

## A First Look at Deep Learning Apps on Smartphones

First take a guess on how many apps use deep learning on your smartphone

### Summary of the paper

This paper studied deep learning functions on 16,500 Android apps. They built and used tools to analyse deep learning functions on those apps. They mainly focused on who were the companies/developers that used deep learning, what did they use deep learning for, and how did their deep learning models look like. They found deep learning apps became a trend and had a promising future on smartphones. They also found deep learning frameworks were getting more used as a core function in many apps. However, their findings also indicate the needs of optimisation and security protection on deep learning models deployed on smartphones.

### Key points of the paper

- They found DL apps had more downloads, reviews, and app size than non-DL apps. 149 out of 211 DL apps used DL for image processing. Most DL apps use DL as a core feature.
- TensorFlow is the most used DL framework on mobile apps. Other DL frameworks were also gaining traction. They also deemed the multi-usage of frameworks as bad practice because it unnecessarily increases the apk size and memory footprint.
- Convolutional Neural Network (CNN) model takes 87.7% of the DL apps. Most models missed obvious optimisations such as app size and memory footprint. They also found not many DL apps are protected and thus not very secure.

### Questions

Recall the first line of this handout, how many deep learning apps do you think you have on your smartphone now?

What types of DL apps do you think you have on your smartphone? What kind of DL apps will be popular in the next few years?

When I was choosing the research papers, this paper is categorised as cybersecurity rather than Artificial Intelligence and Machine Learning. Any thoughts on that?