*ECUE21.2 Science des données*

# Bonnes pratiques

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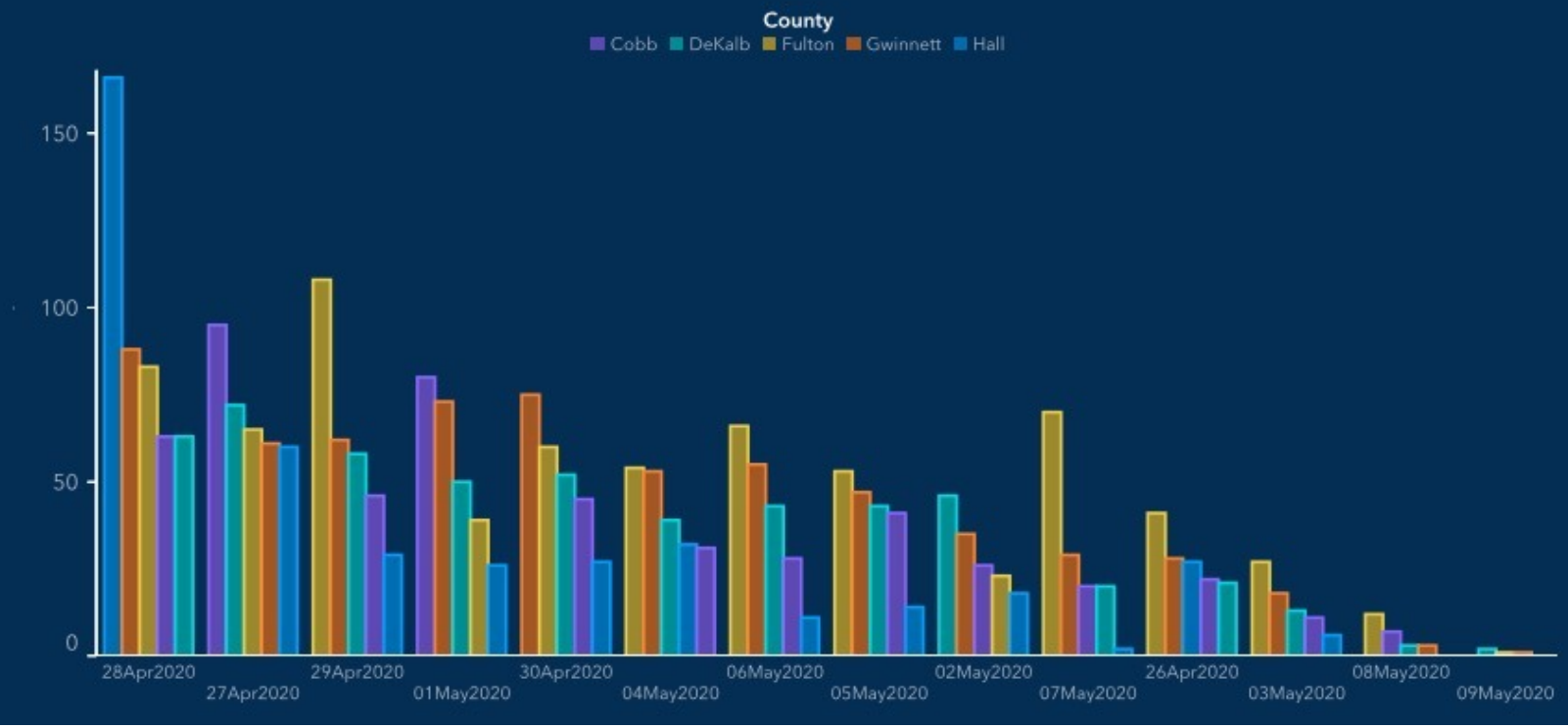
# 1. Visualisation de données

# 1. Exemple 1

**Top 5 Counties with the Greatest Number of Confirmed COVID-19 Cases**

The chart below represents the most impacted counties over the past 15 days and the number of cases over time. The table below also represents the number of deaths and hospitalizations in each of those impacted counties.




Department of Public Health (Georgia, USA), May 2020

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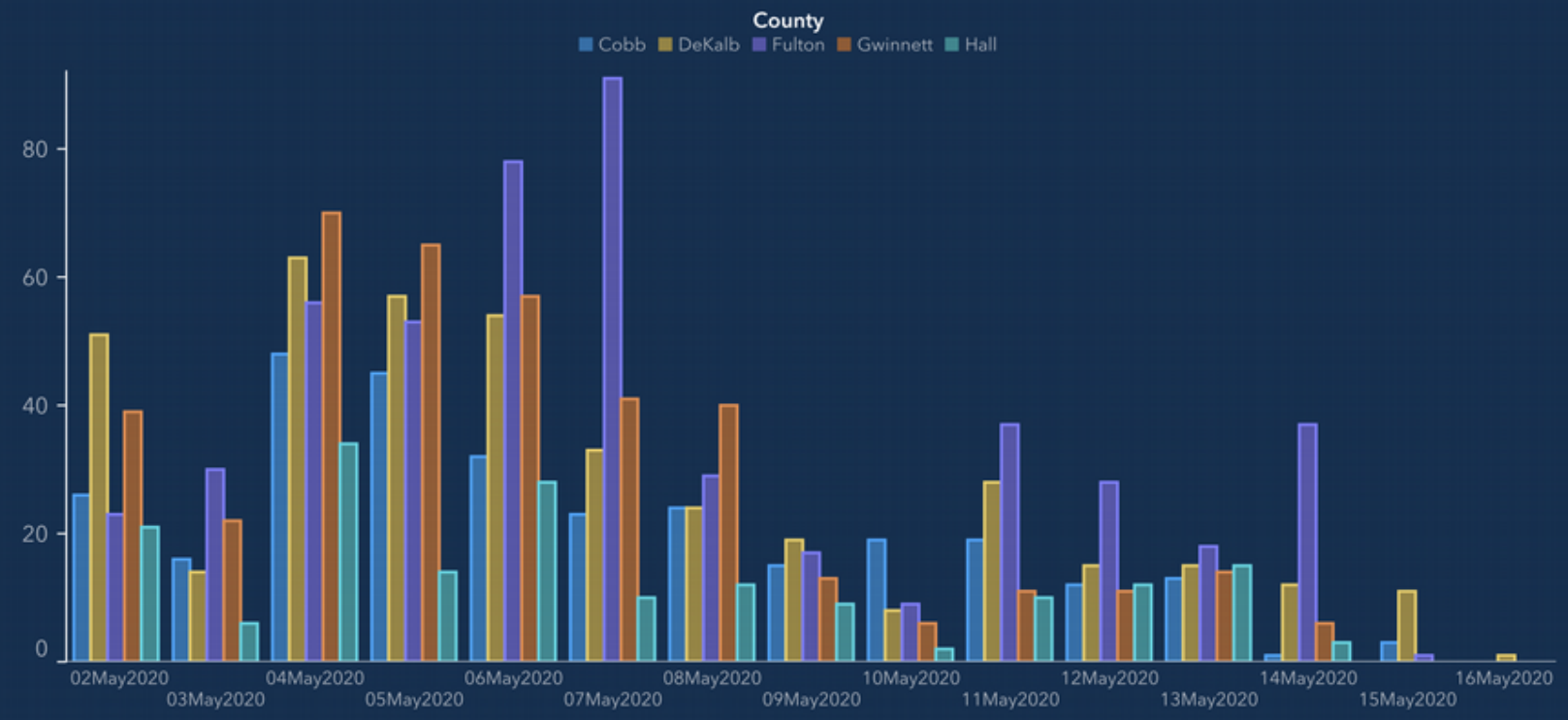
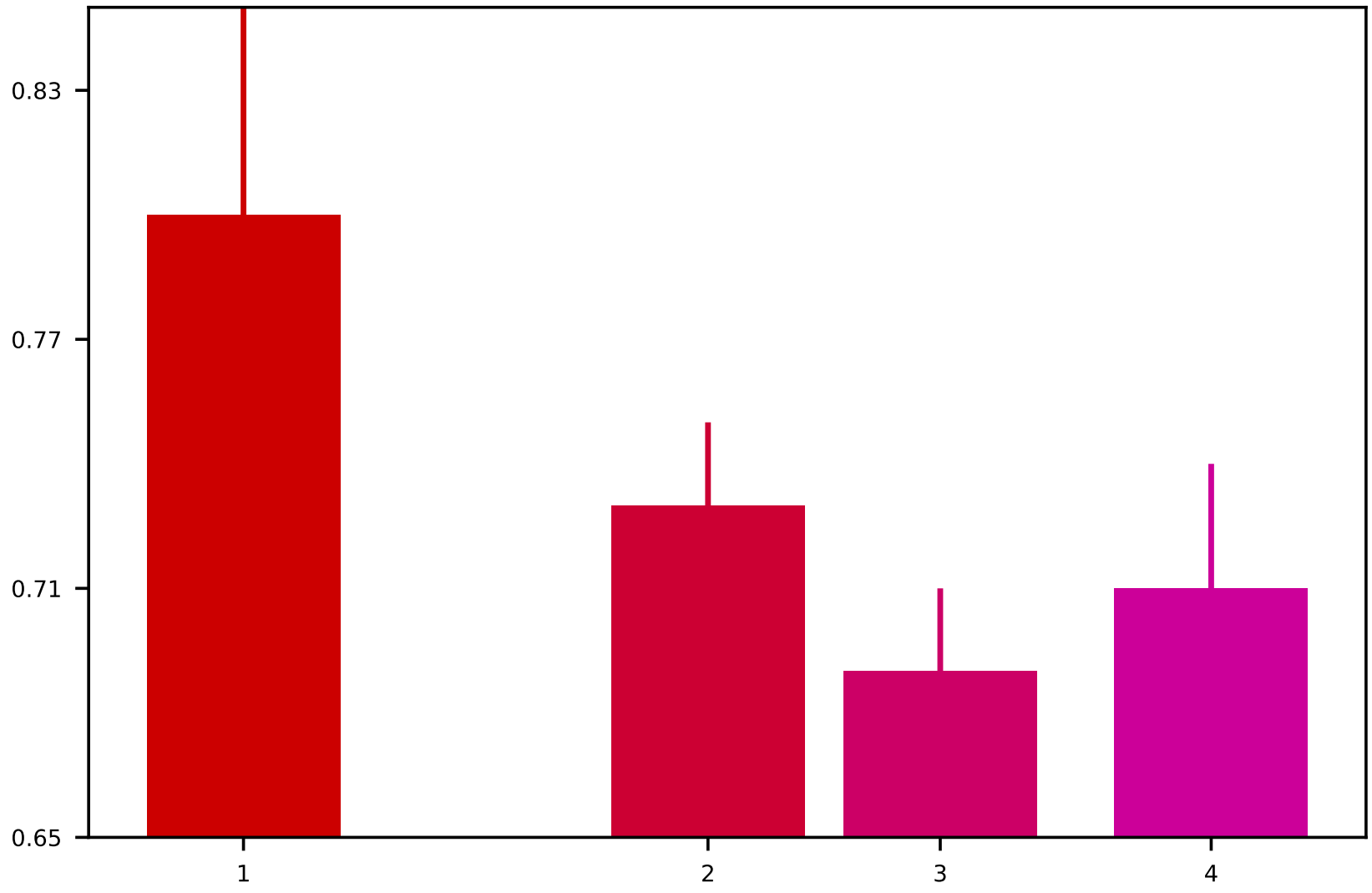


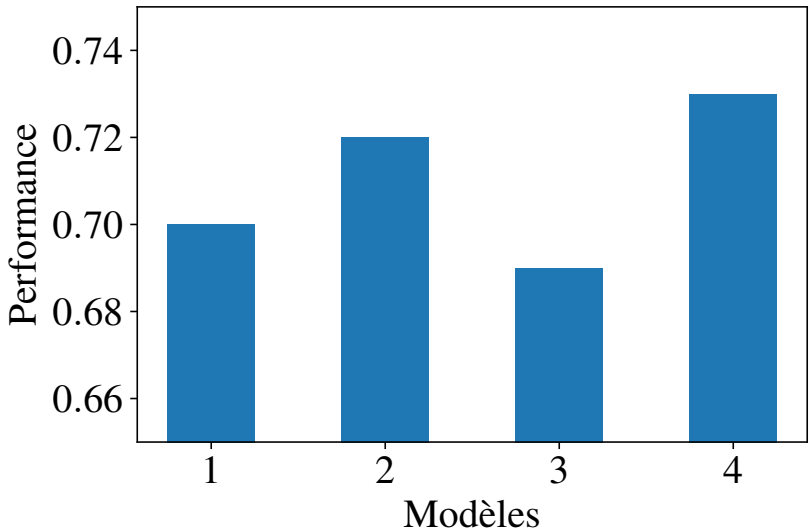

Department of Public Health (Georgia, USA), May 2020

# 2. Exemple 2

Performance de 4 modèles sur un problème d'apprentissage



# 3. Choix des axes (1)



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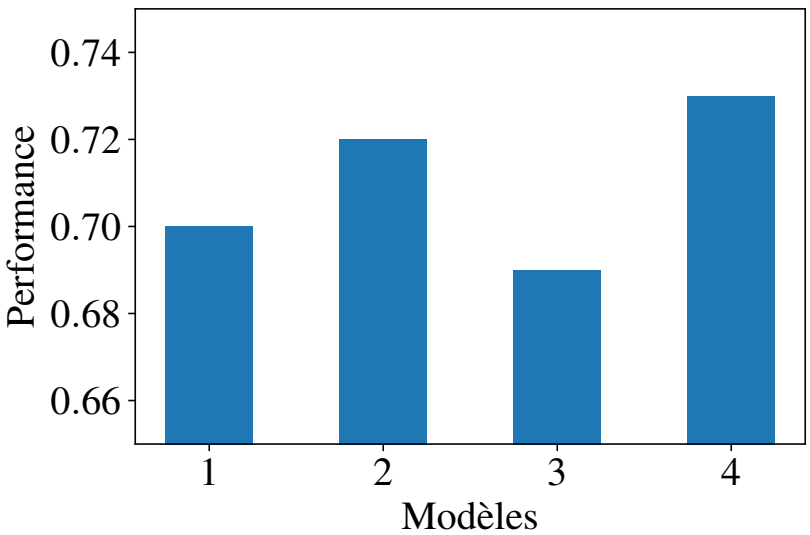
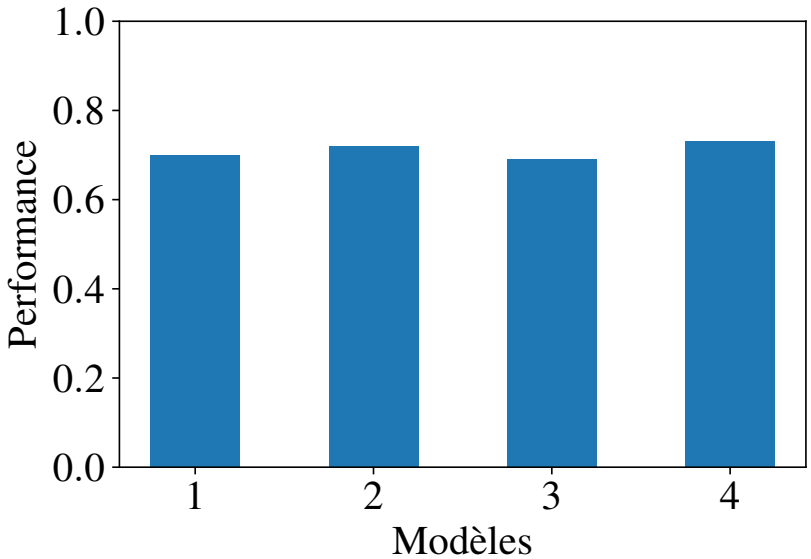
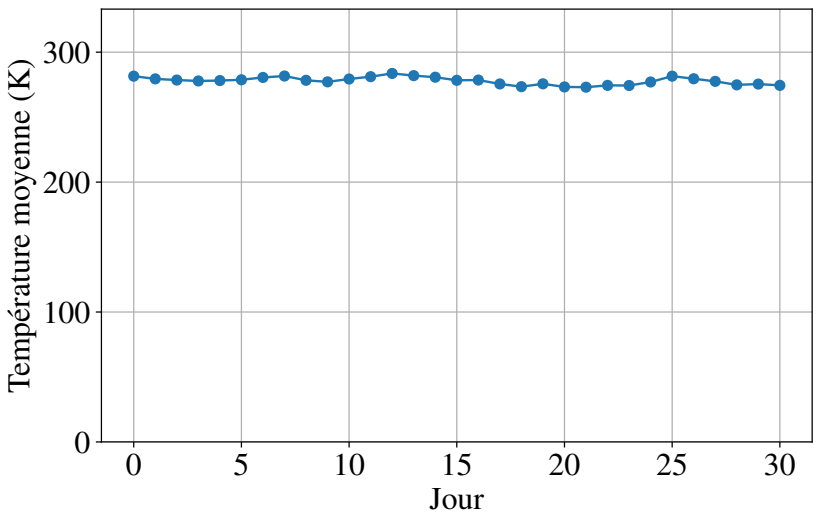


# 3. Choix des axes (2)



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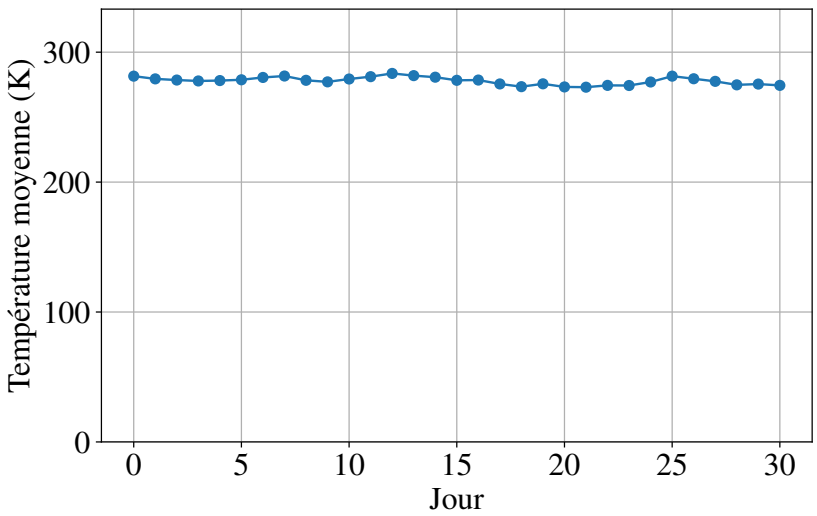
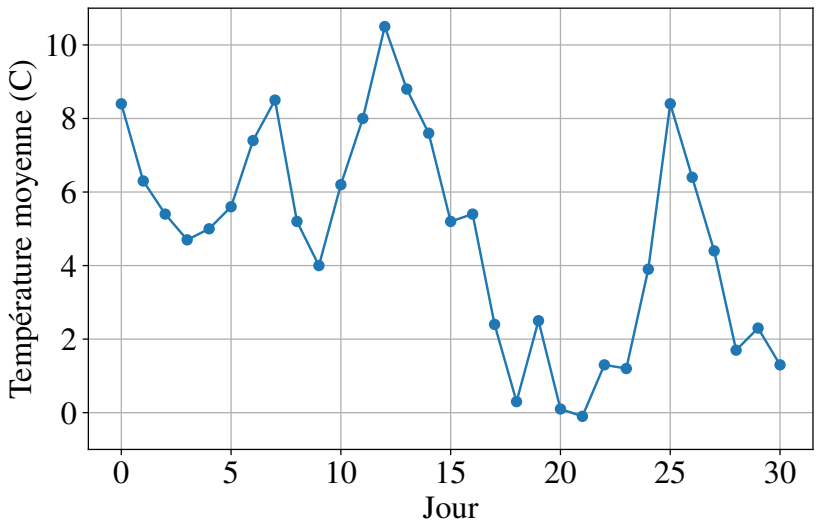
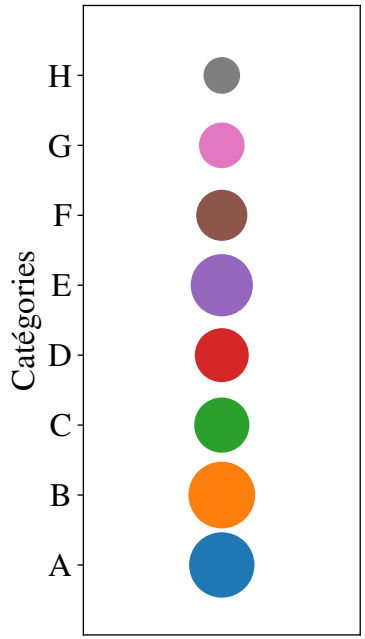


# 4. Proportional ink



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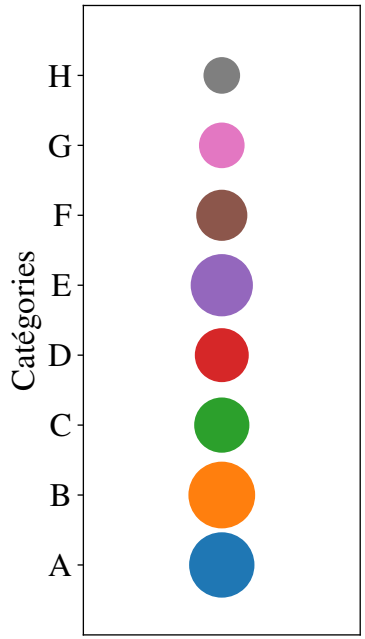


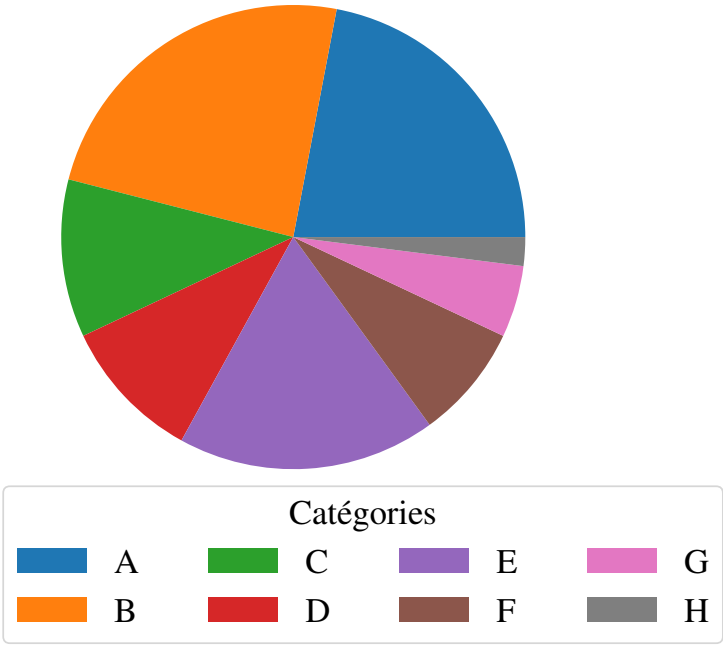

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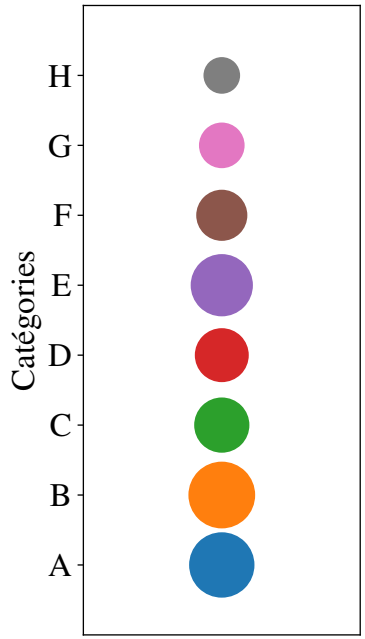
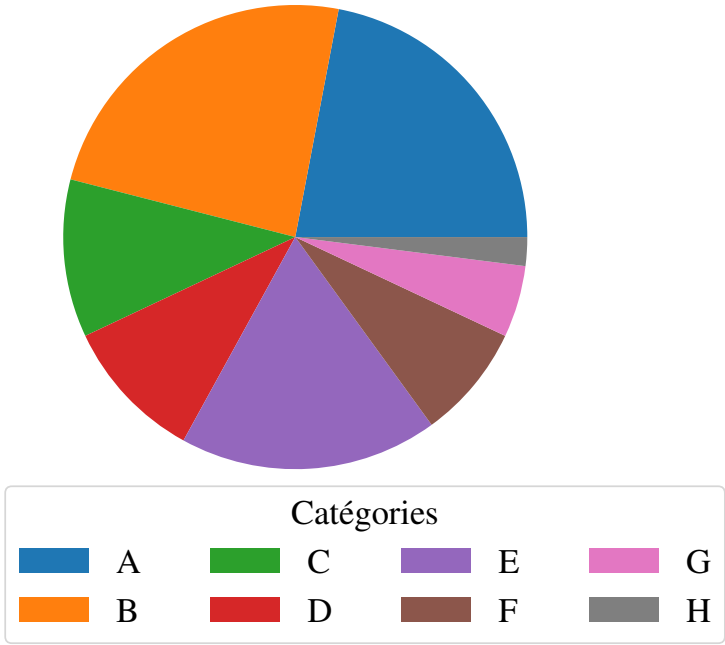
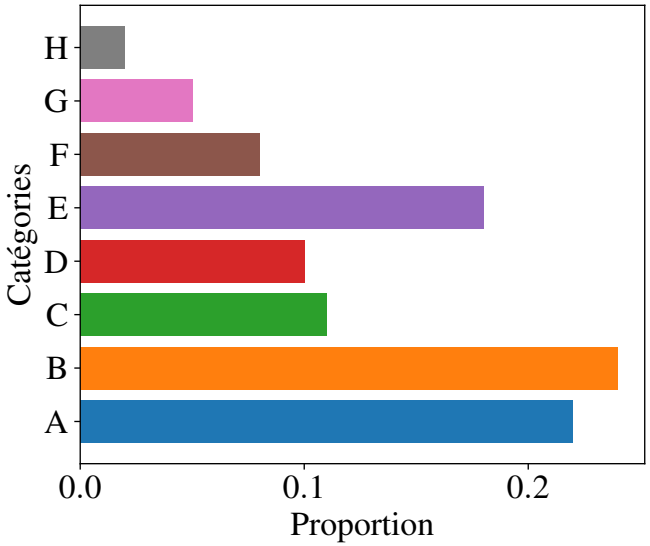
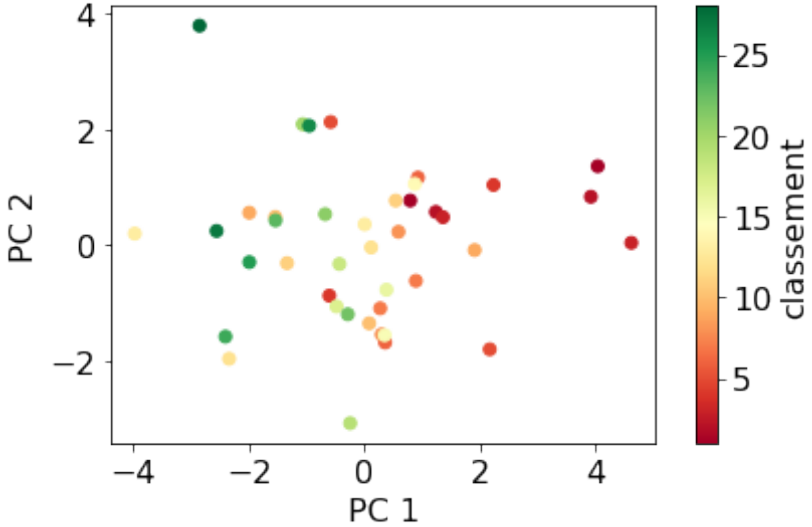


# 5. Dyschromatopie




```
plt.scatter(...cmap='RdYlGn')
```

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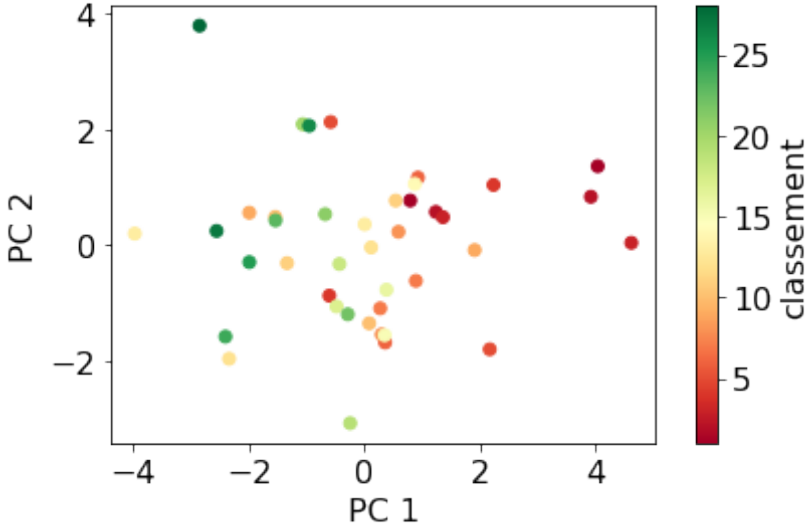


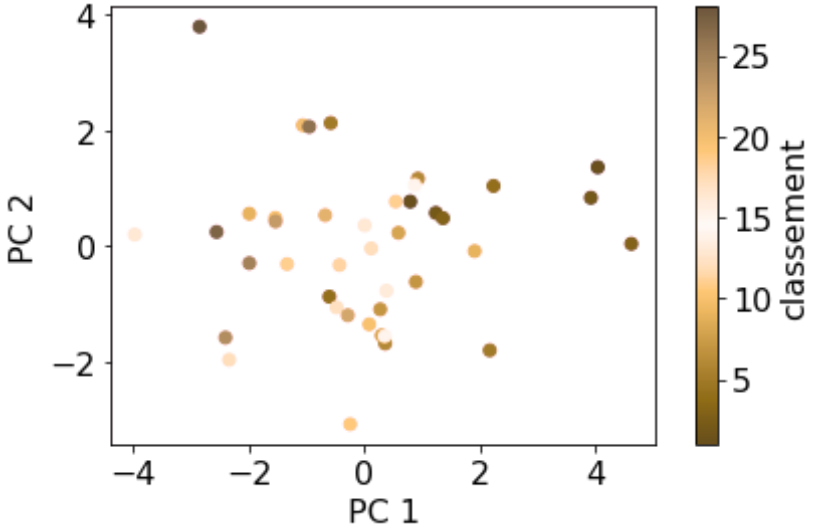


`plt.scatter(...cmap='RdYlGn')`

Simulation de deutéranopie par CoBliS

[lien vers CoBliS]

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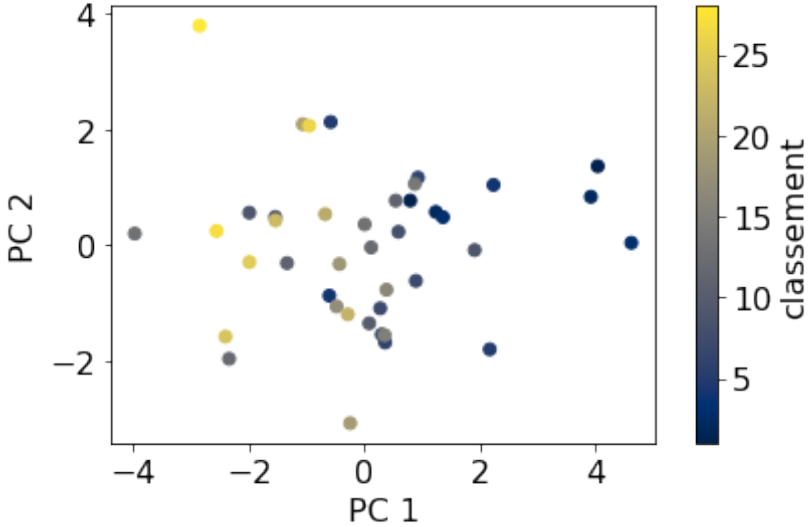


```
plt.scatter(...cmap='cividis)
```

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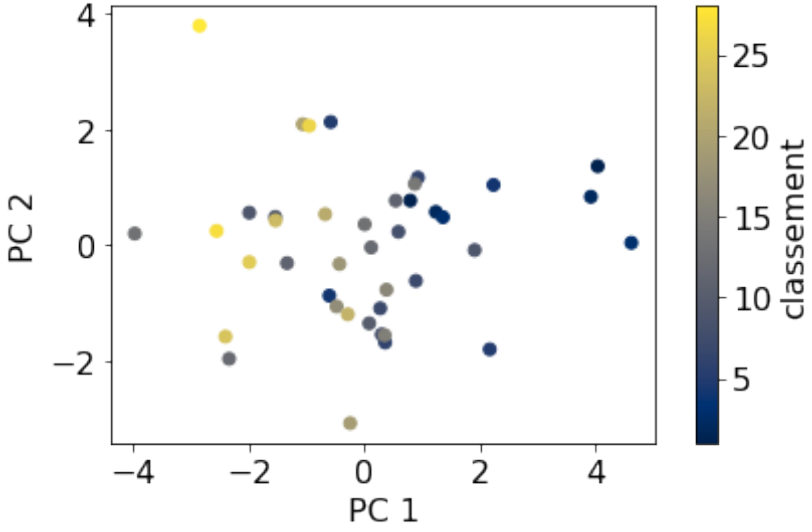
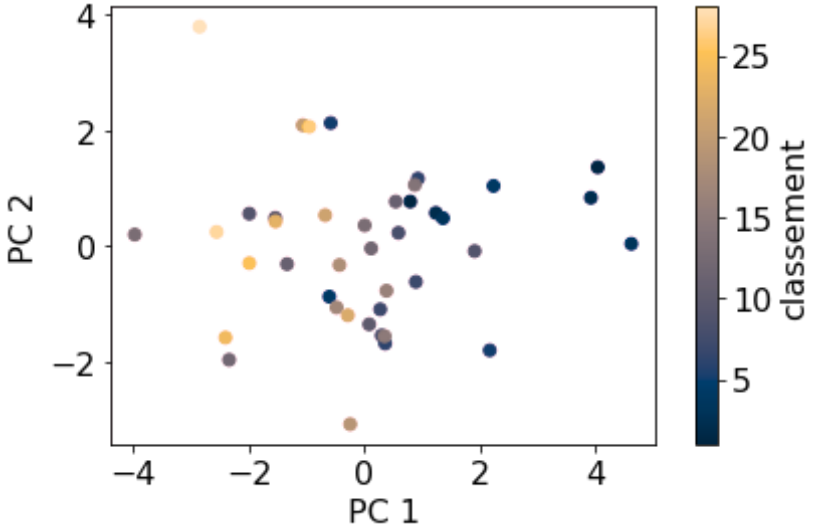



`plt.scatter(...cmap='cividis)`




Simulation de deutéranopie par CoBliS

[lien vers CoBliS]

# 2. Équité des algorithmes

# 1. Recrutement automatisé (Amazon)

source: Reuters [lien]

- Système fortement biaisé en faveur des CV déposés par des hommes
- Pourtant le sexe ne faisait pas partie des variables utilisées

# 2. Détection de criminels par leur photo

- Article sur arxiv : *Automated Inference on Criminality using Face Images*, Xiaolin Wu & Xi Zhang (2017)
- Motivation : "Unlike a human examiner/judge, a computer vision classifier has absolutely no subjective baggage, having no emotions, no biases whatsoever due to past experience, race, religion, political doctrine, gender, age, etc."

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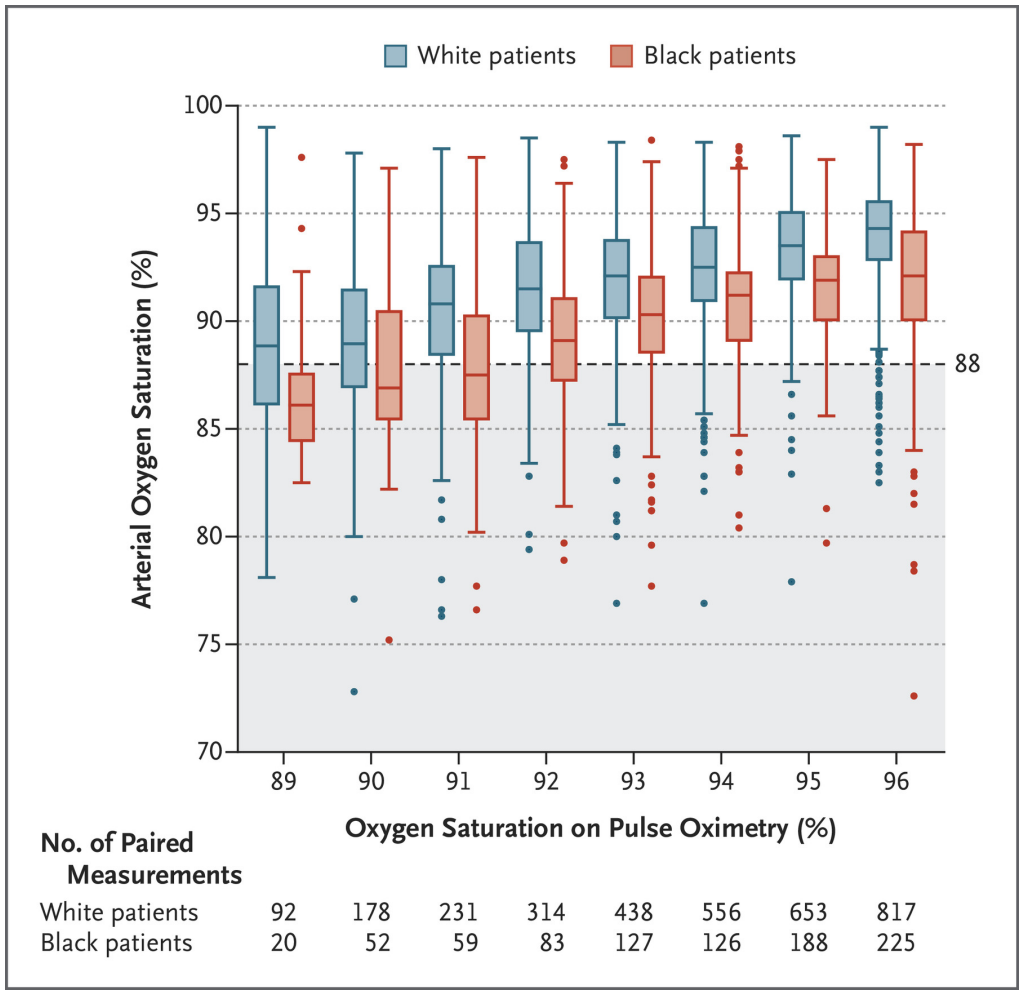
(a) Three samples in criminal ID photo set $S_c$.

(b) Three samples in non-criminal ID photo set $S_n$

Figure 1. Sample ID photos in our data set.

# 3. It's not just AI : oxymètres de pouls

– *Racial Bias in Pulse Oximetry Measurement*, Sjoding et al., New England Journal of Medicine, 2020; 383:2477-2478 [lien]




Accuracy of Pulse Oximetry in Measuring Arterial Oxygen Saturation, According to Race.

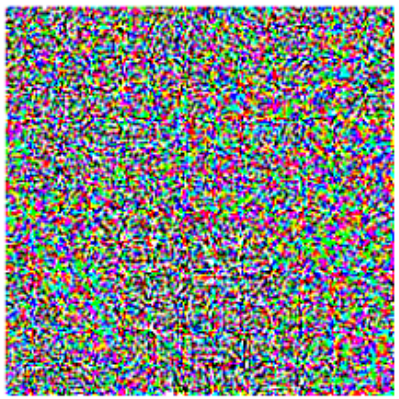
# 3. Fiabilité

# Attaque (bruit gaussien)

$\boldsymbol{x}$

"panda"
57.7% confidence

$+ .007 \times$



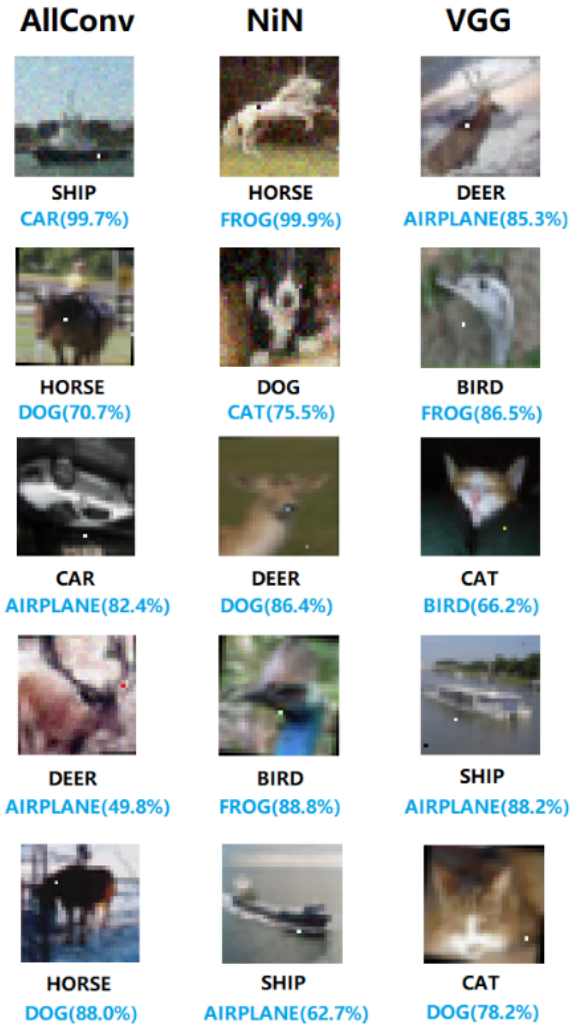
$\text{sign}(\nabla_{\boldsymbol{x}} J(\boldsymbol{\theta}, \boldsymbol{x}, y))$

$=$

$\boldsymbol{x} + \epsilon\text{sign}(\nabla_{\boldsymbol{x}} J(\boldsymbol{\theta}, \boldsymbol{x}, y))$
"gibbon"
99.3 % confidence

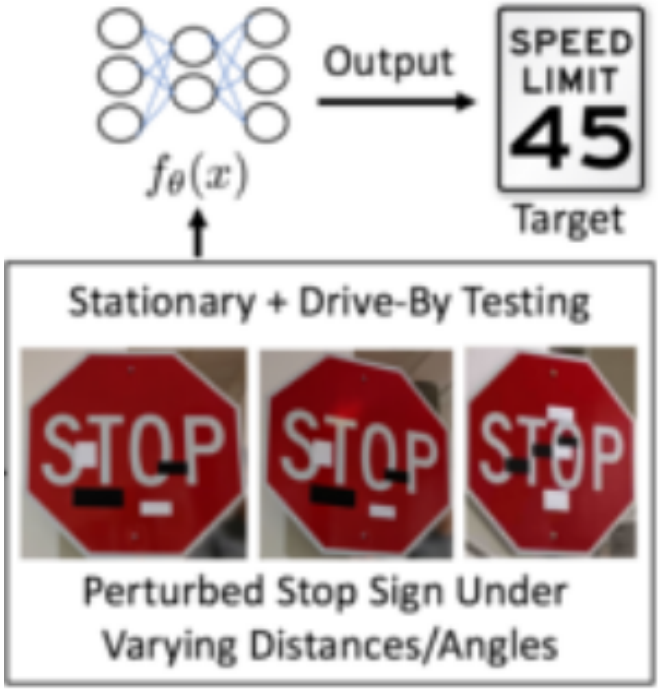
Goodfellow, Shlens & Szegedy (ICLR 2015)

# Attaque (1-pixel)




Su, Vargas & Kouichi (IEEE Transactions on Evolutionary Computation 2019)

# Attaque (monde réel)




Eykholt et al. (CBPR 2018)

# 4. Confidentialité

# 5. Enjeux écologiques