SynDiag

Artificial Intelligence for Gynecology

Early diagnosis of cancer with AI for Sonography

Rosilari Bellacosa - founder and R&D
rosilari.bellacosa@syndiag.ai

AI in Healthcare

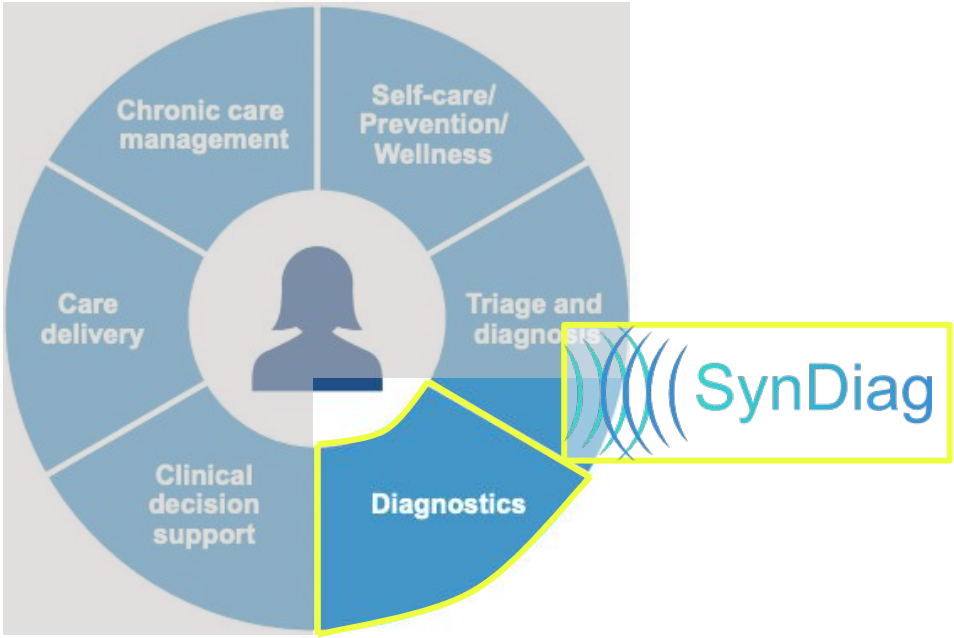
Improving population-health management

Improving operations

Strengthening innovation

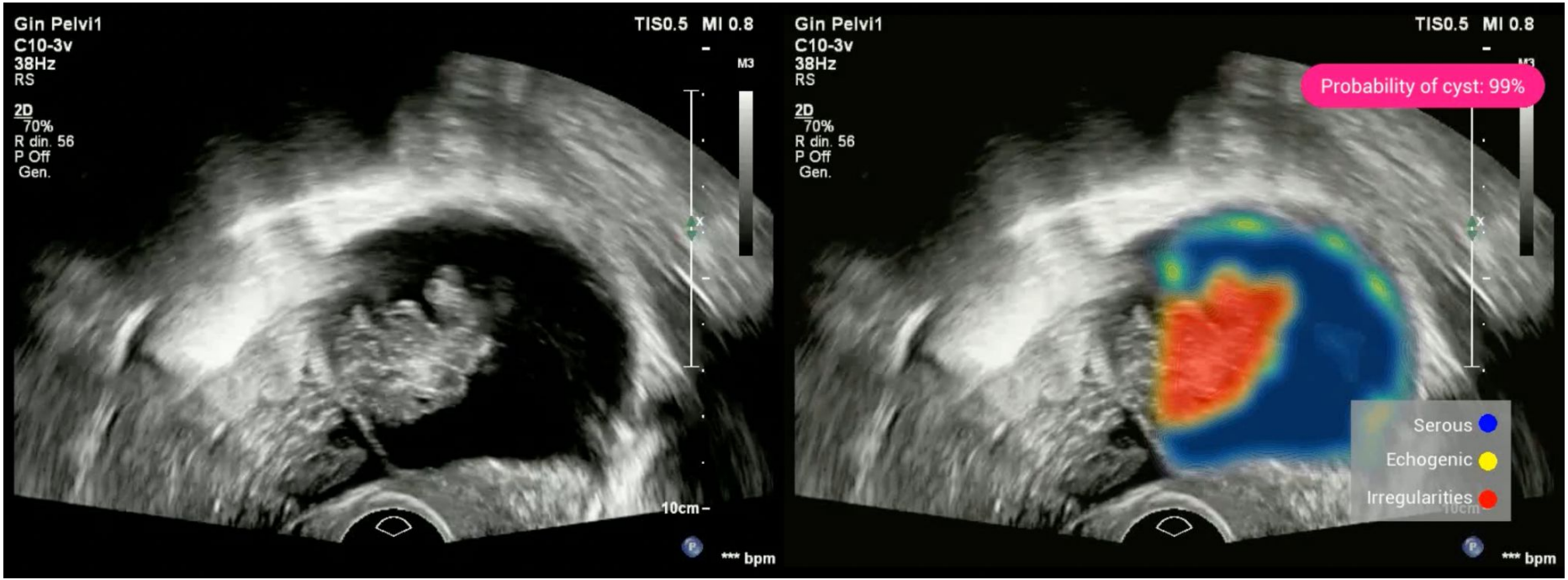
EIT, McKinsey- Health report, 2020

AI in Healthcare



EIT, McKinsey- Health report, 2020

AI in Healthcare - SynDiag example

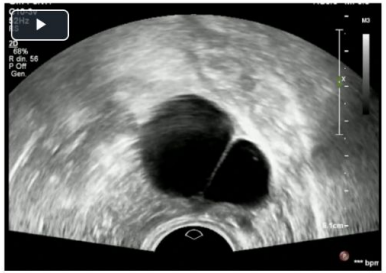


AI in Healthcare - SynDiag example

OvAi dataset and task.

1. Hospital involvement: multicenter, observational, protocol
2. Importance of privacy
3. Armonization
4. Scarcity, tumor type distribution
5. Labelling
6. Task complexity

AI in Healthcare - SynDiag example



Identificativo proprio: M_0008 — OvAi

Creato il 31 maggio 2021

Cistoadenoma sieroso

Leggi di più...

Condividi o stampa | Dettaglio caso clinico

Identificativo proprio: M_0007 — OvAi

Creato il 31 maggio 2021

Cistoadenocarcinoma endometrioide dell'ovaio sinistro

Leggi di più...

Condividi o stampa | Dettaglio caso clinico

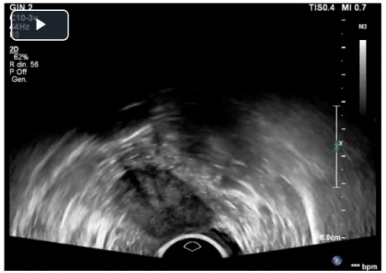
Identificativo proprio: M_0006 — OvAi

Creato il 30 maggio 2021

Cistoadenoma sieroso papillare con limitate aree di cistoadenoma borderline

Leggi di più...

Condividi o stampa | Dettaglio caso clinico



Identificativo proprio: M_0005 — OvAi

Creato il 30 maggio 2021

Fibrotecoma bilaterale dell'ovaio

Leggi di più...

Condividi o stampa | Dettaglio caso clinico

Identificativo proprio: M_0004 — OvAi

Creato il 30 maggio 2021

CISTOADENOMA MUCINOSO DELL'OVAIO (sx) CON MINORITARIA (< 10%) COMPONENTE PROLIFERATIVA ENDOCISTICA ATIPICA TIPO BORDERLINE (sec. WHO 2014). Aree associate di flogosi granulocitaria ed istiocitaria con aspetti reattivi a spandimento di muco in sede intralesionale (stroma) e perilesionale (superficie sierosa).

Leggi di più...

Identificativo proprio: M_0003 — OvAi

Creato il 24 maggio 2021

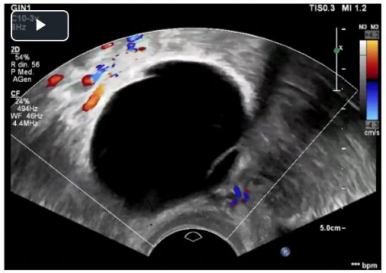
Nessun report istologico presente

Identificativo proprio: M_0002 — OvAi

Creato il 1 marzo 2021

Paziente inviata a chirurgia - referto istologico atteso per metà marzo

Leggi di più...



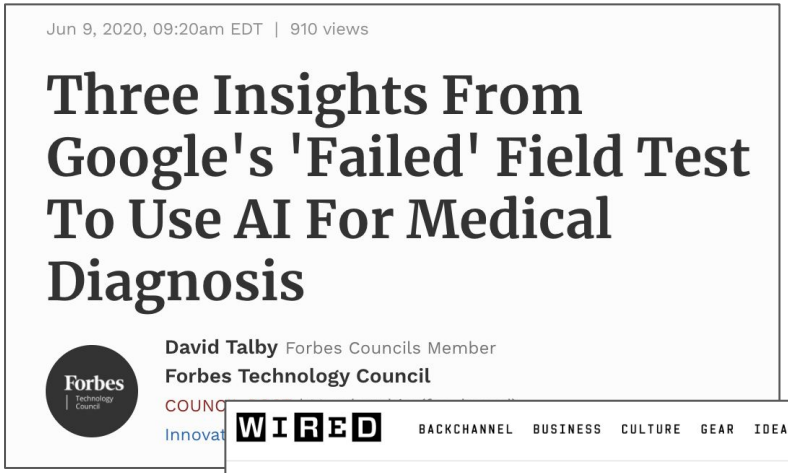
Identificativo proprio: M_0001 — OvAi

Creato il 11 febbraio 2021

Cistoadenofibroma sieroso dell'ovaio

Leggi di più...

AI in Healthcare - current limitations



Jun 9, 2020, 09:20am EDT | 910 views

Three Insights From Google's 'Failed' Field Test To Use AI For Medical Diagnosis

Forbes Technology Council

David Talby Forbes Councils Member

Forbes Technology Council

COUNC

Innovat

WIRED BACKCHANNEL BUSINESS CULTURE GEAR IDEAS SCIENCE SECURITY SIGN IN

GREGORY BARBER BUSINESS 05.19.2020 06:00 AM

Why Didn't Artificial Intelligence Save Us From Covid-19?

The key to good AI is solid data, and that's been tough to come by in a global health crisis.

What happens when you try to translate research to real-life data?
The importance of:

- Data
- Trust

AI in Healthcare - data

AI in Healthcare - data

"The data scientists just go where the data is rather than where the needs are!"
"Yes, but will this work for my patients?"

Desirable functions of a benchmark dataset.

1. Priorities and desired tasks decided **together** with local and national healthcare providers

2. Facilitating like-for-like comparison of models

3. Reproducibility

4. Normative influence on the clinical domains: create a **standard**

Panch et al., 2020

AI in Healthcare - data

Synthesis of engineering, legal, clinical, and health systems expertize.

1. Design of the dataset
2. Compliance and contracting issues relating to the sharing of sensitive data
3. FAIR: findable, accessible, interoperable, and reusable
4. Planning translation of algorithms to the clinical environment

Panch et al., 2020

AI in Healthcare - data

Synthesis of engineering, legal, clinical, and health systems expertize.

1. **Design of the dataset**
    a. optimal ease-of-use AND data in its native form
    b. common data models for creating multicenter datasets
    c. feedback and control
2. **Compliance and contracting issues relating to the sharing of sensitive data**
3. **FAIR: findable, accessible, interoperable, and reusable**
4. **Planning translation of algorithms to the clinical environment**

Panch et al., 2020

AI in Healthcare - data

Synthesis of engineering, legal, clinical, and health systems expertize.

1. **Design of the dataset**
   a. optimal ease-of-use AND data in its native form
   b. common data models for creating multicenter datasets
   c. feedback and control
2. **Compliance and contracting issues relating to the sharing of sensitive data**
   a. anonimization
   b. informed consent
   c. etical committee
3. **FAIR: findable, accessible, interoperable, and reusable**
4. **Planning translation of algorithms to the clinical environment**

Panch et al., 2020

AI in Healthcare - data

Synthesis of engineering, legal, clinical, and health systems expertize.

1. **Design of the dataset**
   a. optimal ease-of-use AND data in its native form
   b. common data models for creating multicenter datasets
   c. feedback and control
2. **Compliance and contracting issues relating to the sharing of sensitive data**
   a. anonimization
   b. informed consent
   c. etical committee
3. **FAIR: findable, accessible, interoperable, and reusable**
4. **Planning translation of algorithms to the clinical environment**

Panch et al., 2020

AI in Healthcare - data

Synthesis of engineering, legal, clinical, and health systems expertize.

1. **Design of the dataset**
   a. optimal ease-of-use AND data in its native form
   b. common data models for creating multicenter datasets
   c. feedback and control
2. **Compliance and contracting issues relating to the sharing of sensitive data**
   a. anonimization
   b. informed consent
   c. etical committee
3. **FAIR: findable, accessible, interoperable, and reusable**
4. **Planning translation of algorithms to the clinical environment**
   a. *local* benchmark datasets

Panch et al., 2020

Q1.

What are the features of the main public/available medical datasets?

AI in Healthcare - trust

- Measurable, quantifiable, and transferable attributes of AI solutions
- To build trust in the AI solution
- Associated with clinical relevance
- To facilitate onboarding and promote retention.

Explainability helps building trust in AI.

A highly accurate AI system is not necessarily sufficient in and of itself to be routinely utilized and endorsed by clinical staff (Bedoya et al., 2019; Guidi et al., 2015)

AI in Healthcare - clinically relevant explanations

1. Capabilities and limitations

Medical need:

- **Overview of model's strengths and weaknesses** (Cai et al., 2019; Gaube et al., 2021)
- Well-known edge cases
- Models with lower accuracy are acceptable when it is clear why they under-perform (Tonekaboni et al., 2019).
- A larger library of domain-specific test cases could be leveraged to provide an overview of a model's strengths and weaknesses during onboarding and to calibrate AI

Cai et al., 2019; Gaube et al., 2021; Tonekaboni et al., 2019; Kampa et al., 2021

AI in Healthcare - clinically relevant explanations

2. Functionality: input - process - output

Medical need:

- **Transparent design**
- Information on input (dataset used in training)
- Complete information on input and contextual information used by the model (Tonekaboni et al., 2019; Cai et al., 2019)
- Not knowing the AI's process degrades trust (Cai et al., 2019)

Cai et al., 2019; Gaube et al., 2021; Tonekaboni et al., 2019; Kampa et al., 2021

AI in Healthcare - clinically relevant explanations

3. Medical point-of-view

Medical need:

- The model subjective point of view (Cai et al., 2019)
- Sensitivity, specificity
- **The model is seen as a peer's second opinion**
- Practitioners are surprised by system errors that are qualitatively different from the types of errors they make or when they are inconsistent with their own mental schema (Hartswood et al., 1997, 1996)

Cai et al., 2019; Gaube et al., 2021; Tonekaboni et al., 2019; Kampa et al., 2021

AI in Healthcare - clinically relevant explanations

4. Design objective

Medical need:

- What was the model optimized for?
- What task does it solve?
- How does it compensate for common human errors (as opposed to being as independently accurate as possible)?

Cai et al., 2019; Gaube et al., 2021; Tonekaboni et al., 2019; Kampa et al., 2021

AI in Healthcare - clinically relevant explanations

5. Considerations prior to adoption

Medical need:

- Effect on legal liability
- Impact on existing workflows
- Privacy issues

Cai et al., 2019; Gaube et al., 2021; Tonekaboni et al., 2019; Kampa et al., 2021

Q2.

How to design a data acquisition protocol that takes all these needs into account?