("assisted reproductive technology"[tiab] OR "ART"[tiab] OR "in vitro fertilization"[tiab] OR "IVF"[tiab] OR "fertility treatments"[tiab] OR "reproductive assistance"[tiab]) AND ("2015"[Date - Publication] : "2024"[Date - Publication]) AND "human"[MeSH Terms])**

**0 results**

Search

[Advanced](#) [Create alert](#) [Create RSS](#)

[User Guide](#)

Sort by: First author

Display options

No results were found.

Your search was processed without automatic term mapping because it retrieved zero results.

The following term was ignored: human



# Create a PubMed search string using the keywords 'assisted reproductive technology Belgium'



Here's a PubMed search string using the keywords **assisted reproductive technology** and **Belgium**, targeting their appearance in either the title or abstract:

bash

[Copy code](#)

```
("assisted reproductive technology"[title/abstract] OR "ART"[title/abstract]) AND "Belgium"
```

To refine the search with additional filters (e.g., publication dates or human studies), you can expand the query like this:

typescript

[Copy code](#)

```
(("assisted reproductive technology"[title/abstract] OR "ART"[title/abstract]) AND "Belgium"  
AND ("2015"[Date - Publication] : "2024"[Date - Publication])  
AND "human"[MeSH Terms])
```

This will retrieve articles specifically related to assisted reproductive technology in Belgium.

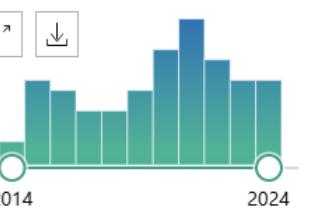
**((("assisted reproductive technology"[title/abstract] OR  
"ART"[title/abstract]) AND "Belgium"[title/abstract] AND  
("2015"[Date - Publication] : "2024"[Date - Publication]))**

**75 results**

# Next steps...

MY CUSTOM FILTERS 

RESULTS BY YEAR



PUBLICATION DATE

- 1 year
- 5 years
- 10 years
- Custom Range

TEXT AVAILABILITY

- Abstract
- Free full text
- Full text

ARTICLE ATTRIBUTE

- Associated data

ARTICLE TYPE

- Books and Documents
- Clinical Trial
- Meta-Analysis
- Randomized Controlled Trial
- Review
- Systematic Review

[See all article type filters](#)

75 results

Page 1 of 2

1 Deep neural network for traffic sign recognition systems: An analysis of spatial transformers and stochastic optimisation methods.

Cite Arcos-García Á, Álvarez-García JA, Soria-Morillo LM.  
Neural Netw. 2018 Mar;99:158-165. doi: 10.1016/j.neunet.2018.01.005. Epub 2018 Jan 31.  
PMID: 29427842

Several classification experiments are conducted over publicly available traffic sign datasets from Germany and **Belgium** using a Deep Neural Network which comprises Convolutional layers and Spatial Transformer Networks. ...The recognition rate of the proposed Convolutional ...

2 36th International Symposium on Intensive Care and Emergency Medicine : Brussels, **Belgium**. 15-18 March 2016.

Cite Bateman RM, Sharpe MD, Jagger JE, Ellis CG, Solé-Violán J, López-Rodríguez M, Herrera-Ramos E, Ruiz-Hernández J, Borderías L, Horcajada J, González-Quevedo N, Rajas O, Briones M, Rodríguez de Castro F, Rodríguez Gallego C, Esen F, Orhun G, Ergin Ozcan P, Senturk E, Ugur Yilmaz C, Orhan N, Arican N, Kaya M, Kucukerden M, Giris M, Akcan U, Bilgic Gazioglu S, Tuzun E, Riff R, Naamanı O, Douvdevani A, Takegawa R, Yoshida H, Hirose T, Yamamoto N, Hagiya H, Ojima M, Akeda Y, Tasaki O, Tomono K, Shimazu T, Ono S, Kubo T, Suda S, Ueno T, Ikeda T, Hirose T, Ogura H, Takahashi H, Ojima M, Kang J, Nakamura Y, Kojima T, Shimazu T, Ikeda T, Suda S, Izutani Y, Ueno T, Ono S, Taniguchi T, O M, Dinter C, Lotz J, Eilers B, Wissmann C, Lott R, Meili MM, Schuetz PS, Hawa H, Sharshir M, Aburageila M, Salahuddin N, Chantziara V, Georgiou S, Tsimogianni A, Alexandropoulos P, Vassi A, Lagiou F, Valta M, Micha G, Chinou E, Michaloudis G, Kodaira A, Ikeda T, Ono S, Ueno T, Suda S, Izutani Y, Imaizumi H, De la Torre-Prados MV, Garcia-De la Torre A, Enguix-Armada A, Puerto-Morlan A, Perez-Valero V, Garcia-Alcantara A, Bolton N, Dudziak J, Bonney S, Tridente A, Nee P, Nicolaes G, Wiewel M, Schultz M, Wildhag...

See abstract for full author list →

Crit Care. 2016 Apr 20;20(Suppl 2):94. doi: 10.1186/s13054-016-1208-6.

PMID: 27885969 [Free PMC article](#).

3 Center Effects in Hospital Mortality of Critically Ill Patients With Hematologic Malignancies.

Cite Biard L, Darmon M, Lemiale V, Mokart D, Chevret S, Azoulay E, Resche-Rigon M.  
Crit Care Med. 2019 Jun;47(6):809-816. doi: 10.1097/CCM.0000000000003717.  
PMID: 30889024

SETTING: Seventeen ICUs across France and **Belgium**. PATIENTS: One-thousand eleven patients with hematologic malignancies hospitalized in ICUs. INTERVENTIONS: Reanalysis of the original data using state-of-the-art statistical methods with permutation procedures for te ...

# Adapt text for different audiences



# Explain the generic and brand names of a drug to an 8-year-old



Copilot

Sure! Let's break it down in a simple way.

**Generic Name:** This is the common name for a medicine. It's like calling a dog "dog" instead of its specific name. For example, "ibuprofen" is a generic name.

**Brand Name:** This is the special name a company gives to the medicine. It's like calling a dog "Buddy" or "Max." For example, "Advil" is a brand name for ibuprofen.

So, **ibuprofen** is the generic name, and **Advil** is one of the brand names. Both names refer to the same medicine that helps with pain and fever, but the brand name is like a nickname given by the company that makes it.

Does that help? Do you have any other questions about medicines? 😊



# What is the reading age of the following medical text, and is it suitable for adult patients with no medical knowledge

To assess the reading age of the provided medical text, we can apply some common readability formulas. Since I can't calculate it directly, here's how you can do it manually or with an online tool.

Steps to Manually Assess the Reading Age:

## 1. Flesch-Kincaid Grade Level:

- **Formula:**

$$(\text{Grade Level}) = 0.39 \left( \frac{\text{Total Words}}{\text{Total Sentences}} \right) + 11.8 \left( \frac{\text{Total Syllables}}{\text{Total Words}} \right) - 15.59$$

- **Process:** Count the total words, sentences, and syllables in the text.

## 2. Gunning Fog Index:

- **Formula:**

$$(\text{Fog Index}) = 0.4 \left( \text{ASL} + \text{PHW} \right)$$

- **ASL (Average Sentence Length):** Total words divided by total sentences.

- **PHW (Percentage of Hard Words):** Percentage of words with three or more syllables.

## 3. SMOG Index:

- **Formula:**

$$(1.043 \sqrt{\text{Number of Polysyllabic Words}} \times \left( \frac{30}{\text{Number of Sentences}} \right) + 3.1291)$$

- **Process:** Count the number of polysyllabic words (words with three or more syllables) in 30 sentences.

Use an Online Tool:

You can use a tool like Hemingway App or Readability Score to input the text and get an immediate readability assessment. These tools automate the count of words, syllables, and sentences to apply these formulas and provide a grade level or age range.



# What is the reading age of the following medical text, and is it suitable for adult patients with no medical knowledge

To determine the reading age of the provided medical text, we can use readability formulas like the Flesch-Kincaid Grade Level. These formulas analyze the complexity of the text based on factors like sentence length and word difficulty.

Would you like me to calculate the reading age for you using one of these tools?

The text you provided is written at a reading level suitable for adults with no medical knowledge. It uses clear and straightforward language to explain complex medical concepts, making it accessible to a general audience. The use of simple sentences, common words, and explanations of medical terms helps ensure that the information is understandable.

Would you like any further assistance with this text?

 Edit in Pages

 Copy

● 6 of 30 responses   AI-generated content may be incorrect



# Key takeaways

# AI tools: Key takeaways

## Pros

- › Improve efficiency
- › Expand capabilities

## Cons

- › Time investment to learn how to use each tool
- › Inconsistent accuracy
- › Outputs limited when working at high level
- › Environmental concerns
- › AI-generated outputs easy to spot



Calling all healthcare professionals interested in #PFIC!

# Will AI replace medical writers?



[sarah@greenpensolutions.com](mailto:sarah@greenpensolutions.com)  
[www.greenpensolutions.com](http://www.greenpensolutions.com)

