



Aalto University  
School of Science  
and Technology

# Multilabel classification through structured output learning

Hongyu Su

Department of Computer Science  
School of Science, Aalto University  
[hongyu.su@aalto.fi](mailto:hongyu.su@aalto.fi)

March 24, 2015

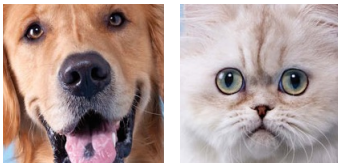
# content

- ▶ 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  $100 \times 100$  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>).

# Future work



# 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.