

Intelligence artificielle et anesthésie-réanimation :

Dr Kaissar SASSI

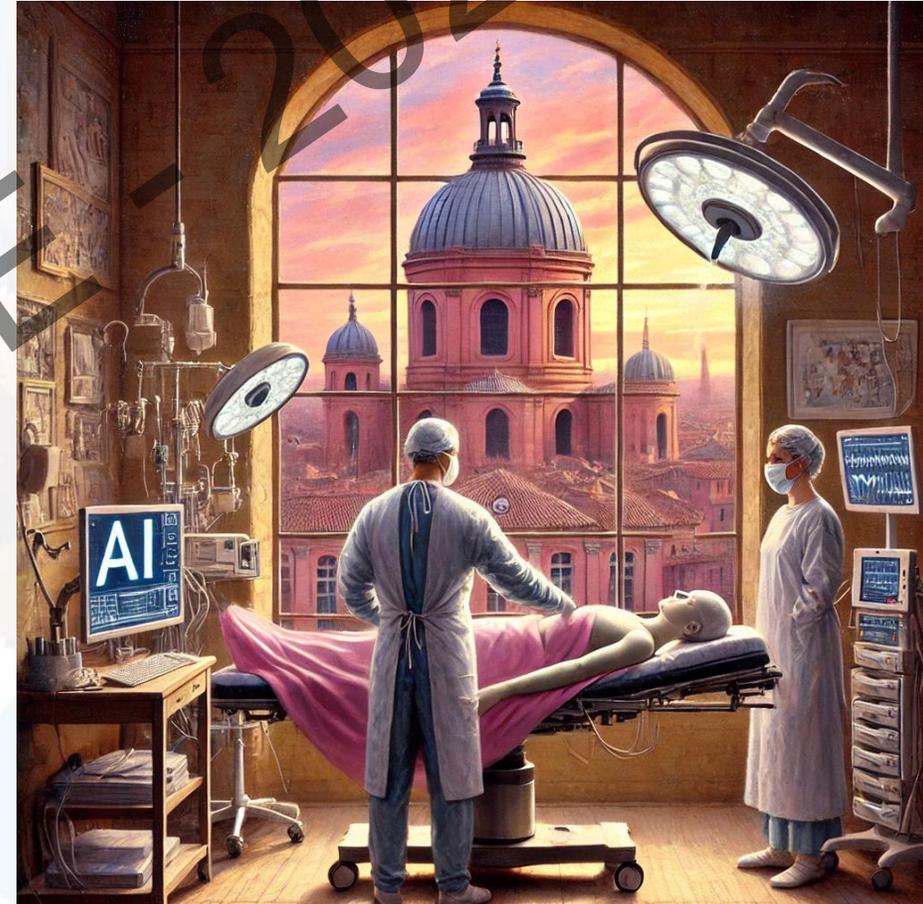
Médecin anesthésiste-réanimateur, CHU Toulouse

Expert en santé numérique

Expert en intelligence artificielle appliquée en santé

Formateur en santé numérique en cours de certification

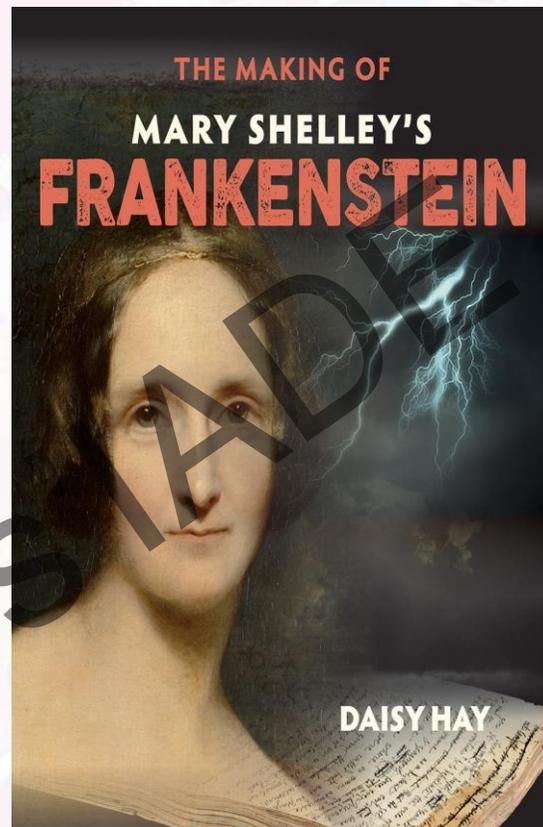
- Consultant auprès d'associations loi 1901 en santé numérique
- Consultant auprès de la société DeepBrain en santé numérique
- Plusieurs IA ont été utilisé pour aider à la réalisation de cette présentation



Ça ce n'est pas l'intelligence artificielle



Mystère de l'intelligence



- It's not possible.
- No it's necessary.

Interstellar
TARS et Cooper



La révolution est en marche....

Deep Learning for Network Biology

Marinka Zitnik and Jure Leskovec
Stanford University



Deep Learning-Based Multi-Omics Data Integration Reveals Two Prognostic Subtypes in High-Risk Neuroblastoma

ARTIFICIAL INTELLIGENCE

New AI Strategy Mimics How Brains Learn to Smell

By JORDANA CEPELEWICZ

September 18, 2018

Deep Learning: A Primer for Radiologists¹

Cardiologist-Level Arrhythmia Detection with Convolutional Neural Networks

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Abstract

We develop an algorithm which exceeds the performance of board-certified cardiologists in detecting a wide range of heart arrhythmias from electrocardiograms recorded with a single-lead wearable monitor. We build a dataset with more than 500 times the number of unique patients than previously studied corpora. On this dataset, we train a 34-layer convolutional neural network which maps a sequence of ECG samples to a sequence of rhythm classes. Committees of board-certified cardiologists annotate a gold standard test set on which we compare the performance of our model to that of 6 other individual cardiologists. We exceed the average cardiologist performance in both recall (sensitivity) and precision (positive predictive value).

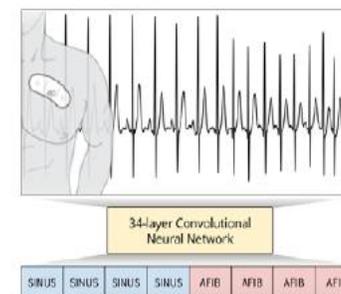


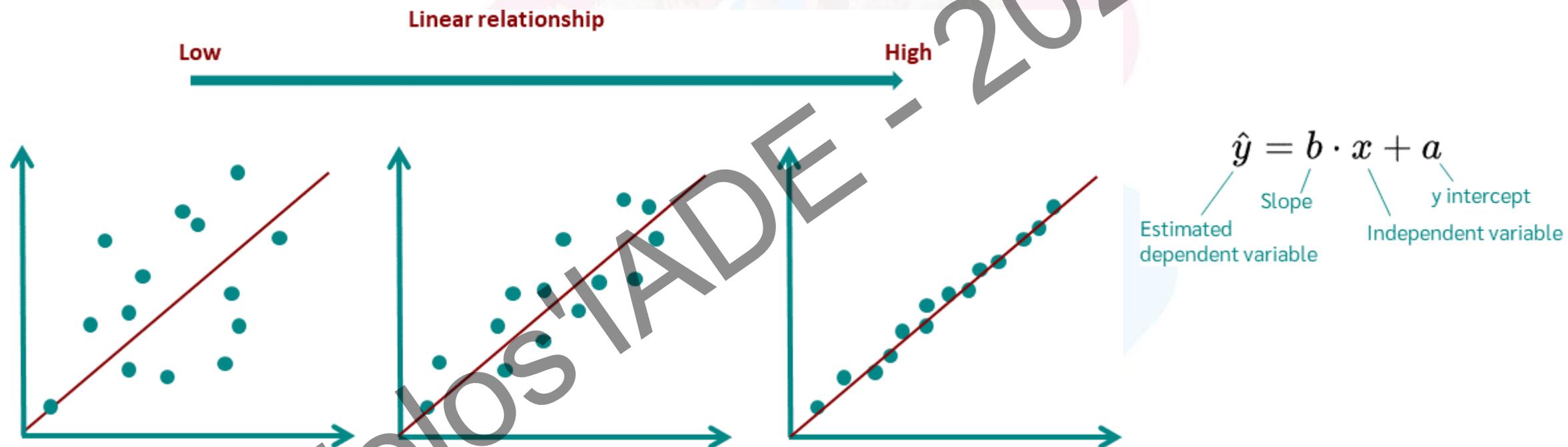
Figure 1. Our trained convolutional neural network correctly detecting the sinus rhythm (SINUS) and Atrial Fibrillation (AFIB) from this ECG recorded with a single-lead wearable heart monitor.

Définition de l'intelligence artificielle

- Intelligence Artificielle (IA)
- Informatique
- Systèmes autonomes
- Tâches humaines : reconnaissance d'images, langage, décisions, apprentissage
- Machine learning
- Apprentissage à partir de données
- Programmation implicite

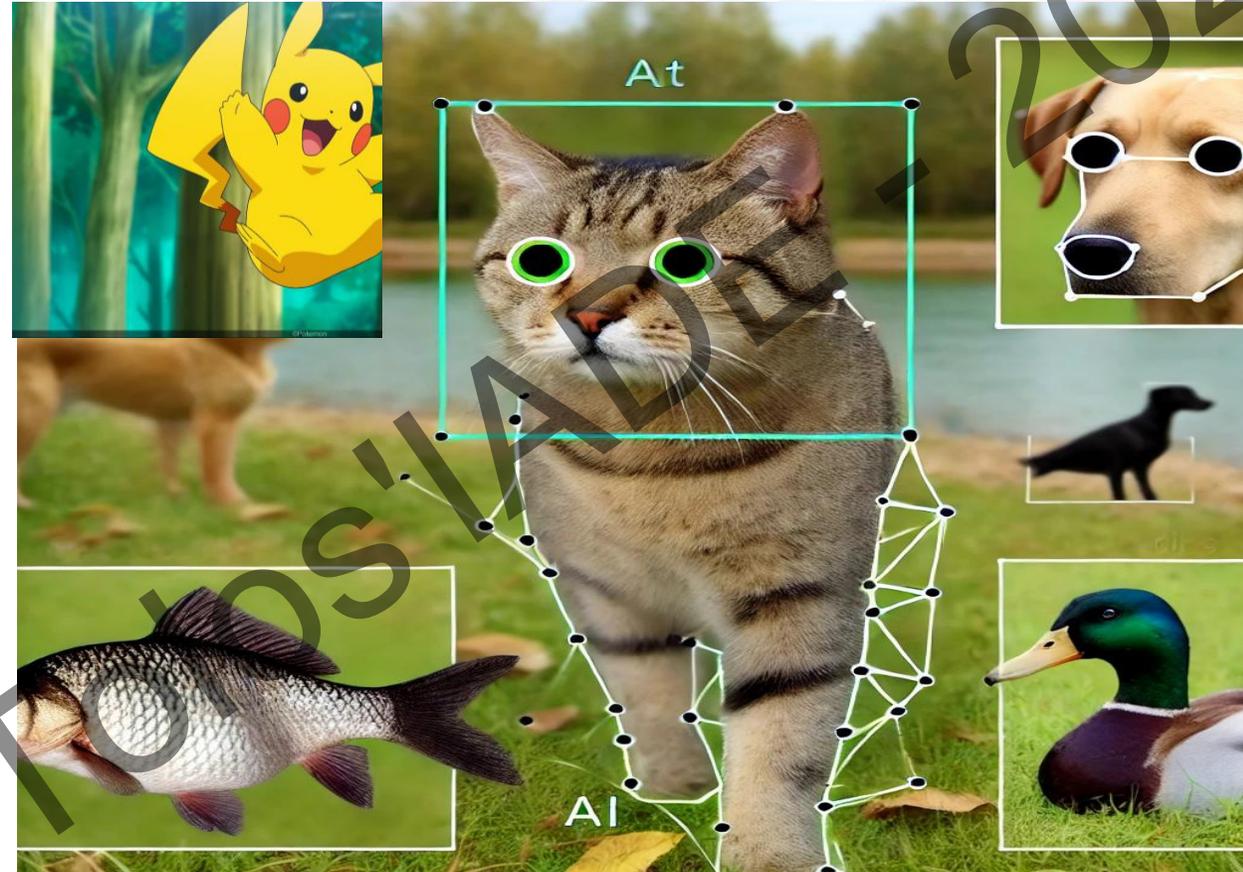


Algorithme : régression linéaire



<https://datatab.fr/tutorial/linear-regression>

Ces 5 millions de pixels sont un chat avec une probabilité de 0,98 / 1



Tout est question d'apprentissage puis : Prédiction



Exemple appliqué en santé



https://colab.research.google.com/drive/1GQGg5Y_Wa5T-Vc2LkER2iDOjTgiqlyq6#scrollTo=FBzKfGLQ7SzP

```

class_names = list(info["label"].values())

plt.figure(figsize=(10,10))
inds = np.random.choice(Xtrain.shape[0], size = 25)

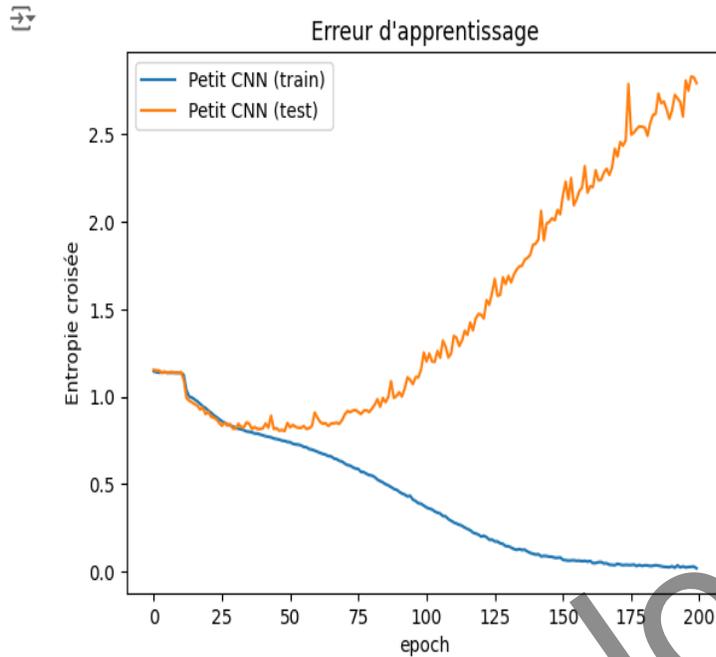
for i in range(25):
    plt.subplot(5,5,i+1)
    plt.xticks([])
    plt.yticks([])
    plt.grid(False)
    plt.imshow(Xtrain[inds[i]], cmap=plt.cm.binary)
    plt.xlabel(class_names[ytrain[inds[i]][0]])
plt.show()

```



219/219 — 1s 3ms/step - loss: 0.8358 - val_loss: 0.8422

```
plt.plot(entrainement_petit_cnn.history['loss'])  
plt.plot(entrainement_petit_cnn.history['val_loss'])  
plt.title("Erreur d'apprentissage")  
plt.ylabel("Entropie croisée")  
plt.xlabel('epoch')  
plt.legend(['Petit CNN (train)', 'Petit CNN (test)'], loc='upper left')  
plt.show()
```

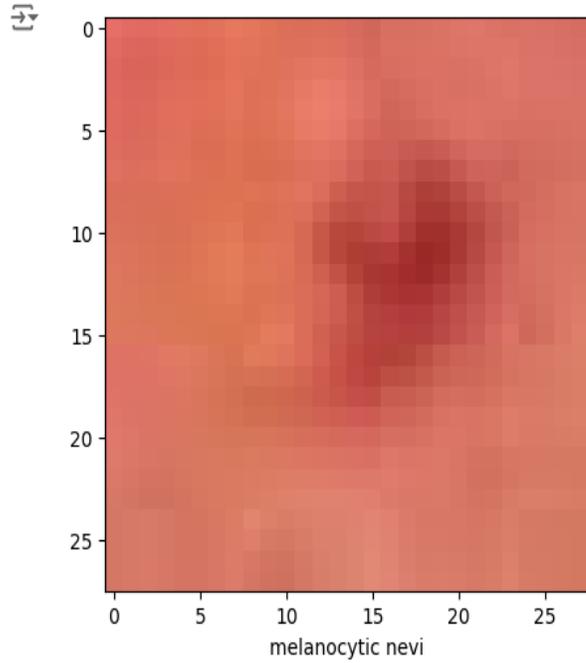


Il semble qu'il aurait fallu arrêter l'entraînement avant la fin des 200 epochs. Il est possible d'arrêter prématurément un entraînement ainsi, afin d'améliorer les performances (et accessoirement, de gagner du temps). Cela s'appelle l'arrêt prématuré, ou early stopping.

```
[ ] early_cnn = keras.Sequential([
```

```
Epoch 20/200  
219/219 — 1s 3ms/step - loss: 0.1582 - val_loss: 1.6528  
Epoch 21/200  
219/219 — 1s 3ms/step - loss: 0.1316 - val_loss: 1.6078
```

```
i = 1  
  
plt.imshow(Xtrain[i,:,:,:], cmap=plt.cm.binary)  
plt.xlabel(class_names[ytrain[i][0]])  
plt.show()
```

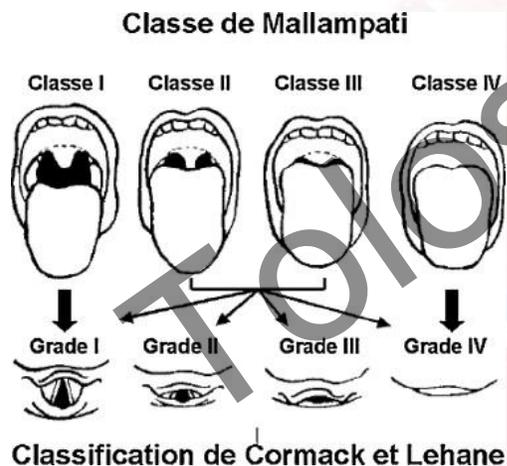


```
[ ] early_cnn(Xtrain[0:1,:,:,:])
```

```
<tf.Tensor: shape=(1, 7), dtype=float32, numpy=  
array([[0.03146356, 0.1320037, 0.03138018, 0.03138018, 0.03138018, 0.03138018, 0.03138018]])
```

IA et anesthésie : l'intérêt de la prédiction par excellence

Score ASA



Intérêt de la recherche pour l'IA



ELSEVIER

Contents lists available at ScienceDirect

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

Continuous action deep reinforcement learning for propofol dos general anesthesia^{☆☆☆}

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^c Tempus, Chicago, IL 60654, USA

^d Department of Anesthesia, Critical Care and Pain Medicine, Massachusetts General Hospital, Boston, MA 02114, USA

Development and Validation of a Deep Neural Network Model for Prediction of Postoperative In-Hospital Mortality

Christine K Lee, MS, PhD^{1,2}, Ira Hofer, MD³ [Assistant Professor], Eilon Gabel, MD³ [Assistant Professor], Pierre Baldi, PhD² [Professor], and Maxime Cannesson^{1,3,4} [MD PhD] [Professor and Vice Chair]

¹Department of Anesthesiology and Perioperative Care, University of California Irvine, Irvine, CA

OPEN

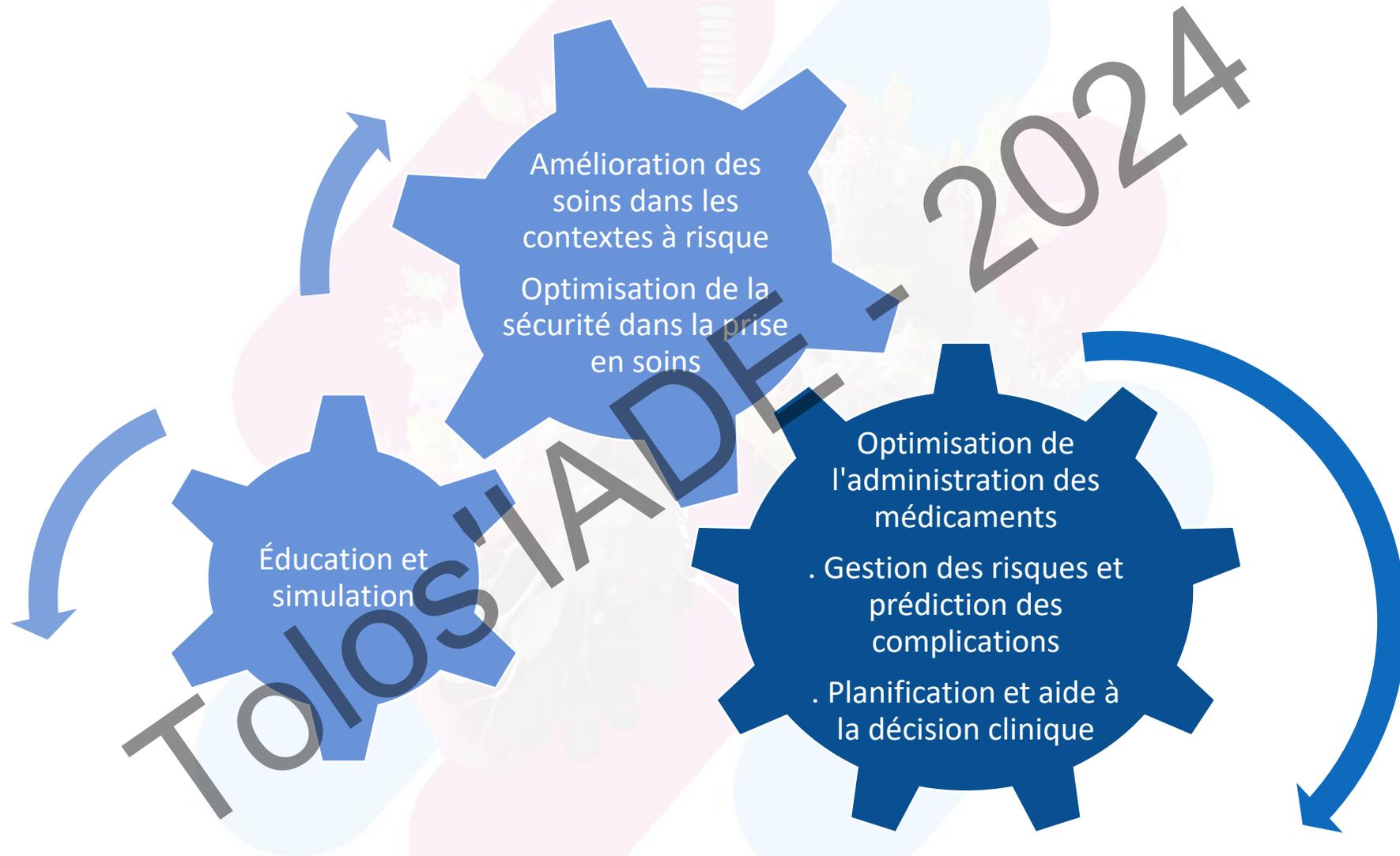
Predicting Deep Hypnotic State From Sleep Brain Rhythms Using Deep Learning: A Data-Repurposing Approach

Sunil Belur Nagaraj, PhD,* Sowmya M. Ramaswamy, Msc,† Maud A. S. Weerink, MD,† and Michel M. R. F. Struys, MD, PhD, FRCA†‡

Supervised Machine-learning Predictive Analytics for Prediction of Postinduction Hypotension

Samir Kendale, M.D., Prathamesh Kulkarni, Ph.D., Andrew D. Rosenberg, M.D., Jing Wang, M.D., Ph.D.

Perspectives en anesthésie



Tolos'IADE - 2024

L'IA et l'éthique





Recherche

Les Echos



Se connecter

S'abonner

À la une Idées Économie Politique Entreprises Finance - Marchés Bourse Monde Election US Tech-Médias Start-up Régions Patrimoine Travailler mieux Le Mag W-E



Quand le logiciel de recrutement d'Amazon discrimine les femmes

En 2014, le géant du e-commerce a voulu confier ses candidatures à un algorithme, mais celui-ci a commencé à écarter les profils féminins.

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The Cambridge Analytica Files
Cambridge Analytica

This article is more than 6 years old

Revealed: 50 million Facebook profiles harvested for Cambridge Analytica in major data breach

Whistleblower describes how firm linked to former Trump adviser Steve Bannon compiled user data to target American voters

'I made Steve Bannon's psychological warfare tool': meet the data war whistleblower

Mark Zuckerberg breaks silence on Cambridge Analytica

RESEARCH ARTICLE

ECONOMICS

Dissecting racial bias in an algorithm used to manage the health of populations

Ziad Obermeyer^{1,2*}, Brian Powers³, Christine Vogeli⁴, Sendhil Mullainathan^{5*†}

La loi européenne sur l'intelligence artificielle

Développements et analyses actualisés de la loi européenne sur l'IA

CNIL

COMMISSION NATIONALE
INFORMATIQUE & LIBERTÉS

2024

TOLOS'IADE

RGPD

25 Mai 2018

The infographic features five yellow icons on a dark blue background, connected by a dotted white line. From left to right: a person icon with a padlock, a document icon with a checkmark, an alarm clock, a padlock with an 'X', and a key.

Conclusion

L'intelligence artificielle : innove

L'intelligence artificielle : aide



Conclusion

L'intelligence artificielle : Pousse les limites de l'imagination

L'intelligence artificielle : facilite une tâche difficile



Conclusion

L'intelligence artificielle : mais.....



Tolos'IADE - 2024

merci de votre attention

KAISSAR SASSI

MAR – CHU – TOULOUSE

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