

# Therapixel

L'IA au service du dépistage du cancer du sein

[oclatz@therapixel.com](mailto:oclatz@therapixel.com)

# FDA – 11/04/2018

“IDx-DR is the first device authorized for marketing that provides a screening decision without the need for a clinician to also interpret the image or results

which makes it usable by health care providers who may not normally be involved in eye care”

# Le dépistage du cancer du sein : quel objectif ?

Examen suspect

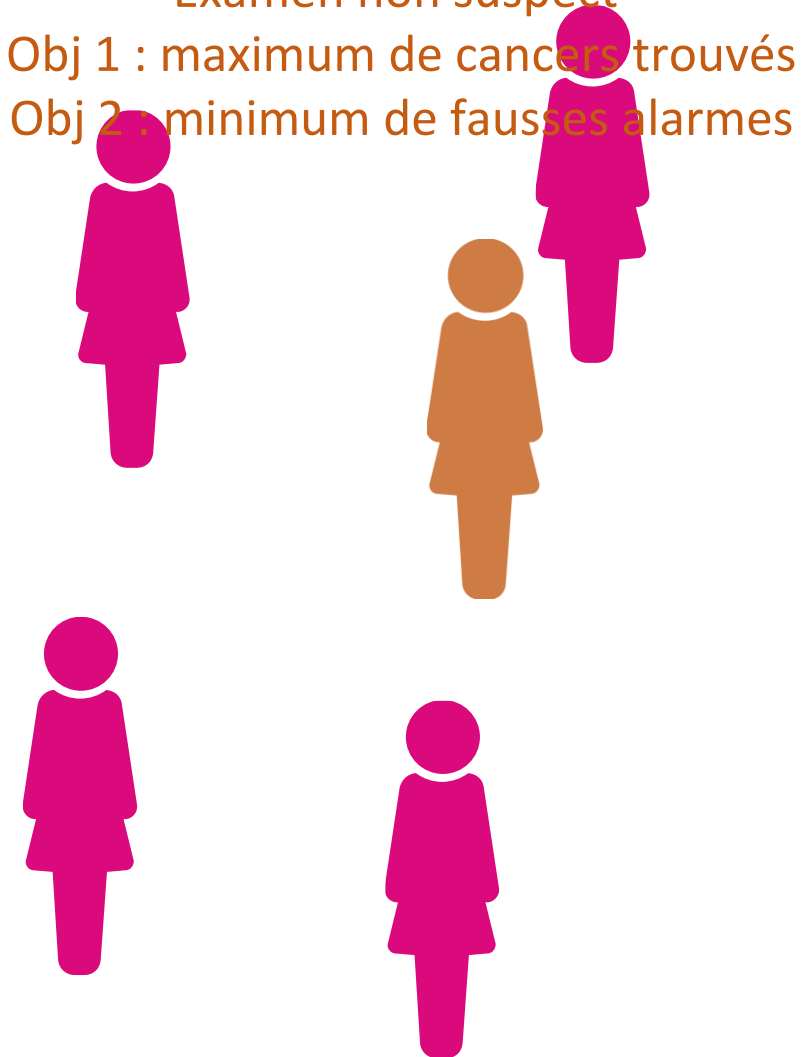
Obj 1 : ne pas manquer de cancers



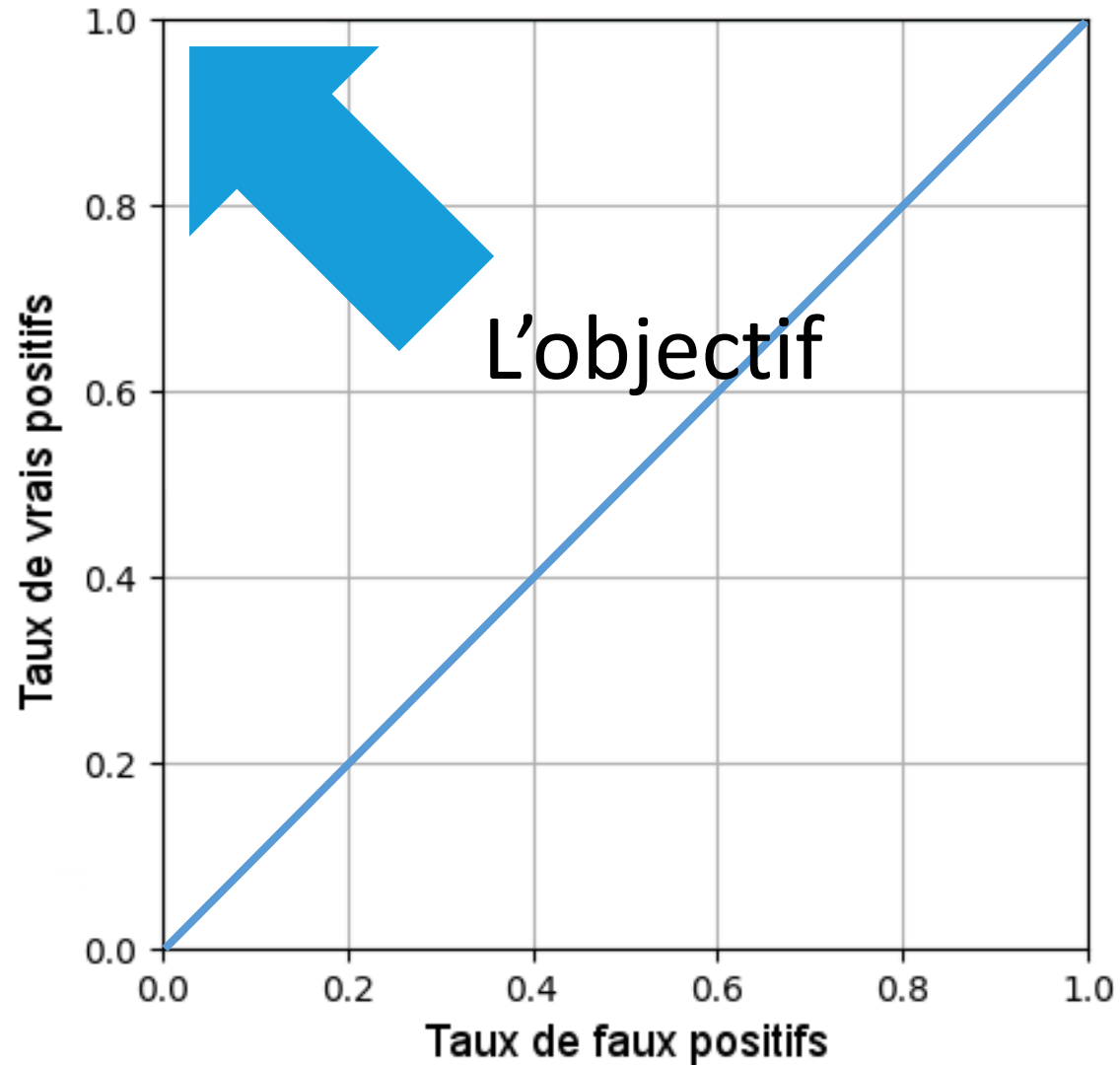
Examen non suspect

Obj 1 : maximum de cancers trouvés

Obj 2 : minimum de fausses alarmes



# L'évaluation de la performance du dépistage



La diagonale  
du hasard

L'objectif

# Comment font les radiologues ?



# “Feature engineering” avant l’heure

Subseries 4 of 6

Mammography Lexicon	
Breast composition	A. entirely fatty
	B. scattered areas of increased density
	C. heterogeneous density with some indistinct or obscure masses
	D. extremely dense breasts with decreased sensitivity
Mass	shape: oval - rounded - irregular
	margin: circumscribed - microlobulated - spiculated
	density: fat - low - equal - high
Asymmetry	asymmetry - global - focal - developing

Subseries 3 of 6

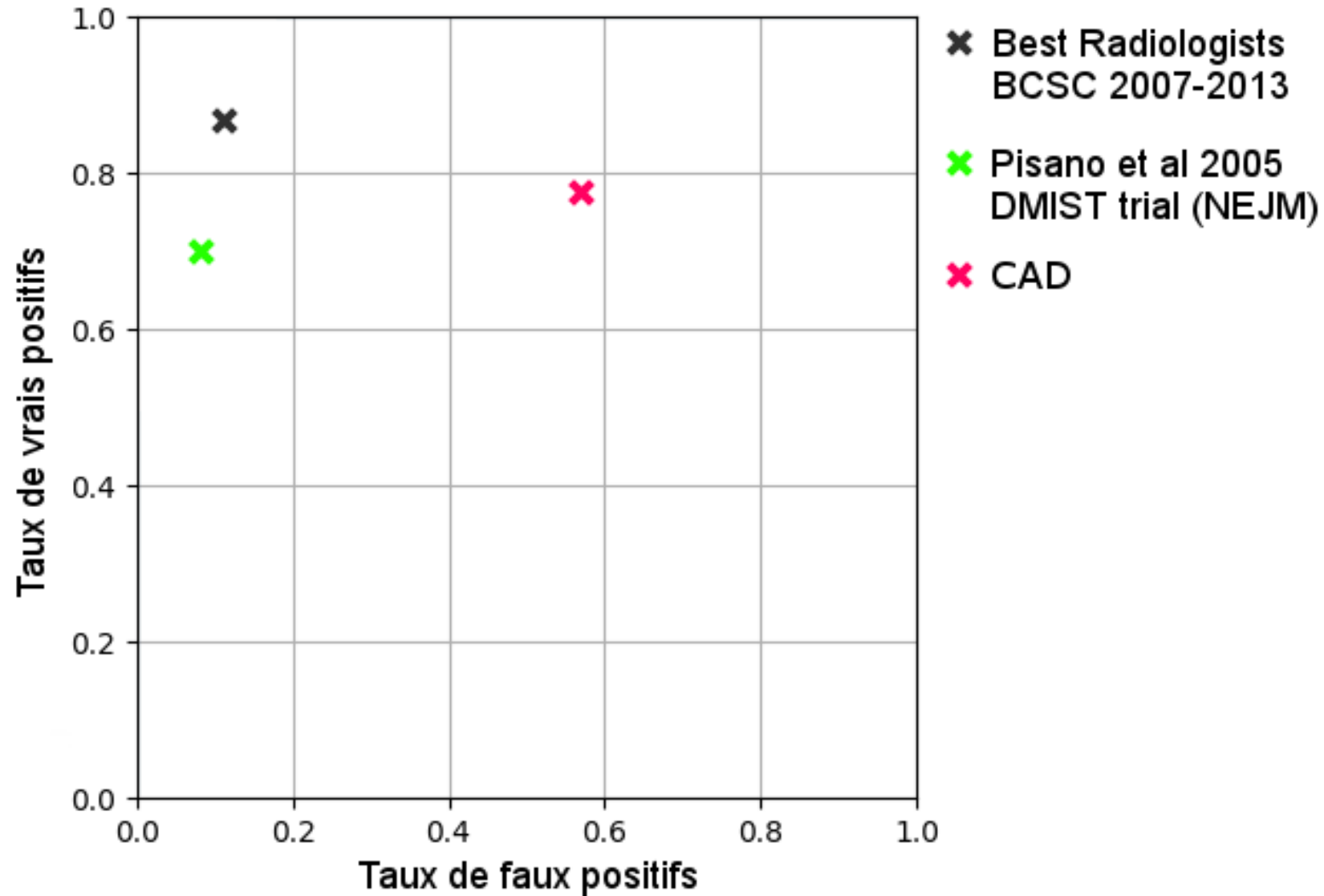
Architectural distortion	distorted parenchyma with no visible mass
4B	typically benign
	1. amorphous 2. coarse heterogeneous
4C	3. fine pleiomorphic 4. fine linear or fine linear branching
	diffuse - regional - grouped - linear - segmental
Associated features	skin retraction - nipple retraction - skin thickening - trabecular thickening - axillary adenopathy - architectural distortion - calcifications

BIRADS  
1-2-3-4-5

Zoom: 1.39 ▶  
W 1341 L 1680 ▶

Zoom: 1.41 ▶  
W 1341 L 1680 ▶

# Quelle performance actuelle ? (USA)



Et l'IA ?

Algorithme d'estimation de :

$$F(\text{Image}) = P_{\text{Cancer}}$$



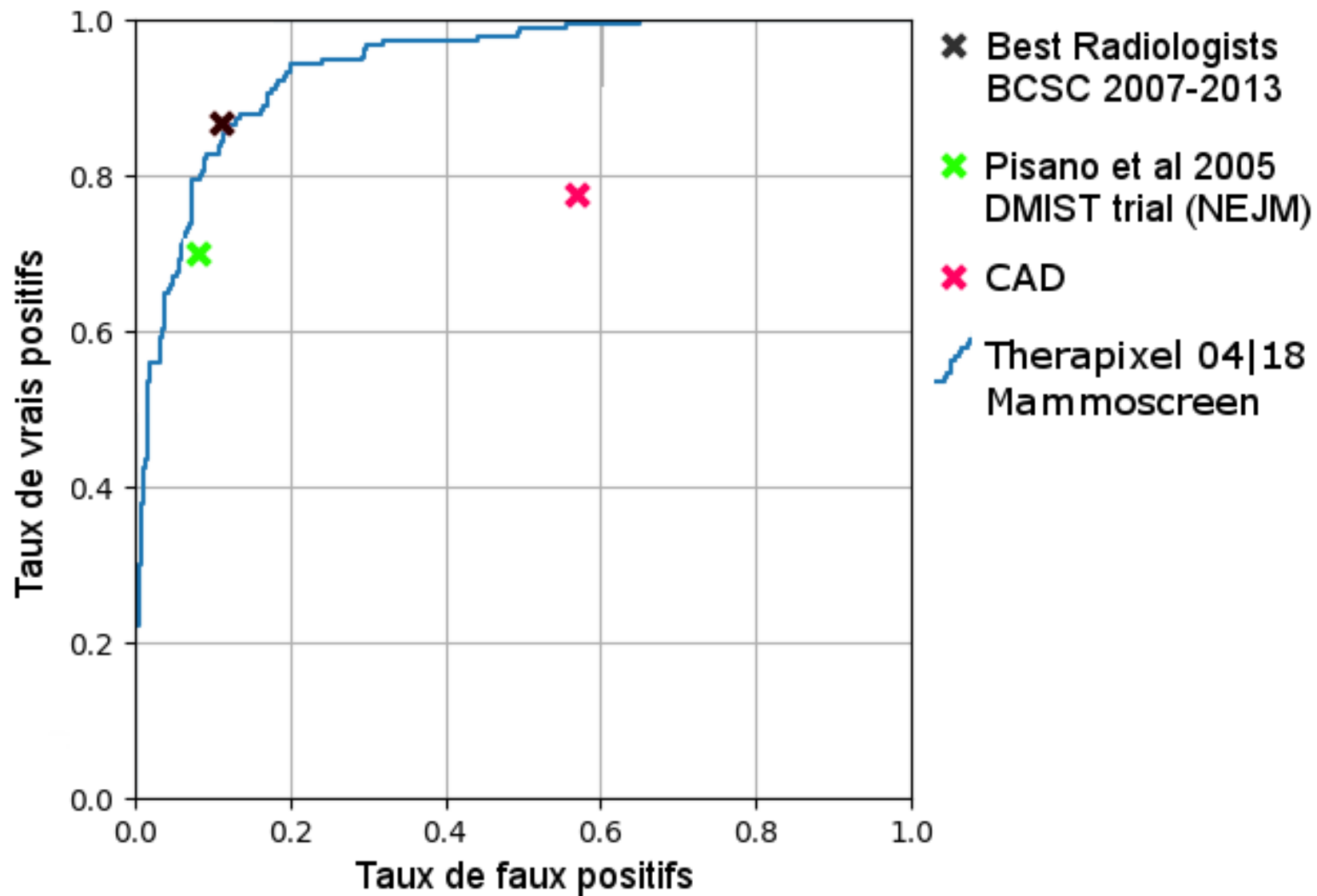
Estimer F ?

Pour beaucoup d'exemples ( Image<sub>i</sub> ; Cancer<sub>i</sub> )

Minimiser:  $\sum_i \text{Erreur}(F(\text{Image}_i) ; \text{Cancer}_i)$



# Quelle performance actuelle ? (USA)



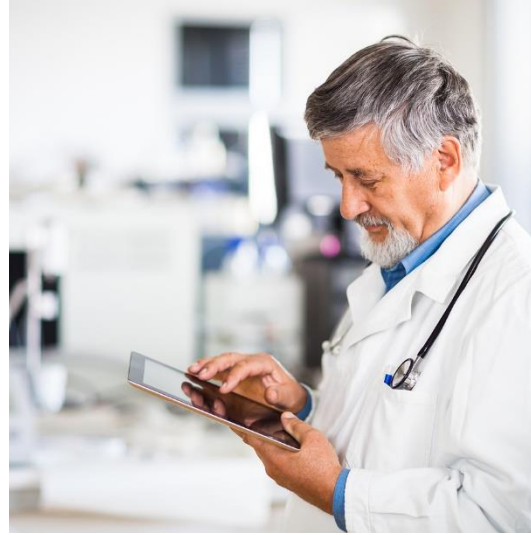
# Comment intégrer l'IA ?

①



5min

②

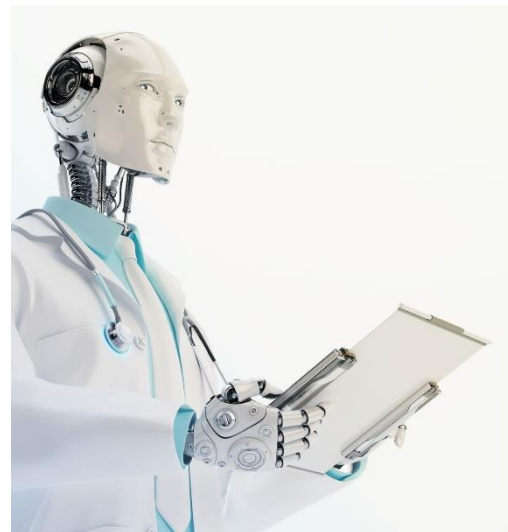


30s

1 cancer sur 10  
manqué par le 1er lecteur



①



2s

②



30s



JAMES BURKE  
TOOL CO.  
PAT. NO. 1413

Merci



[oclatz@therapixel.com](mailto:oclatz@therapixel.com)