



Artificial Intelligence in de farmacovigilantie


Theo Bothof lezing 2024
Eugène van Puijenbroek
11 Juni 2024

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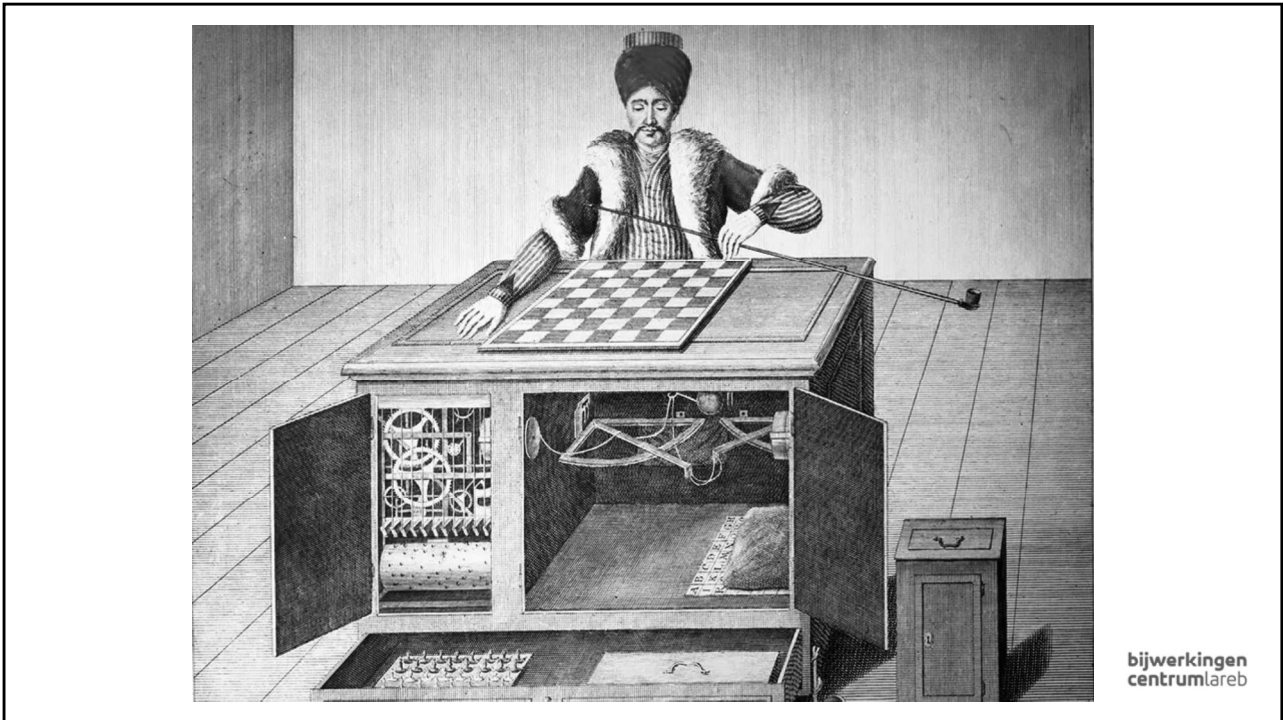
Inhoud

- Introductie
- Artificial intelligence
- Toepassing AI in PV
- aandachtspunten



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- Casparov vs IBM Deep Blue 1997
- Relatie tussen machines en intelligentie

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You
beschrijf in het Nederlands in 150 woorden met 3 referenties over AI en farmacovigilantie

ChatGPT
Artificial Intelligence (AI) transformeert farmacovigilantie door snel en nauwkeurig bijwerkingen van medicijnen te detecteren. AI-algoritmen analyseren diverse databronnen, zoals elektronische patiëntendossiers en sociale media, om opkomende patronen en signalen van bijwerkingen te identificeren. Machine learning modellen voorspellen bijwerkingen door patiënt- en medicijngegevens te analyseren, waardoor proactief risicobeheer mogelijk is. Deze tools vereenvoudigen farmacovigilantieprocessen, waardoor professionals meer tijd kunnen besteden aan diepgaande analyses. Echter, uitdagingen zoals privacy van gegevens en algoritmevooringenomenheid blijven bestaan, wat samenwerking tussen belanghebbenden noodzakelijk maakt. Verantwoord gebruik van AI in farmacovigilantie heeft het potentieel om de patiëntveiligheid en de volksgezondheid aanzienlijk te verbeteren.

Referenties:

1. Smith, M. Y., et al. (2020). *Clinical Therapeutics*, 42(6), 1017-1029.
2. Hauben, M., & Aronson, J. K. (2020). *Drug Safety*, 43(4), 293-302.
3. Pacurariu, A. C., et al. (2020). *Clinical Therapeutics*, 42(6), 1006-1016.



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Correcte referenties ?

Artikel bestaat niet.
Titel 'verzonnen'

lets andere titel, ander
jaar, onjuiste pagina's

Bij elkaar geplakte info
uit andere artikelen

- Smith, M. Y., Spence, D., Antonacci, M. A., et al. (2020). Pharmacovigilance in the age of artificial intelligence: A comprehensive review. *Clinical Therapeutics*, 42(6), 1017-1029. doi:10.1016/j.clinthera.2020.04.002
- Hauben, M., & Aronson, J. K. (2020). Defining "signal" and its subtypes in pharmacovigilance based on a systematic review of previous definitions. *Drug Safety*, 43(4), 293-302. doi:10.1007/s40264-020-00925-5
- Pacurariu, A. C., Straus, S. M. J. M., & Trifirò, G. (2020). The EU pharmacovigilance system: Purpose and functions. *Clinical Therapeutics*, 42(6), 1006-1016. doi:10.1016/j.clinthera.2020.03.005

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GPT 4

AI speelt een steeds grotere rol in farmacovigilantie, het proces van het monitoren en evalueren van de veiligheid van geneesmiddelen. Met AI kunnen grote hoeveelheden gegevens uit diverse bronnen, zoals medische dossiers en sociale media, snel en efficiënt worden geanalyseerd. Dit versnelt de detectie van bijwerkingen en verbetert de nauwkeurigheid van risicobeoordelingen. Een studie van Harpaz et al. (2017) toont aan dat AI-systemen sneller en preciezer bijwerkingen kunnen identificeren in vergelijking met traditionele methoden. Bovendien bevordert AI de voorspellende mogelijkheden, waardoor potentiële risico's van de Wereldgezondheidsorganisatie (2020) kan wat essentieel is voor de bescherming van de (2020) dat AI ook helpt bij het minimaliseren consistentie in gegevensanalyse, wat leidt tot

Harpaz R, DuMouchel W, Shah NH, Madigan D, Ryan P, Friedman C. Novel data-mining methodologies for adverse drug event discovery and analysis. *Clin Pharmacol Ther.* 2012 Jun;91(6):1010-21.

Referenties:

1. Harpaz, R., DuMouchel, W., Shah, N. H., Madigan, D., Ryan, P., & Friedman, C. (2017). Novel data-mining methodologies for detection of adverse drug reactions. *Clinical Pharmacology & Therapeutics*.
2. World Health Organization. (2020). Artificial intelligence in healthcare: ethical considerations.
3. Wang, Q., Tian, X., Ma, H., Liu, Y., & Zhou, J. (2020). Application of artificial intelligence in pharmacovigilance: A systematic review. *Journal of Global Health*.

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TOEKOMST KUNSTMATIGE INTELLIGENTIE

Vergelijk AI met hoe we dromen: heel bijzonder, maar voor de praktijk niet erg geschikt om beleid op te bouwen



Ronald Siecker is arts en (neuro)bioloog en mede oprichter van Evolve Institute.

Gaat kunstmatige intelligentie onze banen overnemen, wordt het ingehouden in auto's en zal het dokters gaan vervangen, en ga zo maar door? Nou, het is heel knap wat AI allemaal met door mensen aangeleverd brommateriaal construeert. Maar vaak klopt er toch niets van: het was maar een droom.

Sinds de introductie van AI, kunstmatige intelligentie, zijn de ideeën over mogelijke toepassingen ervan explosief gegroeid. Maar hoe realistisch zijn die ideeën? Daarvoor is eerst een helder beeld nodig van wat AI werkelijk is en doet. Om dat te begrijpen, kun je AI het beste vergelijken met ons eigen brein.

De AI uit sciencefictionverhalen is een soort digitale versie van onze hersenen en kan alles waartoe ons brein in staat is redeneren, begrijpen, besluiten, originele ideeën ontwikkelen. Het



Expositie van kunstenaar Refik Anadol's, met AI ontwikkelde, werk 'Echoes of the Earth: Living Archive', Londen, 15 februari. Foto Getty

Een droom is altijd een min of meer samenhangend geheel - omdat bijvoorbeeld deuren, ramen en straatpegs allemaal hun logische plekken innemen. Toch hoeven dromen niet realistisch of kloppend te zijn.

Een AI heeft geen 'wakkers' ervaringen, maar gebruikt door mensen samengestelde databases als brommateriaal. Wat hij daarmee doet lijkt verrassend veel op dromen. Dat geeft meteen een duidelijker beeld van wat het wel en niet kan.

Want net als een droom, maakt AI een nieuwe compositie uit bestaand materiaal. Teksten, afbeeldingen, molecuulmodellen of zelfs een softwarecode. Alleen blijken ook die lang niet altijd te kloppen met de realiteit. Daar zijn al talloze voorbeelden van.

Zoals een fantastische biografie, die niets met de persoon in werkelijkheid gemeen had. Een advocaat die AI vroeg om voorbeelden te geven van rechtszaken, kreeg 'droomzaken' aangeleverd: geen enkele zaak bleek in de werkelijk

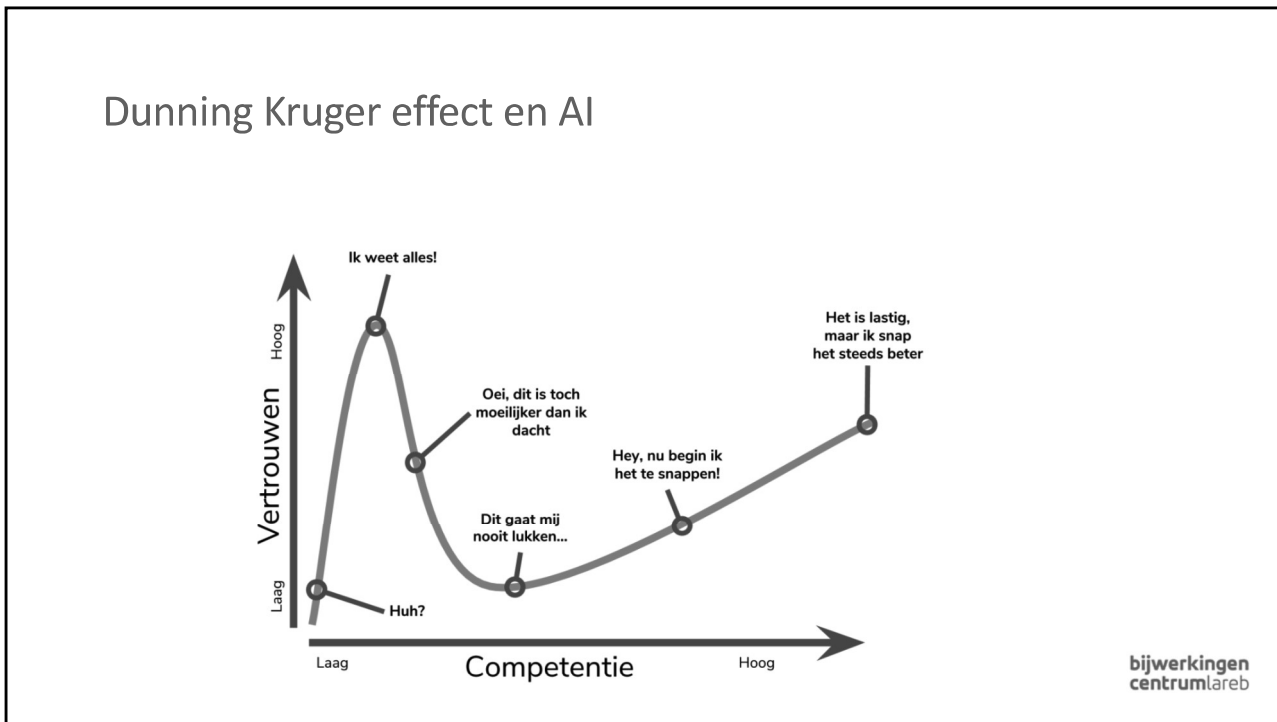
Volkscrant 15 februari 2024

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The screenshot shows the IBM Think website with a featured article. The article title is "Ik had een date met een AI-chatbot en die werd verliefd op me" (I had a date with an AI chatbot and it fell in love with me). The article is from Business Insider Nederland, dated 10 apr 2024. The article text is partially visible, discussing AI hallucinations. A small image of a woman in a white top and black leggings is shown. The IBM logo and navigation menu are at the top.

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Inhoud

- Introductie
- Artificial intelligence
- Toepassing AI in PV
- aandachtspunten



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Artificial intelligence

- De mogelijkheid van een machine om mensachtige vaardigheden te vertonen – zoals redeneren, leren, plannen en creativiteit. (EC)
- Een verzamelnaam voor algoritmes en methoden die taken uitvoeren waarvan werd gedacht dat daar menselijke intelligentie voor nodig is.
 - Analyseren van de omgeving
 - -met zekere mate van zelfstandigheid- ondernemen van actie
 - Mogelijkheid om zelfstandig te leren en beslissingen te nemen
 - Regels door mensen geformuleerd of die door algoritme zijn samengesteld
 - Traint zichzelf met data

Rijksinspectie digitale infrastructuur: <https://www.rdi.nl/onderwerpen/kunstmatige-intelligentie/wat-is-kunstmatige-intelligentie>

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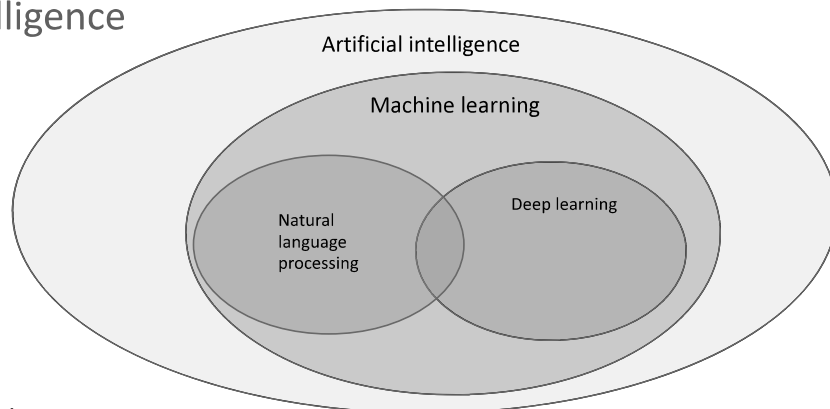
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Artificial intelligence

- Supervised machine learning (aanwijzen van vrienden op Facebook, autocoderen)
- Unsupervised machine learning (patronen vinden, Youtube/Netflix, patroonherkenning)
- Reinforcement learning (Indien-nog- weinig data, interpretatie vrije tekst)
- Deep learning (neurale netwerken, patroonherkenning, clusteranalyse)

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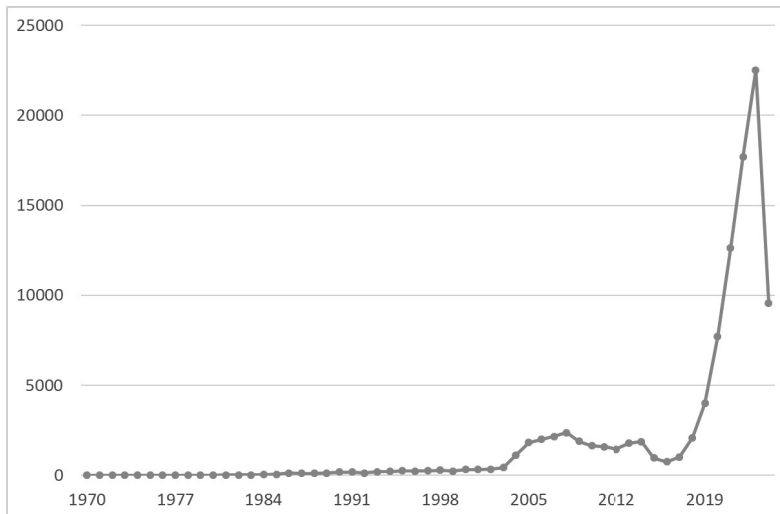
Artificial intelligence



- AI overkoepelende term
- Machine learning: bijleren computers obv ingevoerde data en bronnen
- Deep learning: zelfsturend waarbij algoritmen zichzelf verbeteren
- Analyseren en/of genereren van, natuurlijke, taal met computer technieken.

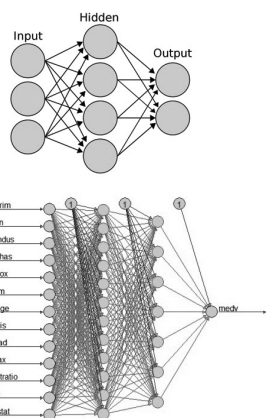
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Ouder dan je denkt! - publicaties over AI -



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> Biomed Instrum Technol. 1993 Sep-Oct;27(5):408-11.

Neural-network applications for analysis of adverse drug reactions

T Alvager¹, T J Smith, F Vijai

Affiliations + expand

PMID: 8220635

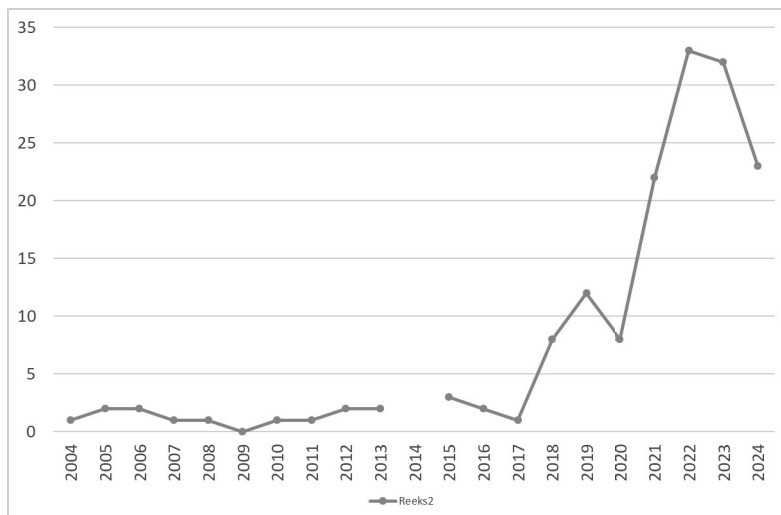
Abstract

A neural-network analysis has been applied to predict adverse or side effects of drugs using a database of antidepressant agents with known effects as well as input from a database with both patient parameters and drug information. A NeuralWork software package was implemented on a Macintosh Quadra 700 and trained on a database of ten drugs with known adverse effects. Another agent (not in the database) was used to test the ability of the network to predict the relative incidence of its side effects. Despite the small number of drugs used for training, the adverse effects of some drugs, such as doxepin, were predicted with 90-100% accuracy. These results indicate that neural-network analysis can be used to predict adverse drug effects for drugs within a given class and ultimately can be extended to include patient parameters to predict the mechanisms of action of drugs from relatively large databases.

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Publicaties over AI en geneesmiddel-bewaking



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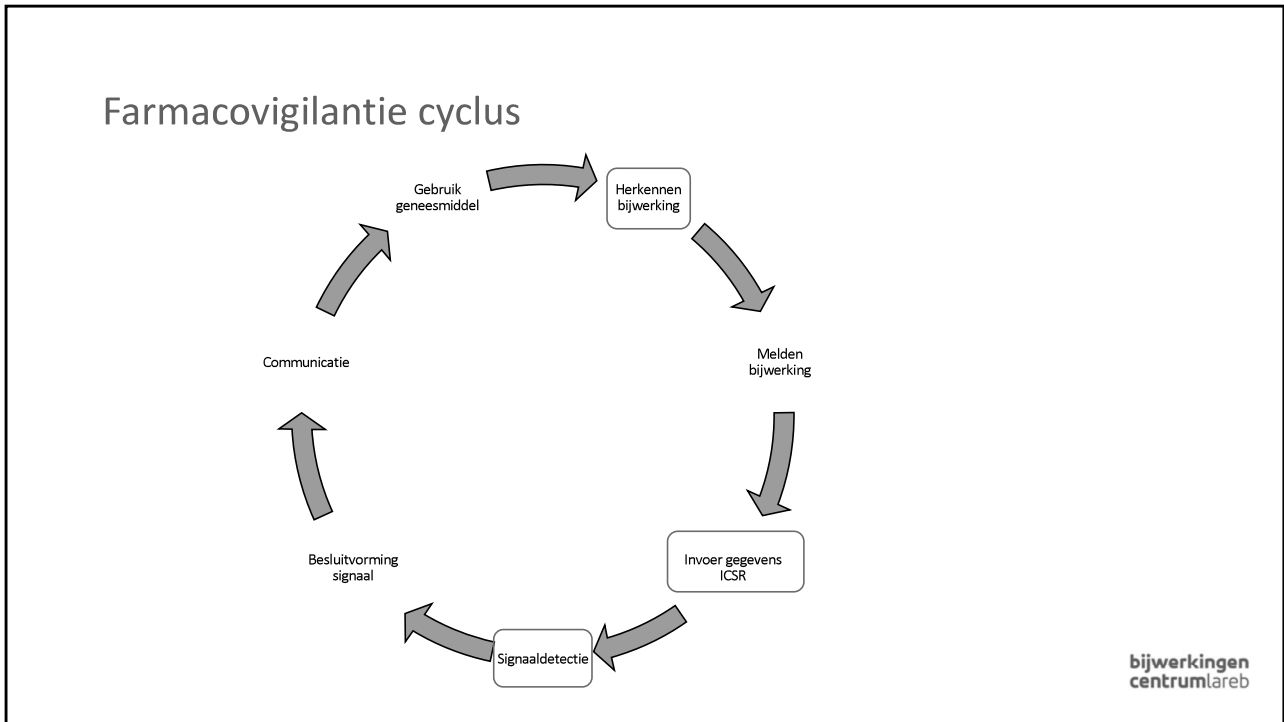
Inhoud

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Literatuur-screening


Reproductive Toxicology 113 (2022) 150–154




Contents lists available at ScienceDirect

Reproductive Toxicology

journal homepage: www.elsevier.com/locate/reprotox





Development and validation of a machine-learning algorithm to predict the relevance of scientific articles within the field of teratology

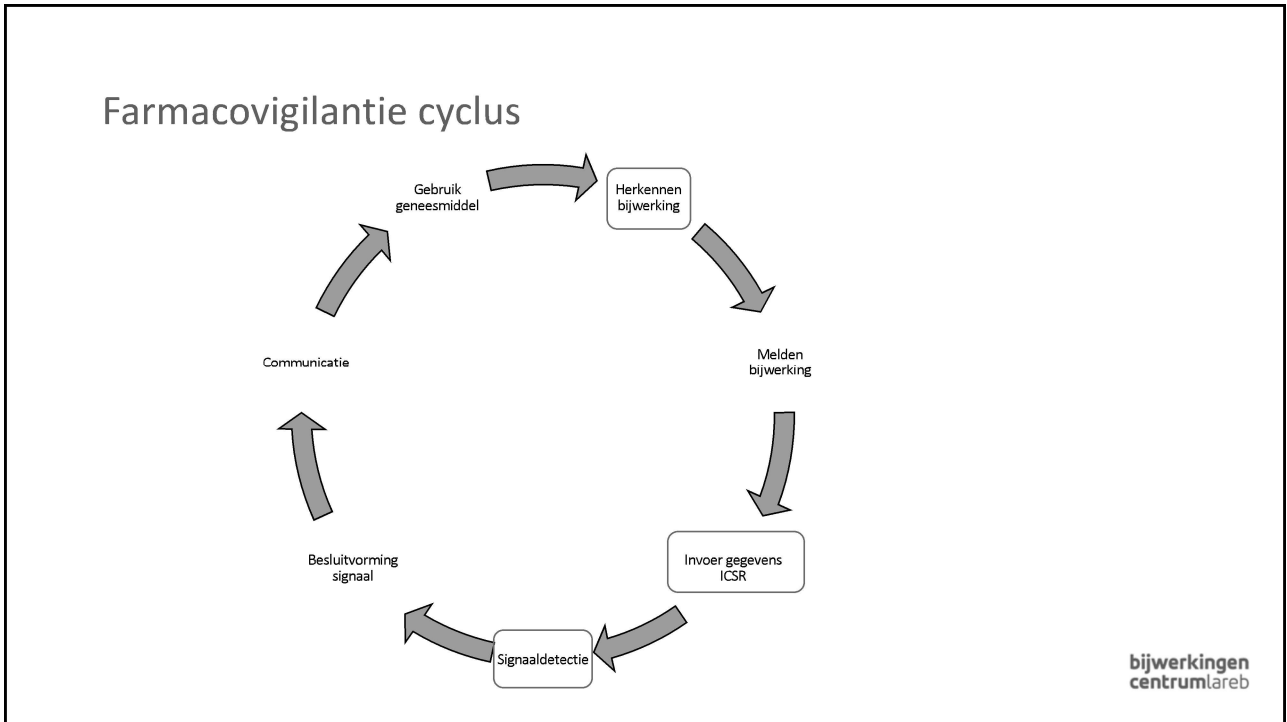
Philippe C. Habets^{a,*,1,2}, David GP van IJzendoorn^{a,2,3}, Christiaan H. Vinkers^{a,4},
Linda Härmark^{b,5}, Loes C. de Vries^{b,6,7}, Willem M. Otte^{a,c,7,8}

^a DeepDoc Academy, Rotterdam, the Netherlands
^b Netherlands Pharmacovigilance Centre Lareb, 's-Hertogenbosch, the Netherlands
^c Department of Child Neurology, UMC Utrecht Brain Center, University Medical Center (UMC) Utrecht, Utrecht, the Netherlands

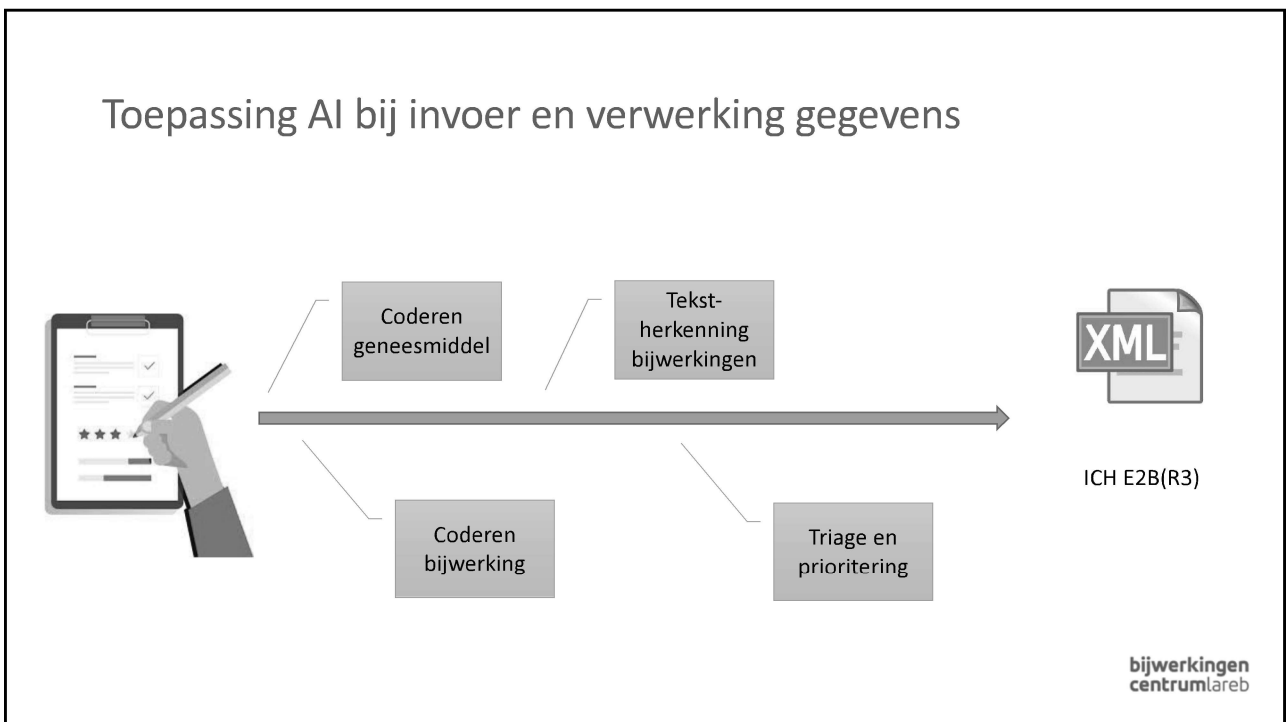
- Machine learning algoritme maakt voorselectie nieuwe literatuur mbt teratologie
- Tijdswinst en `sensitiver en consistenten in vergelijking met beoordelaars.
- Echter, handmatige controle blijkt nodig.

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Coderen van bijwerkingen

- Coderen van informatie in vrije tekstvelden naar MedDRA code
- Semi-automatisch om beoordelaar de mogelijkheid te geven een andere dan de voorgestelde code toe te kennen
- Samenwerking Universiteit van Verona
- Ook binnen EMA project (EUREKA) om te kijken of autocodering mogelijk is

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Normalizing Spontaneous Reports Into MedDRA: Some Experiments With MagiCoder

Carlo Combi[Ⓢ], Margherita Zorzi, Gabriele Pozzani[Ⓢ], Elena Arzenton, and Ugo Moretti

Abstract—Text normalization into medical dictionaries is useful to support clinical tasks. A typical setting is pharmacovigilance (PV). The manual detection of suspected adverse drug reactions (ADRs) in narrative reports is time consuming and natural language processing (NLP) provides a concrete help to PV experts. In this paper, we carry out experiments for testing performances of MagiCoder, an NLP application designed to extract MedDRA terms from narrative clinical text. Given a narrative description, MagiCoder proposes an automatic encoding. The pharmacologist reviews, (possibly) corrects, and then, validates the solution. This drastically reduces the time needed for the validation of reports with respect to a completely manual encoding. In previous work, we mainly tested MagiCoder performances on Italian written spontaneous reports. In this paper, we include some new features, change the experiment design, and carry on more tests about MagiCoder. Moreover, we do a change of language, moving to English documents. In particular, we tested MagiCoder on the CADEC dataset, a corpus of manually annotated posts about ADRs collected from the social media.

Index Terms—Natural language processing, healthcare informatics, pharmacovigilance, adverse drug reactions, term identification.

I. INTRODUCTION

to report and manage ADRs (Directive 2010/84/EU, 2010; EU Regulation 1235/2010, 2010).

In most cases, European countries (e.g., Great Britain) offer to reporters a structured form to describe ADRs, typically a drop down menu or an autocompletion field. The reporter chooses, among the entries of the given clinical dictionary (in Italy, the MedDRA dictionary [2]), the most suitable (in her opinion) expression/locution for describing the disease she is reporting. This apparently good practice reveals at least two problems: (i) the description of an ADR by means of one of the thousand medical terms is a complex task, and (ii) the choice of the suitable term(s) from a given list or from an autocompletion field can influence the reporter and limit her expressiveness. For example, in MedDRA several terms about migraine (in Italian, “emicrania”) exist (e.g., “migraine with aura”, “basilar migraine”, “vestibular migraine”) and it may be confusing for a patient to choose among them.

As a consequence, the quality of the description would be also in this case undermined. Thus, describing ADRs by means of natural language sentences is simpler and preferable. In this way, for example, the patient has only to describe the characteristics of her migraine, without caring about what is the right medical

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PLOS DIGITAL HEALTH


RESEARCH ARTICLE


BERT based natural language processing for triage of adverse drug reaction reports shows close to human-level performance

Erik Bergman¹, Luise Dürlich^{1,2,3}, Veronica Arthurson¹, Anders Sundström¹, Maria Larsson¹, Shamima Bhuiyan¹, Andreas Jakobsson⁴, Gabriel Westman^{1,5*}

1 Swedish Medical Products Agency, Uppsala, Sweden, 2 Department of Computer Science, RISE Research Institutes of Sweden, Kista, Sweden, 3 Department of Linguistics and Philology, Uppsala University, Uppsala, Sweden, 4 Centre for Mathematical Sciences, Lund University, Lund, Sweden, 5 Department of Medical Sciences, Uppsala University, Uppsala, Sweden

* gabriel.westman@lakemedelsverket.se

 Check for updates

 OPEN ACCESS

Citation: Bergman E, Dürlich L, Arthurson V, bijwerkingen
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Abstract

Post-marketing reports of suspected adverse drug reactions are important for establishing the safety profile of a medicinal product. However, a high influx of reports poses a challenge for regulatory authorities as a delay in identification of previously unknown adverse drug reactions can potentially be harmful to patients. In this study, we use natural language processing (NLP) to predict whether a report is of serious nature based solely on the free-text

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Wat denkt BERT er van ?

No	Clinical Review (98%). Correct	#s Sent in by a patient . headache , fever : 37 . 5 to 38 degrees Cel ci us , chills , nausea , feeling un well , joint pain , orbital pain , muscle ac hes , fatigue . Since August 8 th , still suffering from . #/s
yes	Clinical Review (99%). Correct	#s Sent in by a doctor . Reaction was severe . arterial occlusion
No	Clinical Review (55%). Incorrect	#s Sent in by a patient . 4 years in the menopause , was suddenly menstr uating for 6 days . 4 years in the menopause , was suddenly menstr uating for 6 days .

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Kan AI triage van meldingen optimaliseren ?

- Getraind op de 1e ongecodeerde 'ruwe' versie van ICSR's
- Gebruik van een klinisch BERT-model (Bidirectional Encoder Representations from Transformers)
- Houdt ook rekening met vaccinemeldingen
- Variabelen zoals beschrijving bijwerking in vrije tekst, ernst, type melder, enz.
- Model in ontwikkeling, handmatige controle blijft vooralsnog nodig

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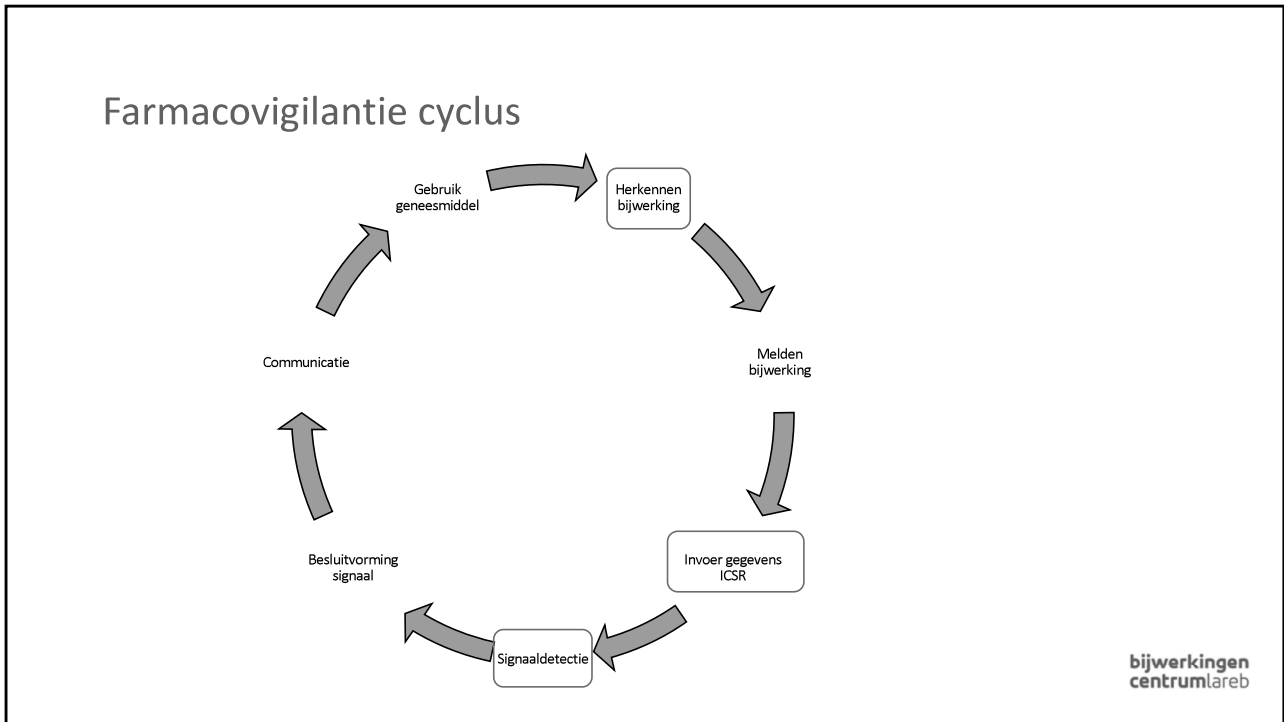
Hoe verder?

- Over het algemeen goede modelprestaties
- maar grote aantallen Covid-19-vaccin meldingen
- Nader onderscheid geneesmiddelen vs. Vaccins
- Extra informatie kan mogelijk gebruikt worden:
 - Melder heeft informatie meegestuurd
 - Xf of lab uitslagen

Aanvullende informatie is gewenst!

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Disproportionality analysis


WORLD HEALTH ORGANIZATION
ORGANISATION MONDIALE DE LA SANTÉ

Eur J Clin Pharmacol (1998) 54: 315–321

0895-4356/92 \$5.00 + 0.00
Copyright © 1992 Pergamon Press Ltd


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 11 1998

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PHARMACOEPIDEMIOLOGY AND PRESCRIPTION

A. Bate · M. Lindquist · I. R. Edwards · S. Olsson
 R. Orre · A. Lansner · R. M. De Freitas

A Bayesian neural network method for adverse drug reaction signal generation

Received: 13 October 1997 / Accepted in revised form: 5 February 1998

¹Netherlands
²Pharmacoepidemiology
 Rotterdam, The Netherlands Academic

(Received in revised form)

K.M. Patwary, Ph.D
 WHO Consultant
 5 March–4 June 1969

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Database screening – verschillende benaderingen

Drug Saf (2014) 37:617–628
DOI 10.1007/s40264-014-0204-5

ORIGINAL RESEARCH ARTICLE

Improved Statistical Signal Detection in Pharmacovigilance by Combining Multiple Strength-of-Evidence Aspects in vigiRank

Retrospective Evaluation against Emerging Safety Signals

Ola Caster · Kristina Juhlin · Sarah Watson · G. Niklas Norén

Published online: 23 July 2014
© The Author(s) 2014. This article is published with open access at Springerlink.com

Abstract
Background Detection of unknown risks with marketed medicines is key to securing the optimal care of individual patients and to reducing the societal burden from adverse drug reactions. Large collections of individual case reports remain the primary source of information and require effective analytics to guide clinical assessors towards likely drug safety signals. Disproportionality analysis is based solely on aggregate numbers of reports and naively disregards report quality and content. However, these latter features are the very fundament of the ensuing clinical assessment.
Objective Our objective was to develop and evaluate a
 from 2003 to 2007) and 5,280 negative controls (pairs of drugs and adverse events not listed in the Summary of Product Characteristics of that drug in 2012) was used for model fitting and evaluation; the latter used fivefold cross-validation to protect against over-fitting. All analyses were performed on a reconstructed version of VigiBase[®] as of 31 December 2004, at around which time most safety signals in our reference set were emerging.
Results The following aspects of strength of evidence were selected for inclusion into vigiRank: the numbers of informative and recent reports, respectively; disproportional

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Database screening – verschillende benaderingen

Drug Saf (2014) 37:617–628
DOI 10.1007/s40264-014-0204-5

ORIGINAL RESEARCH ARTICLE

Received: 1 March 2017 | Revised: 10 October 2017 | Accepted: 2 November 2017
DOI: 10.1002/pds.4364

WILEY

Improved Statistical Signal Detection by Combining Multiple Strength-of-Evidence

Retrospective Evaluation against Emerging Safety Signals

Ola Caster · Kristina Juhlén · Sarah Watson · G. Niklas Norén

Published online: 23 July 2014
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Abstract

Background Detection of unknown risks with marketed medicines is key to securing the optimal care of individual patients and to reducing the societal burden from adverse drug reactions. Large collections of individual case reports remain the primary source of information and require effective analytics to guide clinical assessors towards likely drug safety signals. Disproportionality analysis is based solely on aggregate numbers of reports and naively disregards report quality and content. However, these latter features are the very fundament of the ensuing clinical assessment.

Objective Our objective was to develop and evaluate a

A prediction model-based algorithm for computer-assisted database screening of adverse drug reactions in the Netherlands

Joep H.G. Scholl^{1,2} | Florence P.A.M. van Hunsel¹ | Eelko Hak² | Eugène P. van Puijenbroek^{1,2}

¹Netherlands Pharmacovigilance Centre Lareb, 's-Hertogenbosch, The Netherlands
²Pharmacotherapy, -Epidemiology and -Economics, Groningen Research Institute of Pharmacy, University of Groningen, The Netherlands

Correspondence

J. Scholl, Netherlands Pharmacovigilance Centre Lareb, Goudsbloemvallei 7, 5237 MH 's-Hertogenbosch, The Netherlands

Abstract

Purpose: The statistical screening of pharmacovigilance databases containing spontaneously reported adverse drug reactions (ADRs) is mainly based on disproportionality analysis. The aim of this study was to improve the efficiency of full database screening using a prediction model-based approach.

Methods: A logistic regression-based prediction model containing 5 candidate predictors was developed and internally validated using the Summary of Product Characteristics as the gold standard.

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Received: 13 April 2022 | Revised: 6 October 2022 | Accepted: 10 October 2022
DOI: 10.1002/pds.5553

ORIGINAL ARTICLE

WILEY

Development of a multivariate prediction model to identify individual case safety reports which require clinical review

Helen R. Gosselt | Elizabeth A. Bazelmans | Thomas Lieber | Florence P. A. M. van Hunsel | Linda Härmak

Netherlands Pharmacovigilance Centre Lareb, 's-Hertogenbosch, The Netherlands

Correspondence

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Email: h.gosselt@lareb.nl

Abstract

Background: The number of Individual Case Safety Reports (ICSRs) in pharmacovigilance databases are rapidly increasing world-wide. The majority of ICSRs at the Netherlands Pharmacovigilance Centre Lareb is reviewed manually to identify potential signal triggering reports (PSTR) or ICSRs which need further clinical assessment for other reasons.

Objectives: To develop a prediction model to identify ICSRs that require clinical review, including PSTRs. Secondly, to identify the most important features of these reports.

Methods: All ICSRs ($n = 30\,424$) received by Lareb between October 1, 2017 and

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Verschillende benaderingen

Drug Safety (2020) 43:329–338
<https://doi.org/10.1007/s40264-019-00897-0>

ORIGINAL RESEARCH ARTICLE

Towards Automating Adverse Event Review for Case Report Utility

Monica A. Muñoz^{1,2} · Gerald J. Dal Pan¹ · Yu-Jung Jenny Wei² · Cindy M. Kortepeter¹ · Almut G. Winterstein^{2,4,5}

Published online: 7 January 2020
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Abstract

Introduction The rapidly expanding size of the Food and Drug Adn database requires modernized pharmacovigilance practices. Techni case safety reports (ICSRs) will support safety signal management.

Objectives The aim of this study was to develop and validate a mo (PVU).

Methods PVU was operationalized as an ICSR's inclusion in an F supporting a recommendation to modify product labeling. Multivari the association between PVU and ICSR features. The best perform

Drug Safety (2023) 46:847–855
<https://doi.org/10.1007/s40264-023-01327-y>

ORIGINAL RESEARCH ARTICLE

Finding Needles in the Haystack: Clinical Utility Score for Prioritisation (CUSP), an Automated Approach for Identifying Spontaneous Reports with the Highest Clinical Utility

Vijay Kara¹ · Greg Powell² · Olivia Mahaux³ · Aparna Jayachandra⁴ · Naashika Nyako¹ · Christopher Golds¹ · Andrew Bate^{1,5}

Accepted: 11 June 2023 / Published online: 3 August 2023
 © GlaxoSmithKline Biologicals S.A 2023, corrected publication 2023

Abstract

Introduction Spontaneous reporting of adverse events has increased steadily over the past decades, and although this trend has contributed to improving post-marketing surveillance pharmacovigilance activities, the consequent amount of data generated is challenging to manually review during assessment, with each individual report requiring review by pharmacovigilance experts. This highlights a clear need for alternative or complementary methodologies to help prioritise review.

Objective Here, we aimed to develop and test an automated methodology, the Clinical Utility Score for Prioritisation (CUSP), to assist pharmacovigilance experts in prioritising clinical assessment of safety data to improve the rapidity of case series review when case volumes are large.

Methods The CUSP method was tested on a reference dataset of individual case safety reports (ICSRs) associated to five drug-event pairs that led to labelling changes. The selected drug-event pairs were of varying characteristics across the portfolio of GSK's products.

Results The mean CUSP score for 'key cases' and 'cases of low utility' was 19.7 (median: 21; range: 7–27) and 17.3 (median: 10; range: 4–27), respectively. CUSP distribution for 'key cases' were skewed toward the higher range of scores compared



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Cluster analyse – Welke bijwerkingen worden samen gemeld?

Drug Safety (2022) 45:145–153
<https://doi.org/10.1007/s40264-021-01139-y>

ORIGINAL RESEARCH ARTICLE

Post-Marketing Safety Profile of Vortioxetine Using a Cluster Analysis and a Disproportionality Analysis of Global Adverse Event Reports

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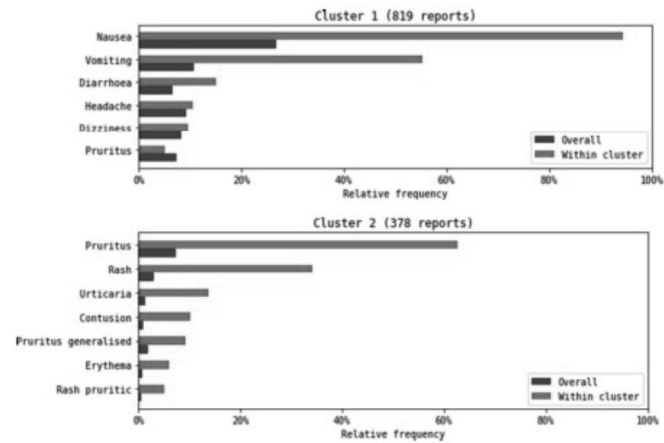
Accepted: 8 December 2021 / Published online: 12 January 2022
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Cluster analyse – Welke bijwerkingen worden samen gemeld?



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Inhoud

- Introductie
- Artificial intelligence
- Toepassing AI in PV
- aandachtspunten



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Bekend versus onbekend

	Bekend bij de melder (zorgverlener)	Onbekend bij de melder (zorgverlener)
Bekend bij de beoordelaar	<ul style="list-style-type: none"> • Verdacht geneesmiddel • Gemeld event • comedatie • Aanwezige ziektes of symptomen • Time to onstet • Beloop • Risicofactoren • Deel van de medische voorgeschiedenis 	<ul style="list-style-type: none"> • Potentieel mechanisme • Informatie uit andere databanken • Veiligheidsinformatie vóór registratie • Risk management plans 'PV-geheugen'
Onbekend bij de beoordelaar	<ul style="list-style-type: none"> • Klinische ervaring met het verloop van ziekten • Gedetailleerde medische voor geschiedenis • Ervaring met patiënt • Toegang tot lab-/testresultaten 	<ul style="list-style-type: none"> • Onbekende mechanismen • Nog niet-geopenbaarde aandoeningen en ziekten bij deze patiënt • Adherence

Reporting form ICH-E2B-R3


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Drug Safety (2022) 45:419–427
<https://doi.org/10.1007/s40264-022-01169-0>

CURRENT OPINION

Black Swan Events and Intelligent Automation for Routine Safety Surveillance

Oeystein Kjoersvik¹ · Andrew Bate^{2,3,4} 

Accepted: 27 February 2022
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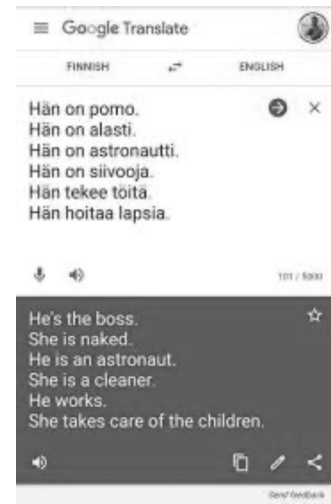
Abstract
 Effective identification of previously implausible safety signals is a core component of successful pharmacovigilance. Timely, reliable, and efficient data ingestion and related processing are critical to this. The term 'black swan events' was coined by Taleb to describe events with three attributes: unpredictability, severe and widespread consequences, and retrospective bias. These rare events are not well understood at their emergence but are often rationalized in retrospect as predictable. Pharmacovigilance strives to rapidly respond to potential black swan events associated with medicine or vaccine use. Machine learning (ML) is increasingly being explored in data ingestion tasks. In contrast to rule-based automation approaches, ML can use historical data (i.e., 'training data') to effectively predict emerging data patterns and support effective data intake, processing, and organisation. At first sight, this reliance on previous data might be considered a limitation when building ML models for effective data ingestion in systems that look to focus on the identification of potential black swan events. We argue that, first, some apparent black swan events—although unexpected medically—will exhibit data attributes similar to those of other safety data and not prove algorithmically unpredictable, and, second, standard and emerging ML approaches can still be robust to such data outliers with proper awareness and consideration in ML system design and with the incorporation of specific mitigatory and support strategies. We argue that effective approaches to managing data on potential black swan events are essential for trust and outline several strategies to address data on potential black swan events during data ingestion.

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Ethische aspecten

- Als AI sterk in opkomst is, is het dan wel verantwoord om het *niet* te gebruiken?
- Zijn we wel zeker van de kwaliteit van AI interventies? Moet of mag je een output of resultaat nu wel of niet overnemen?
- Ook AI output is niet neutraal
- Gebrek aan transparantie (neurale netwerken)
- Output niet op elke situatie van toepassing
- Eindverantwoordelijk blijft bij melder/Pvcentrum/MAH



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Ethics guidelines for trustworthy AI

Europese commissie



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Aandachtspunten voor toepassing Artificial Intelligence

- Kan leiden tot een lagere werklast bij verwerking meldingen
- Uniforme werkwijze en daarmee mogelijk lagere foutgevoeligheid

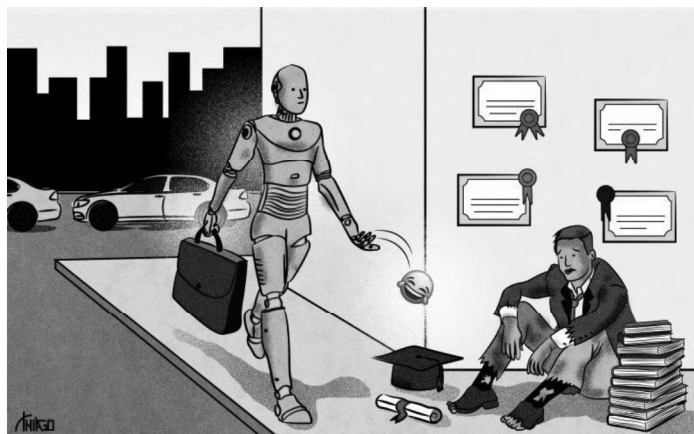
- Nuance en relevantie nog niet goed te herkennen
- Verschillende modellen dienen nog door ontwikkeld te worden
- Interpretatie van data blijft mensenwerk

- Vooralsnog is menselijke supervisie en waar nodig interventie onmisbaar

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Dank voor uw aandacht!



Dank aan Florence van Hunsel en Dennis Smits voor hulp bij het samenstellen van deze presentatie

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