# 15th Annual Neeting of ISNPP

**Communicating Science in an Era of Innovation and Change** 

April 15-17, 2019 • Gaylord National Resort & Convention Center • National Harbor, MD, USA

## How Can Artificial Intelligence Be Utilized in Publications?

**Presenters:** Ken Truman, Jenny Ghith, and Dheepa Chari **Moderator:** Todd Parker





#### Disclaimer

The views and opinions expressed in this presentation are those of the presenters and do not necessarily reflect the opinions of our employers.

The opinions do, however, reflect our research and professional efforts over the past 15 years.



### Agenda



Current Applications of AI Ken Truman, VP, Insights & Connections, MedThink SciCom



Operationalizing Applications of Al at a Pharmaceutical Company Dheepa Chari, Team Lead, Global Scientific Publications, Pfizer Oncology



#### Emerging Applications of AI in Publications Jenny Ghith, Director, Global Scientific Publications,

Pfizer Oncology



## Learning Objectives

01 Define key terminology applicable to artificial intelligence (AI) and current applications in health care



Operationalize AI initiatives in an
 organization (prioritize opportunities and get executive buy-in)



Identify potential applications of AI in medical publications

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## CURRENT APPLICATIONS OF AI



Ken Truman VP, Insights & Connections, MedThink SciCom Any sufficiently advanced technology is indistinguishable from magic.

Arthur C. Clarke



### **Basic Definitions**

#### **Artificial intelligence (AI)**

Systems designed to mimic tasks normally requiring human intelligence

#### **Machine learning**

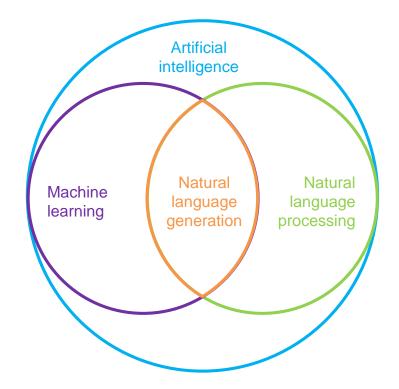
Algorithms that learn from and make inferences or predictions based on data; models improve as more information is available

#### Natural language processing (NLP)

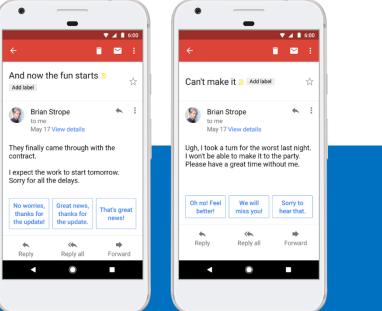
Machine-based processing that allows for human-like interpretation of text

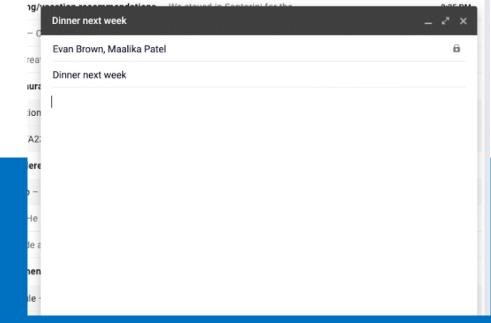
#### Natural language generation (NLG)

Natural-language processing task of generating natural language from data











## **Associated Press Earnings Reports**

AP News McCormick beats Street 3Q forecasts

October 02

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SPARKS, Md. (AP) - McCormick & Co. (MKC) on Thursday reported profit of \$122.9 million in its fiscal third quarter.

www.ap.pro

The Sparks, Maryland-based company said it had profit of 94 cents per share. Earnings, adjusted for non-recurring costs, came to 95 cents per share.

The results topped Wall Street expectations. The average estimate of analysts surveyed by Zacks Investment Research was for earnings of 81 cents per share.

#### VIDEO: Adobe 3Q Sales Miss Estimates Amid Shift to Cloud

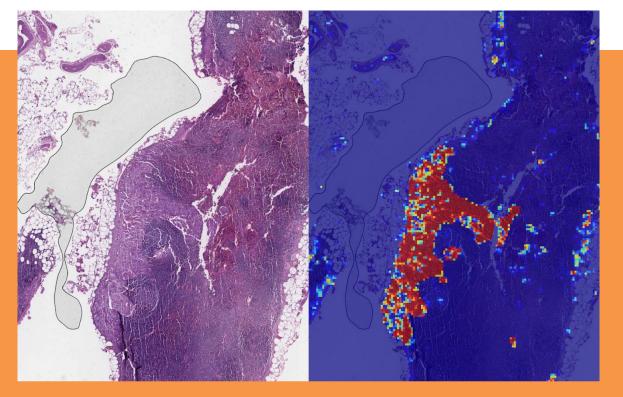
The spices and seasonings company posted revenue of \$1.04 billion in the period, which also topped Street forecasts. Analysts expected \$1.03 billion, according to Zacks.

- Every quarter, public companies in the United States release corporate earnings
- Companies like the Associated Press (AP) go through these reports, extracting the relevant financial numbers to compose stories based on these numbers
- Process is time-consuming and not scalable; could only produce 300 stories per quarter
- Using NLG platform, AP can now produce 4400 quarterly earnings stories per quarter

McCormick expects full-year earnings in the range of \$3.30 to \$3.37 per share.

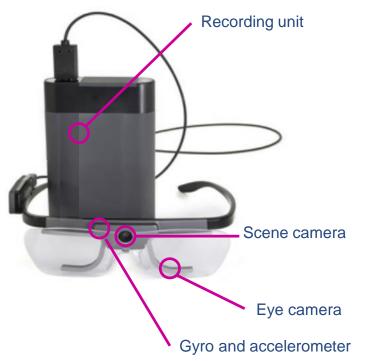


Machine Learning for Detection of Breast Cancer Metastases



## AI Application in Publications: Machine Learning Algorithms Can Simulate Attention

#### **Oculomotor Camera**



#### **Machine Learning Algorithms**



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# **Predictive Analytics for Effective Poster Design**

aly is of stroma and immune-related gene expression patterns during o Joan Albandl<sup>114</sup>, Hartmut Koeppen<sup>1</sup>, Eduardo Martínez de Dueñas<sup>25</sup>, Dan Halligan<sup>e</sup>, Angel Guerrero-Zótano<sup>22</sup>, Jose Ignacio Chacon<sup>23</sup>, Ramón Pérez<sup>2 II</sup>, Silvia Antolin<sup>210</sup>, Isabel Blancas<sup>2 11</sup>, Montserrat M Ampara Cara 11 Maria Helena Lépez-Ceballos 11 Maria Sánchez-Aragol, Rosalia Caballero<sup>2</sup>, Eva Carrasco<sup>2</sup>, Ana María Gonzaloz-Angulo<sup>11</sup>, Ana Lluch<sup>1,3,10</sup>, Elizabeth A. Mittendorf<sup>10</sup>, Federico Rojo an Inst. Annual. Scient Thiogenet San Portro in Altrantas. Calorent, Spain. "The University of Texas MD Anderson Canter Center, Houston, TX. "Hospital Clinico Universitaing in Vallancia. Vallancia. Vallancia. Spain. "Fundación Umitinez Díaz. Madrid, Spain.

spanish breast cancer group

#### UCTION

ulating evidences immune cells are ents of tumors (1), ne immune system nesis is still a matter

of the immune tumors during id aid at developing nerapy strategies. sught to identify the expression nune-related genes ired samples of ist tumors and from patients the GEICAM/2009-R) study.

CTIVES ze the immune ring breast cancer terms of: xpression and

gene expression

#### MATERIALS AND METHODS

✓ We analyzed in 44 matched pairs plus 1 primary and 1 metastatic non-matched tissues from 46 patients participating in the ConvertHER study, PD-L1 expression by immunohistochemistry (IHC) using a specific antibody for tumor and immune cells detection (2) (Figure 1).

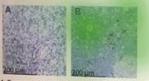


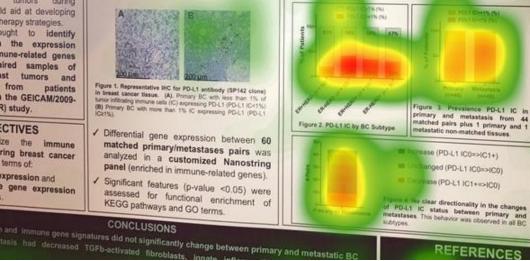
Figure 1. Representative IHC for PD-L1 antibody (SP142 clone) In breast cancer tissue. (A). Primary BC with less than 1% of tumor infitrating immune cells (IC) expressing PD-L1 (PD-L1 (C<1%) (8) Prenary BC with more than 1% IC expressing PD-L1 (PD-L1

 Differential gene expression between 60 matched primary/metastases pairs was analyzed in a customized Nanostring panel (enriched in immune-related genes). ✓ Significant features (p-value <0.05) were assessed for functional enrichment of KEGG pathways and GO terms.

CONCLUSIONS

Prevalence of PD-L1 in immune infiltrating cells (IC) was lowest in ER+HER2- specimens (Figure 2). PDL1 expression in tumor cells (TC) was observed in 1/90 samples.

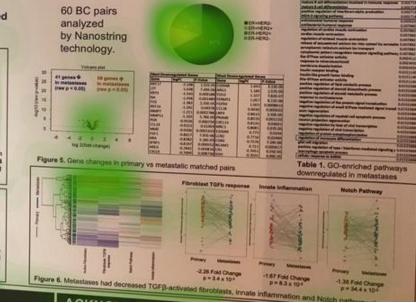
/ No significant changes in PD-L1 IC were observed between matched pairs (Figures 3 and 4).



#### RESULTS

/ No changes in pre-specified immune signatures were observed (Figure 5).

/ Metastases had decreased Notch pathway, innate inflammation and TGFbactivated fibroblasts signatures (Figure 6).



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# OPERATIONALIZING APPLICATIONS OF AI AT A PHARMACEUTICAL COMPANY



Dheepa Chari Team Lead, Global Scientific Publications, Pfizer Oncology



## **Operational Approach for Selection of AI Initiatives**



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## **Identifying Opportunities for AI**

## NSIGHTS

Detect key patterns and relationships from data in real time to derive deep, actionable insights

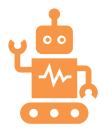
- Gap analyses to identify trends
  over time
- Systematic literature reviews





Use mass personalization and influence desired actions to improve customer, patient, and employee engagement

- Digital assistants to answer scientific and clinical questions via lifelike conversations
- Bots to coordinate logistics of HCP interactions



## AUTOMATE

Automate repetitive, knowledgeand natural language-rich, human-intensive decision-making processes

- Use AI to detect AE reporting in Medical Information requests
- Automated document review for medical/legal/regulatory

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## Things to Consider



- Are there sufficient relevant data?
- Is there bandwidth on your team to guide the project? Sufficient financial support?

#### 02 VALUE • Can vo

01

- Can you articulate the value of the investment?
- What does success look like?

## 03 • Is team aligned or

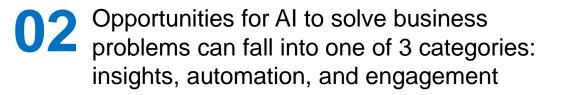
- Is team aligned on maturity of technology and expectations on what is achievable?
  - Assuming successful pilot, are you prepared to adapt to new ways of working?

Prioritization of potential initiatives requires alignment with leadership



## So Where Should I Start?

**01** The growth of big data, advanced analytics, cloud computing, and digital engagement capabilities is creating new opportunities for AI-based approaches





Start by asking a business question!

# EMERGING APPLICATIONS OF AI IN PUBLICATIONS



Jenny Ghith Director, Global Scientific Publications, Pfizer Oncology





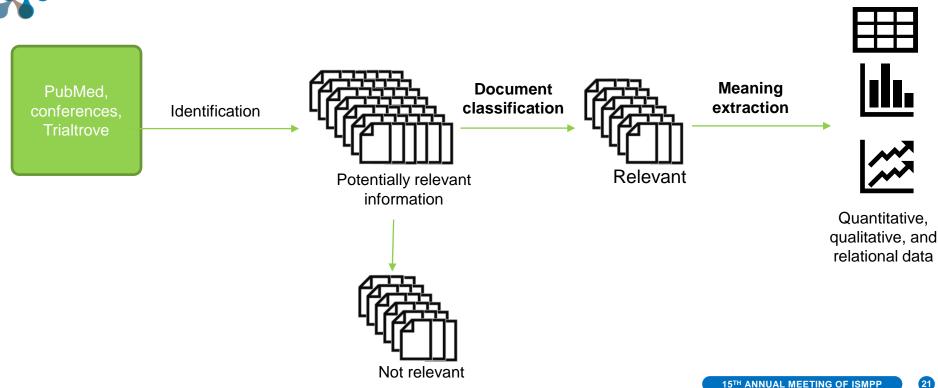
### Information Overload Exceeds Human Capacity

1 million articles per year<sup>1</sup>

• 2 minutes per page<sup>2</sup>

1. Extance. Nature. 2018;561:273-274. 2. Balduino. dzone.com/articles/text-analytics-finding-insights-in-scientific-publ. Published October 26, 2017. Accessed March 18, 2019.

## **Opportunities for Automation and Insight Generation in Publication Gap Analyses**





# Challenges With Monitoring and Evaluating Progress

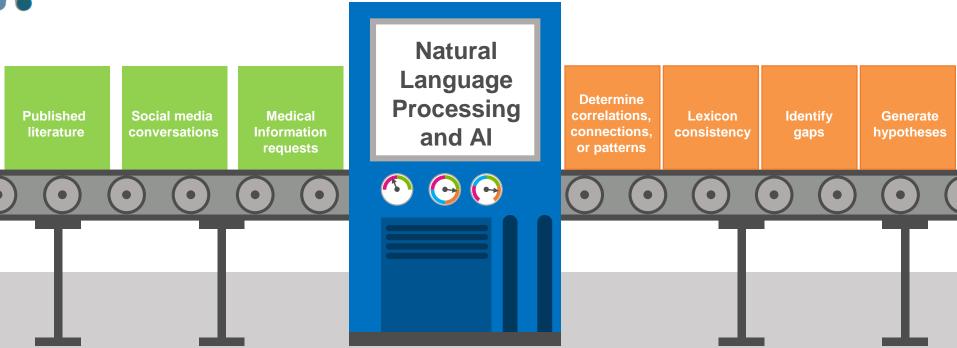
#### **Document Classification Results**

Predicted	True, no	True, yes
No	True negative	False negative
Yes	False positive	True positive

Overall model accuracy is important, but minimizing false negatives takes priority over reducing false positives



### **Automated Insights From Content Analysis**





#### Key Takeaways for Use of AI in Publications

**01** The technology is here and is already being integrated throughout the industry



Leveraging AI has the potential to significantly impact your current practices, increasing efficiency and allowing more time for thinking



Understand the strengths and limitations of AI as a tool, but always evaluate through the lens of the business need



#### Resources

#### **Getting started in Al**

- Agrawal A, Gans JS, Goldfarb A. What to expect from artificial intelligence. *MIT Sloan Management Review.* 2017;58(3).
- Extance A. How AI technology can tame the scientific literature. Nature. 2018;561:273-274.
- What is artificial intelligence? In 5 minutes. YouTube. www.youtube.com/watch?v=2ePf9rue1Ao. Accessed March 18, 2019.
- Wilson HJ, Daughtery PR, Morini-Bianzino N. The jobs that artificial intelligence will create. *MIT Sloan Management Review*. 2017;58(4).

#### **Al-related education/conferences**

- Artificial Intelligence: Implications for Business Strategy (online course). MIT Management Executive Education. executive.mit.edu/openenrollment/program/artificial-intelligenceimplications-for-business-strategy-self-paced-online. Accessed March 18, 2019.
- IBM Think. IBM. www.ibm.com/events/think. Accessed March 18, 2019.
- The AAAI Conference on Artificial Intelligence. Association for the Advancement of Artificial Intelligence. https://www.aaai.org/home.html. Accessed March 18, 2019.

#### **Advanced reading**

- Magic quadrant for data science and machine-learning platforms. Reltio. www.reltio.com/gartner-mq-report. Accessed March 13, 2019.
- Renganathan V. Text mining in biomedical domain with emphasis on document clustering. *Healthc Inform Res.* 2017;23(3):141-146.

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## **THANK YOU!**



# Working Session: What Are the Greatest Opportunities in Your Organization?

# NSIGHTS

Detect key patterns and relationships from data in real time to derive deep, actionable insights

• X





Use mass personalization and influence desired actions to improve customer, patient, and employee engagement

• X



## AUTOMATE

Automate repetitive, knowledgeand natural language-rich, human-intensive decision-making processes

• X

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## QUESTIONS?



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 $15^{TH}$  annual meeting of ismpp

## **UP NEXT!**

Roundtables 5:15 PM–5:45 PM Woodrow Wilson Ballroom

ISMPP Member Poster Presentation & Reception 5:45 PM–6:45 PM Cherry Blossom Ballroom Foyer



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## **BACKUP SLIDES**

