AI Accuracy Supremacy: A race to the bottom for robust and reliable AI in Healthcare

Presagen
A.I. Enhanced Healthcare

SAN FRANCISCO | ADELAIDE | LONDON

Dr Don Perugini
Co-Founder

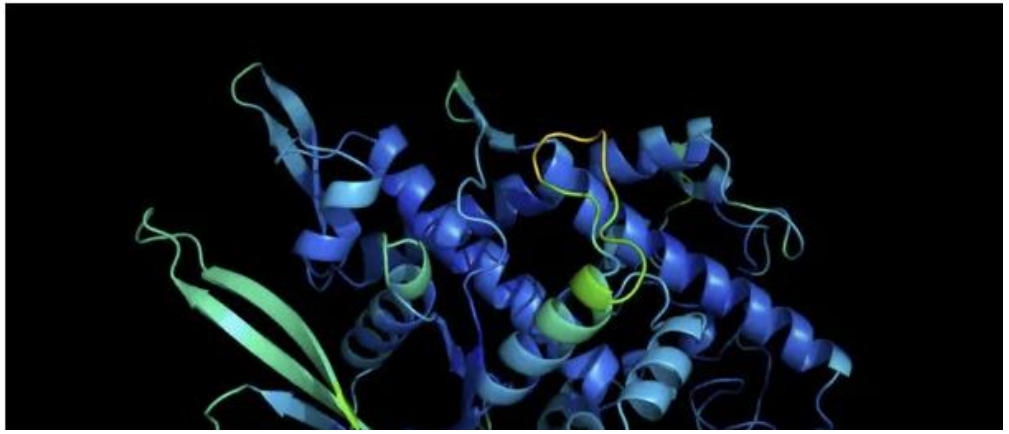
e: Don@Presagen.com
l: https://linkedin.com/in/donperugini
t: @DrDonPerugini
w: Presagen.com

Achieving new records for accuracy in healthcare can be ground-breaking

BREAKING NEWS

DeepMind AI cracks 50-year-old problem of protein folding

Program solves scientific problem in 'stunning advance' for understanding machinery of life



https://www.theguardian.com/technology/2020/nov/30/deepmind-ai-cracks-50-year-old-problem-of-biology-research

However, healthcare AI needs to be consistently accurate to be used in clinical practice

Reliable & Robust

Unbiased

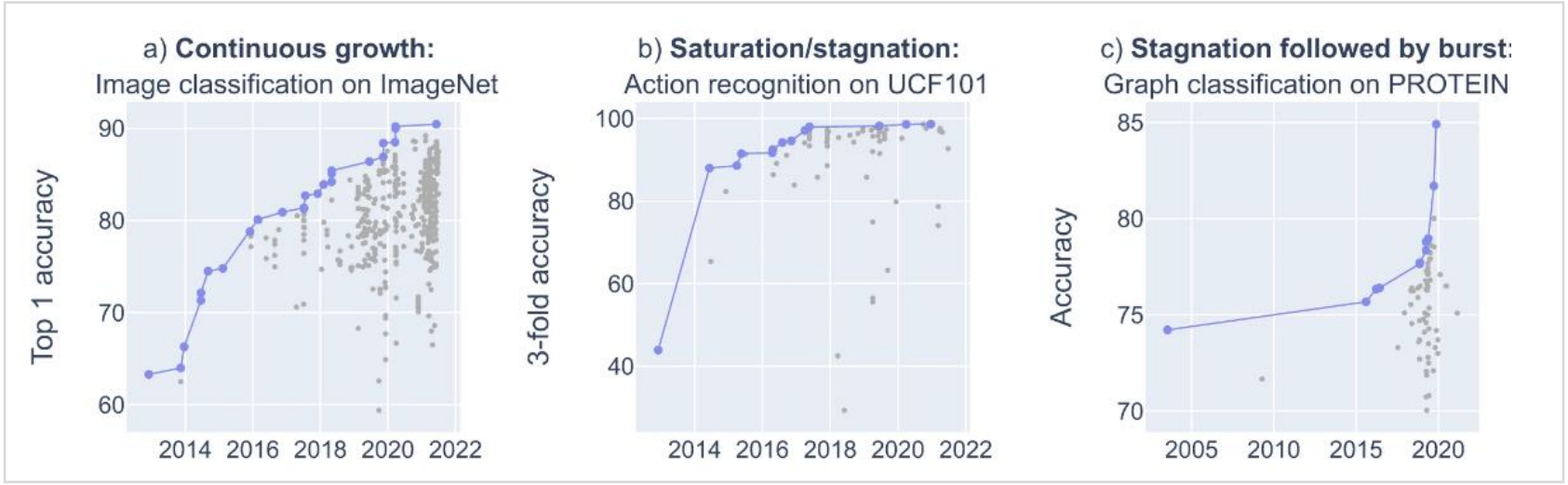
Scalable

Does the obsession with accuracy help AI transition from the lab into the real-world for healthcare?

AI Competitions

kaggle

AI Benchmarks



S. Ott et al., "Mapping global dynamics of benchmark creation and saturation in artificial intelligence", Nature Communications, 2022. https://www.nature.com/articles/s41467-022-34591-0

AI accuracy can be misleading

Accuracy is only as good as the data used to test the AI

Over-estimates general accuracy by overfitting AI performance to test data

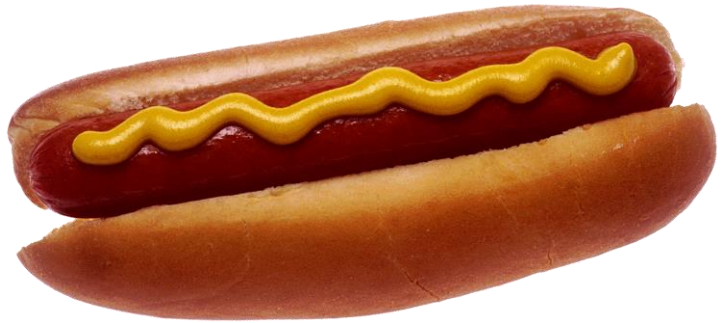
Lead to bias if the test data does not represent real-world diversity

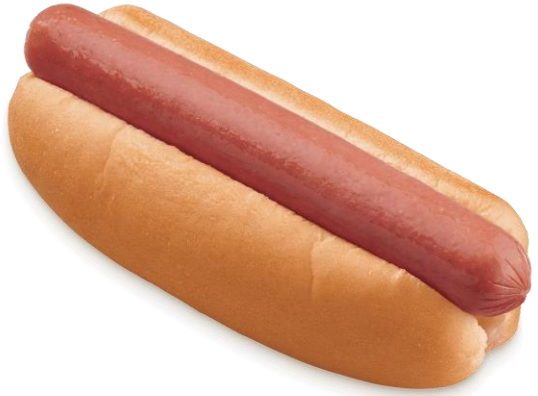
Accuracy provides little insight into how reliable and robust the AI will be

What does this mean and how do we solve it?

Let's do a deep dive…

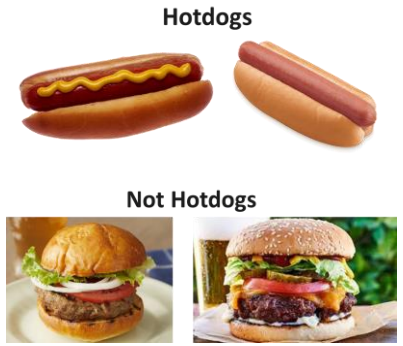
Consider AI trained to detect images of hotdogs



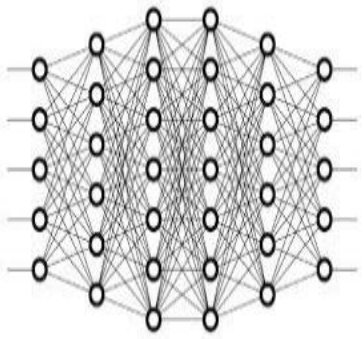


AI Creation Process

Training Data



AI Training



Multiple AI Algorithms

AI 1

AI 2

AI 3

AI 4

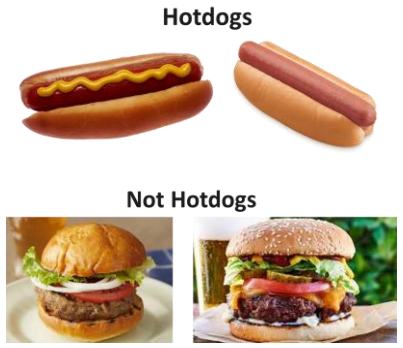
Assess & Test

Select One for Real-World Use

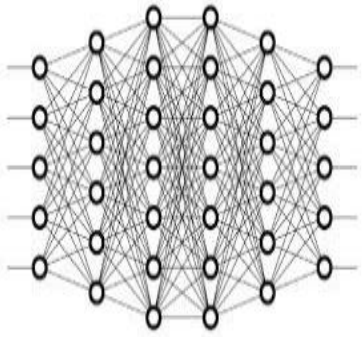
AI 2

How do we assess which AI algorithm is robust and reliable enough for real-world use?

Training Data



AI Training



Multiple AI Algorithms

AI 1

AI 2

AI 3

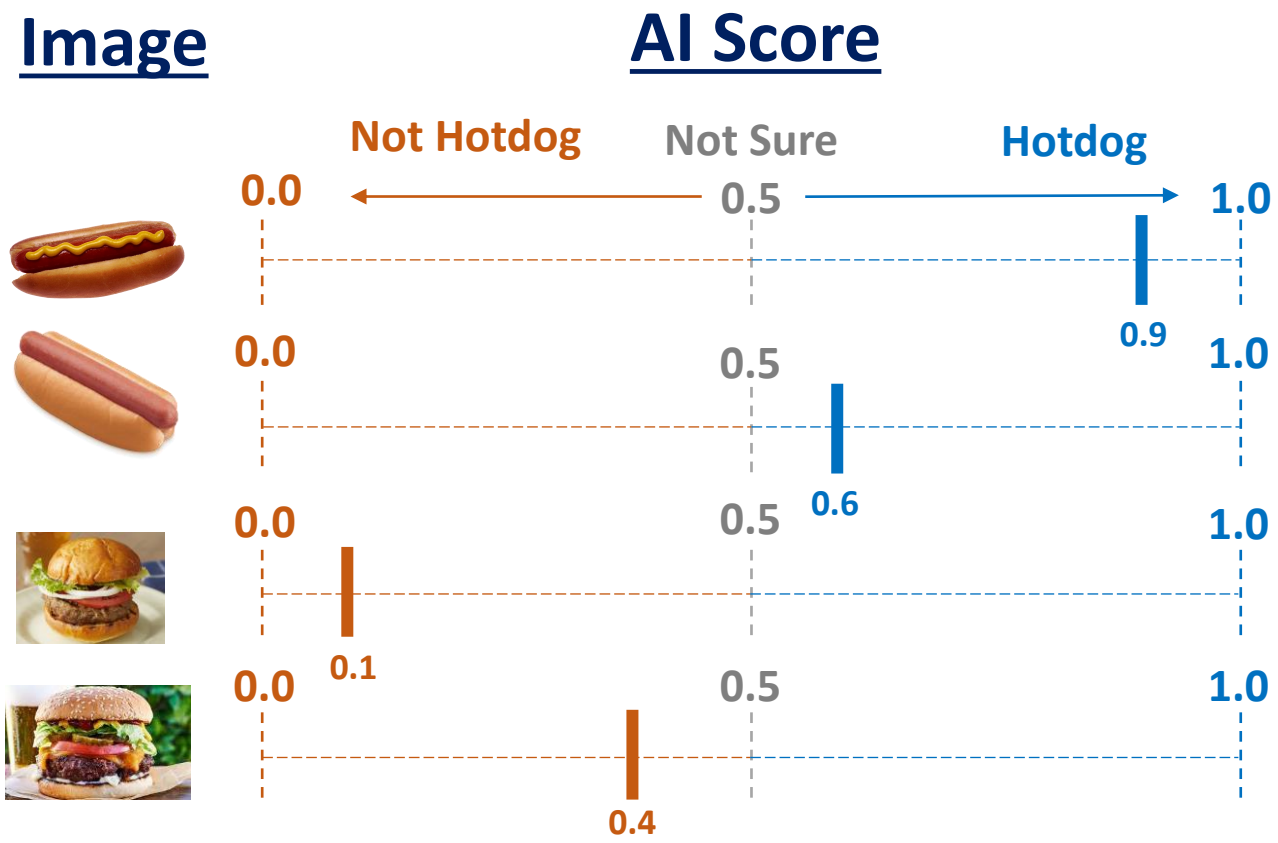
AI 4

Assess & Test

Select One for Real-World Use

AI 2

AI scores each image 0 to 1: confidence its a hotdog

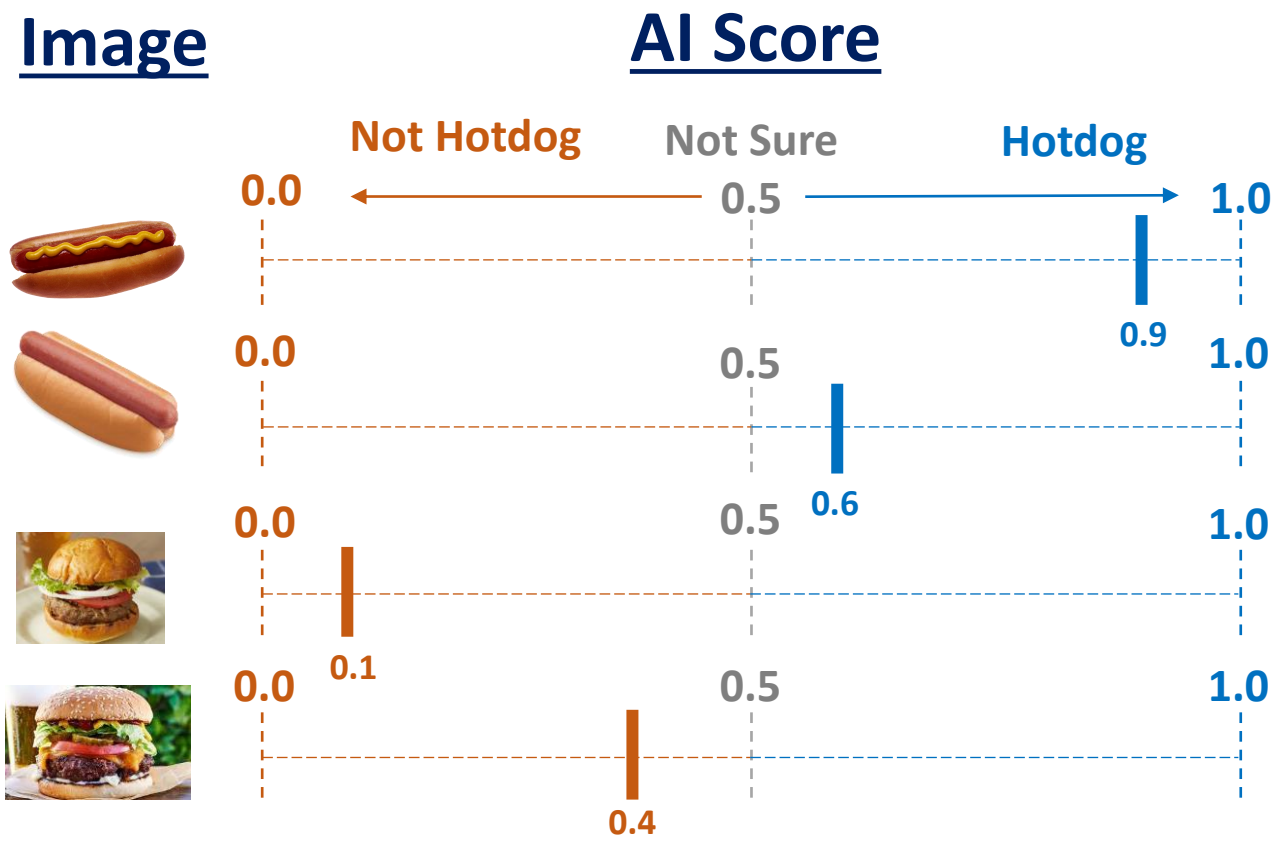


AI Score > 0.5
→ Hotdog

AI Score < 0.5
→ Not Hotdog

AI Score = 0.5
→ Unsure

AI scores each image correctly in this example



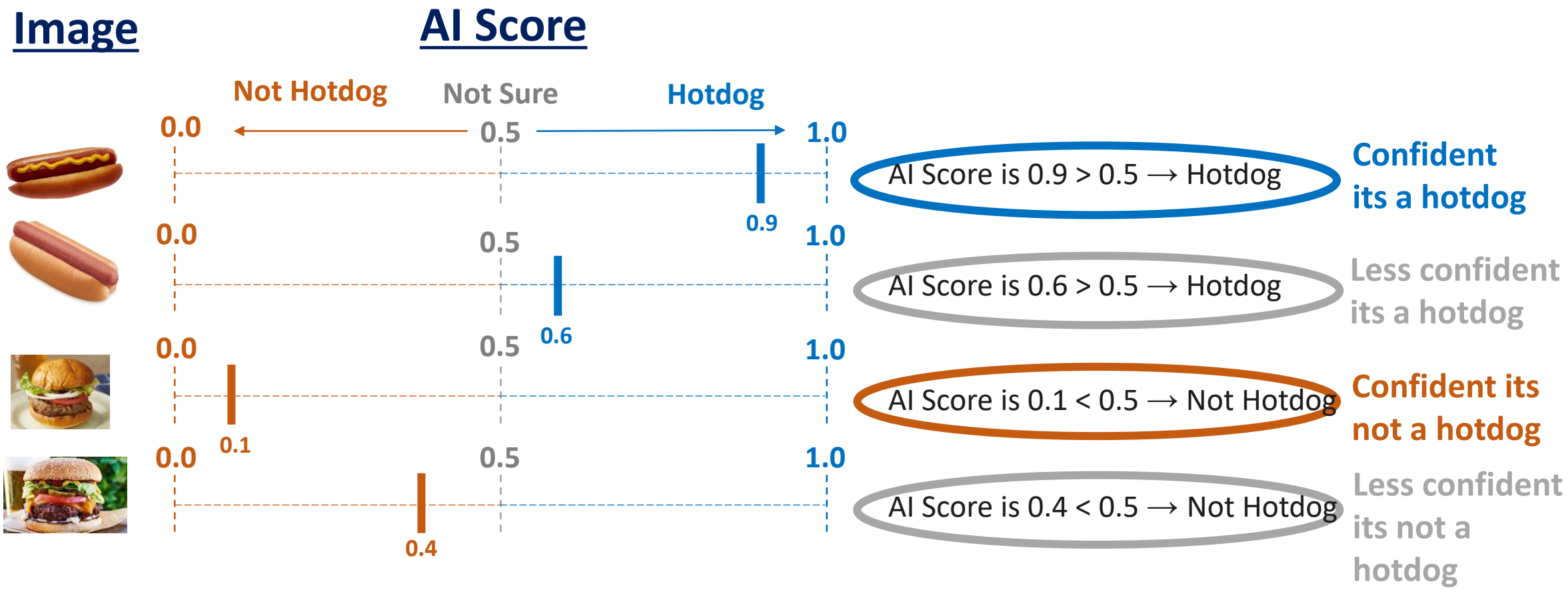
AI Score is 0.9 > 0.5 → Hotdog ✓

AI Score is 0.6 > 0.5 → Hotdog ✓

AI Score is 0.1 < 0.5 → Not Hotdog ✓

AI Score is 0.4 < 0.5 → Not Hotdog ✓

AI is more confident with some images than others

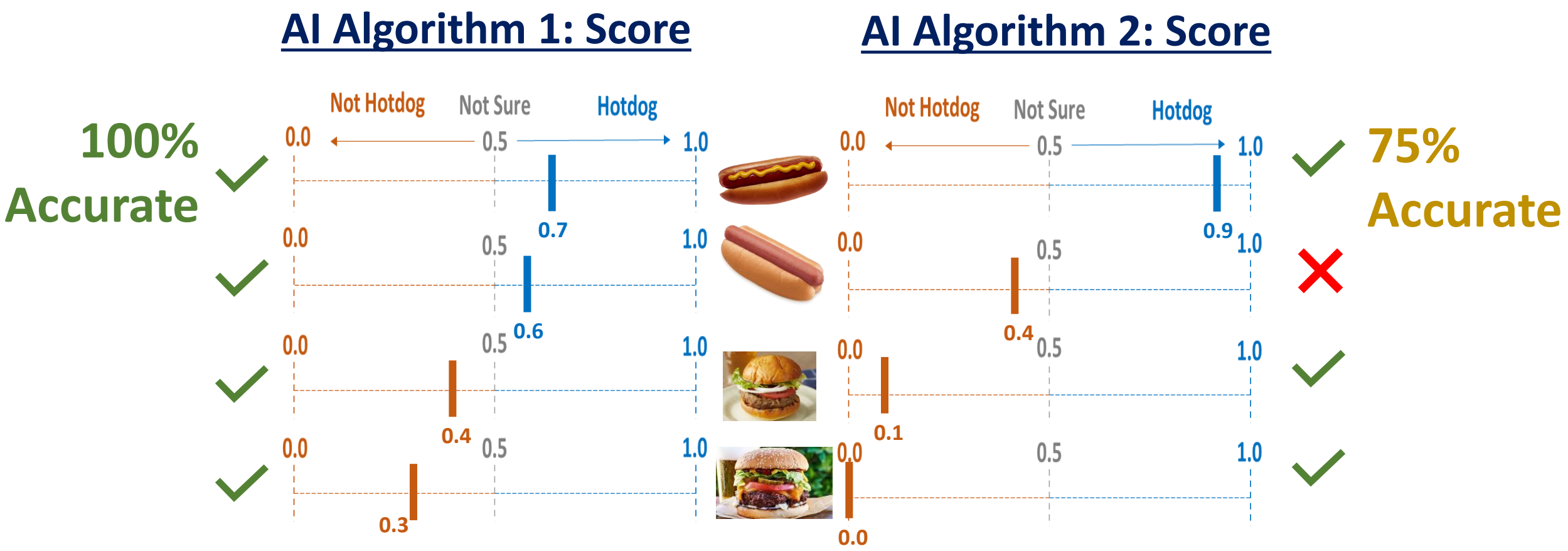


Confidence is a key indicator for reliable and robust AI

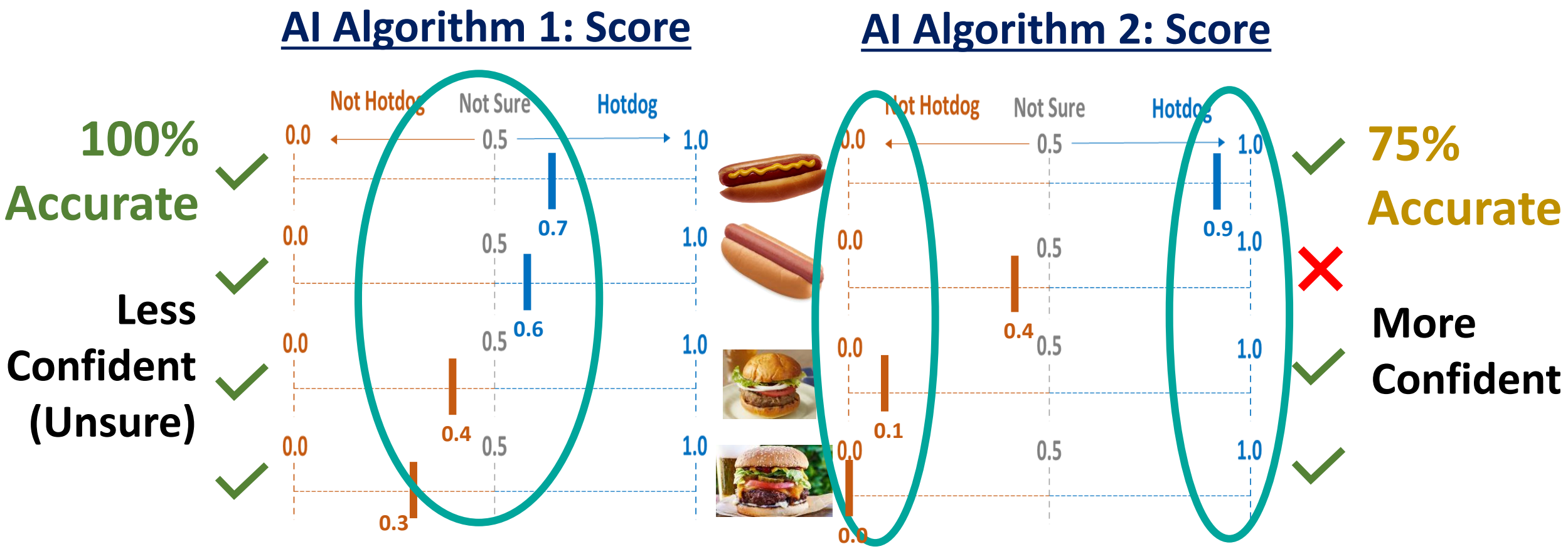
Selecting AI which is both confident and accurate during testing is likely to be more reliable and robust than AI that has greatest accuracy

AI Select. Patent: PCT/AU2021/000029

Why is confidence important? Example:



Why is confidence important? Example:



Why is confidence important? Example:

AI Algorithm 1: Score

100% Accurate

Less confident with correct predictions (unsure = guessing)

High accuracy likely "luck of the draw"

More likely to be brittle & unreliably 100% accurate

AI Algorithm 2: Score

When correct, it was confident that it is correct

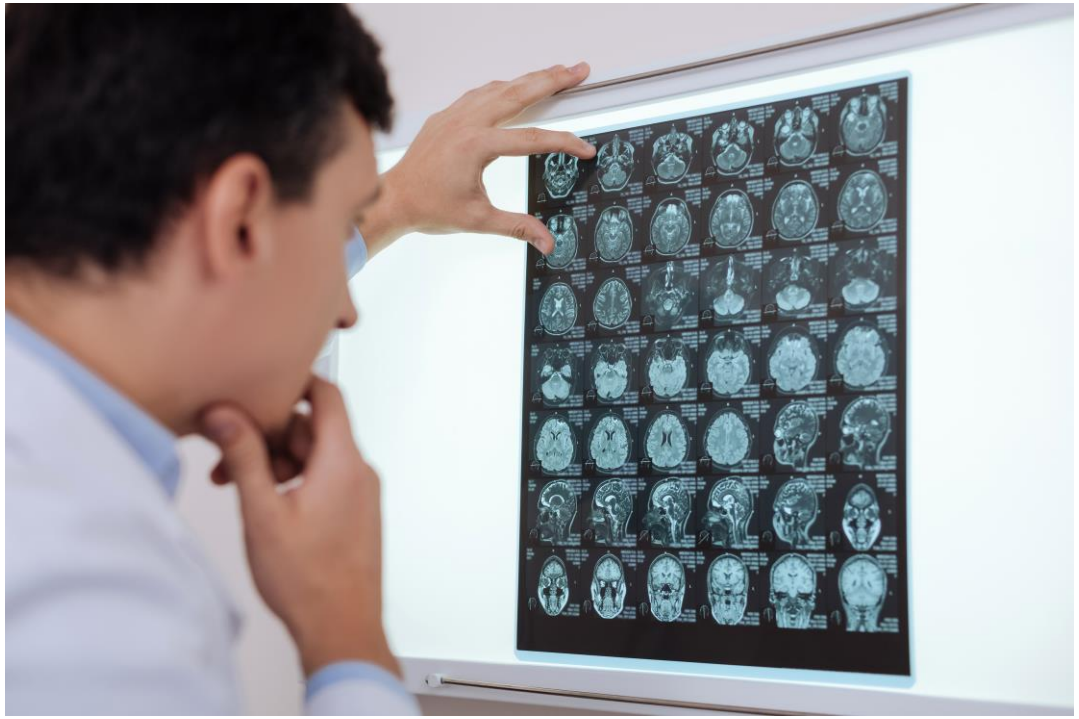
When incorrect, it was less confident it would be correct

More likely to be robust & reliably 75% accurate

75% Accurate

Accuracy and confidence in AI creation means reliable and robust AI in the real-world

It is important that AI healthcare products work reliably according to stated performance metrics, so that medical professionals and patients can rely on their results



Presagen

A.I. Enhanced Healthcare

Dr Don Perugini
Co-Founder

e: Don@Presagen.com
l: https://linkedin.com/in/donperugini
t: @DrDonPerugini
w: Presagen.com

info@Presagen.com
www.Presagen.com
www.linkedin.com/company/Presagen/
https://twitter.com/Presagen_