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Multilabel classification through structured output learning

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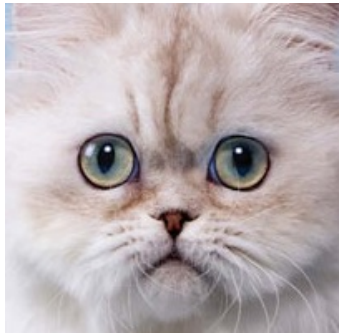
content

- machine learning
- single label classification
- multilabel classification
- structured output learning
- future work
- what can we do

Example: dog vs. cat?

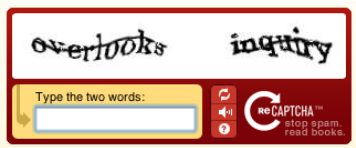
- We have 5000 pictures of dog and 5000 pictures of cat.

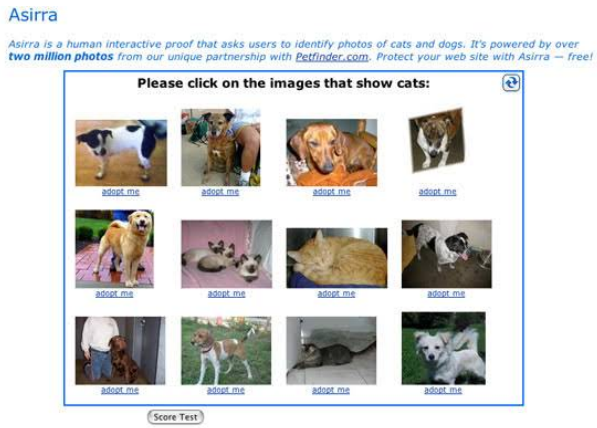



- Computer digitalize each picture into 100×100 pixels.
- Given a new picture, we want to answer: is it a dog or a cat?
- Simple task for human, dog, or cat.
- Golle (2008) claimed this is a difficult task for machines with only 82.7% accuracy.
- In 2013, 98.5% accuracy was reported in a Kaggle competition (https://www.kaggle.com/c/dogs-vs-cats).

In human verification system

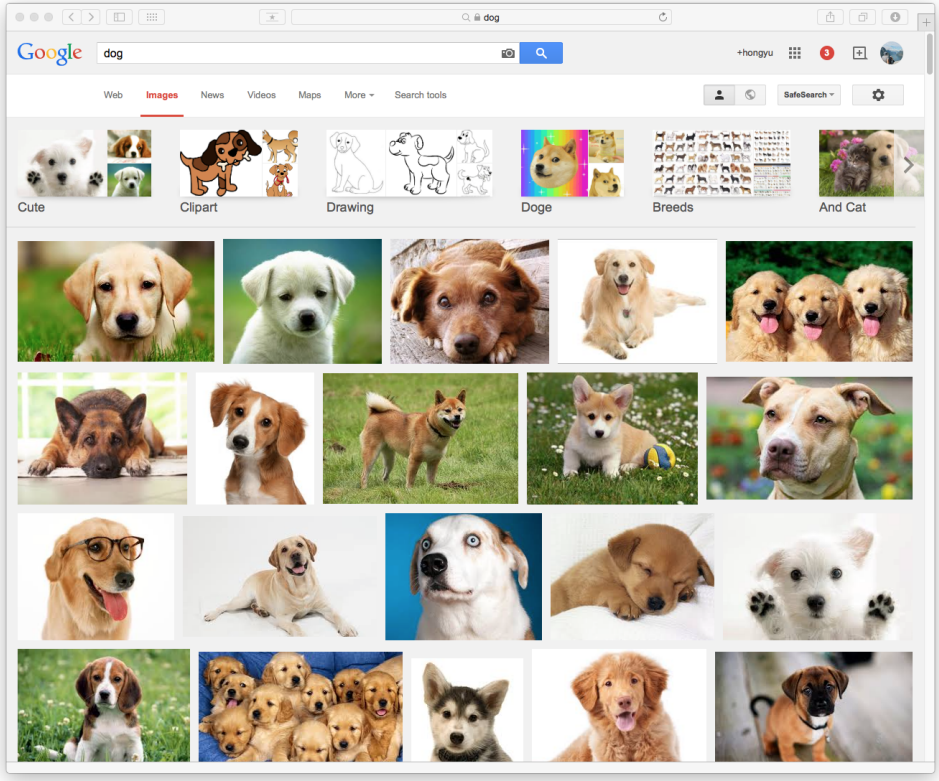
- Is the human verification system safe from machine learning attack.
  - CAPTCHA vs. ASSIRA





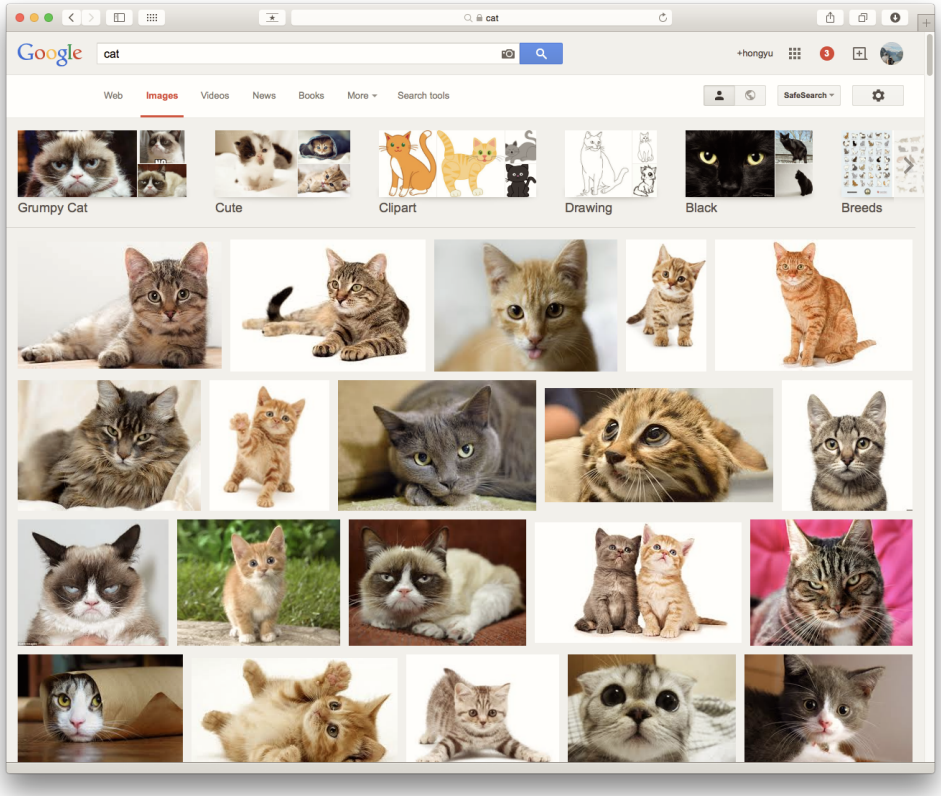
In search engine

- If machine can assign correct keywords to all pictures, we can search pictures by keywords.
- Search all cat pictures.



In search engine

- If machine can assign correct keywords to all pictures, we can search pictures by keywords.
- Search all dog pictures.



Single label classification

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Future work

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To get benefit?

- Fingerprint identification
- Voice recognition
- Information assistant

To contribute?

- SETI@home
- Rosetta@home
- Foldit

Bibliography

Golle, P. (2008). Machine learning attacks against the asirra captcha. In *Proceedings of the 15th ACM Conference on Computer and Communications Security*, CCS '08, pages 535–542, New York, NY, USA. ACM.