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Measuring dissimilarity with diffeomorphism invariance

Théophile Cantelobre, Carlo Ciliberto, Benjamin Guedj, Alessandro Rudi Inria & UCL ICML 2022 @ Baltimore

Poster session Today from 6-8pm Hall E #517

Come talk about machine learning.

Me

Íngia

Setting & problem statement

- Supervised learning, clustering, retrieval: distances are useful!
- Deformations in the wild: perspective, rotation, translation, ...





Find a distance between images which is invariant to smooth diffeomorphisms and computable in practice.



How ? Enforce inductive bias.

- Labeled data is expensive
- Data augmentation is computationally intensive.



Applied to our examples









Raccoon credits: Adrien Bukato







Key idea #1: Seeing images as functions





Key idea #2: change of variable

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Key idea #3: Nyström approximations

Kernel methods are expressive but expensive when used naïvely!



Efficient time complexity thanks to Nyström approximations.



Summary

Find a distance between images which is invariant to smooth diffeomorphisms and computable in practice.



Intuitive dissimilarity based on kernel methods.



Guarantees on behavior of dissimilarity and its **approximation**, with **fast time complexity**.



In practice: behaves as expected on images, fast code using GPU acceleration.



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Find a distance between images which is **invariant to smooth diffeomorphisms** and **computable in practice**.



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Come talk to me Hall E #517 (6-8pm)



You work on invariances in ML.

You are interested in kernel methods, Nyström approximations, ...

□ You like (bad) ML memes...

