

Deep Learning with KotlinDL

Aleksei Zinovev, JetBrains

[@zaleslaw](#)

KotlinConf'23

Amsterdam



Bio

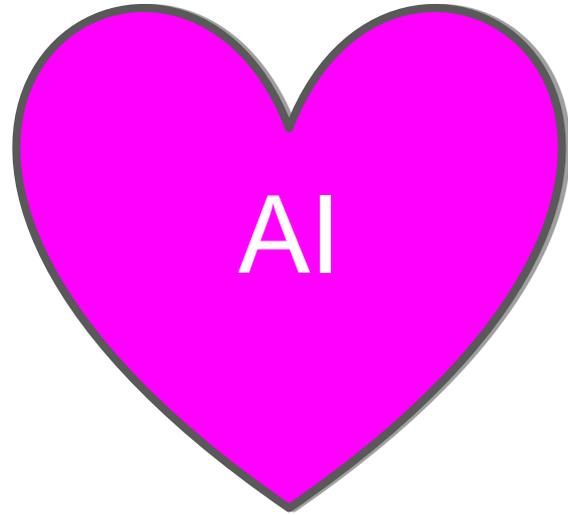
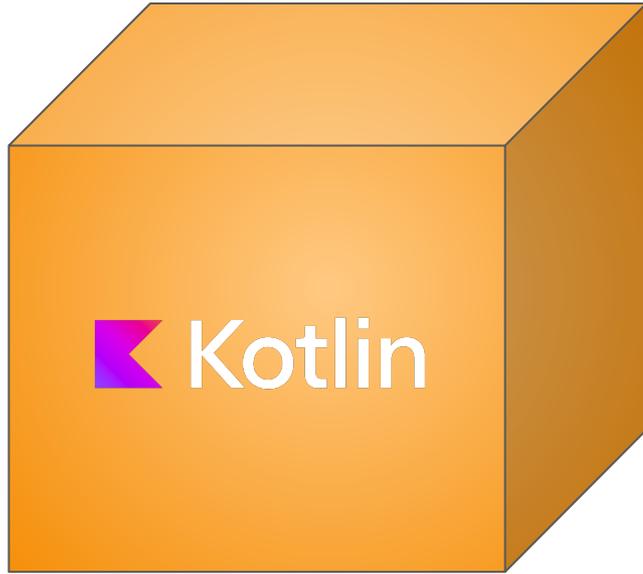
- Java & Kotlin developer
- Distributed ML enthusiast
- Apache Ignite PMC
- TensorFlow Contributor
- JetBrains, Kotlin for Data Science
- Happy father and husband
- <https://github.com/zaleslaw>
- <https://twitter.com/zaleslaw>

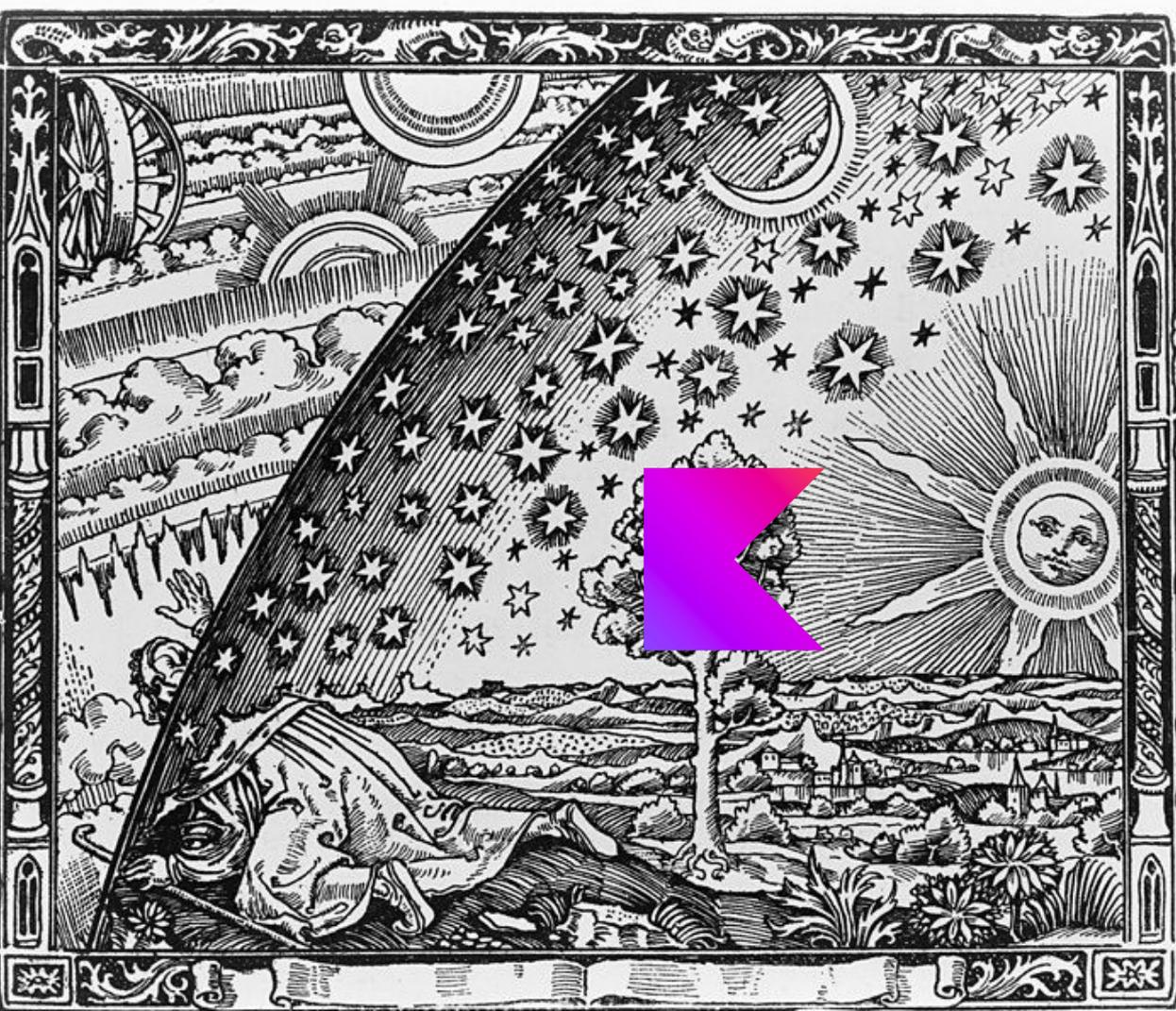


Agenda

- The KotlinDL Intro
- Demo (4 use cases):
 - Object Detection
 - Pose Estimation
 - Face Detection
 - Image Recognition
- Transfer Learning with KotlinDL explanation
- Demo: Transfer Learning
- Useful Links

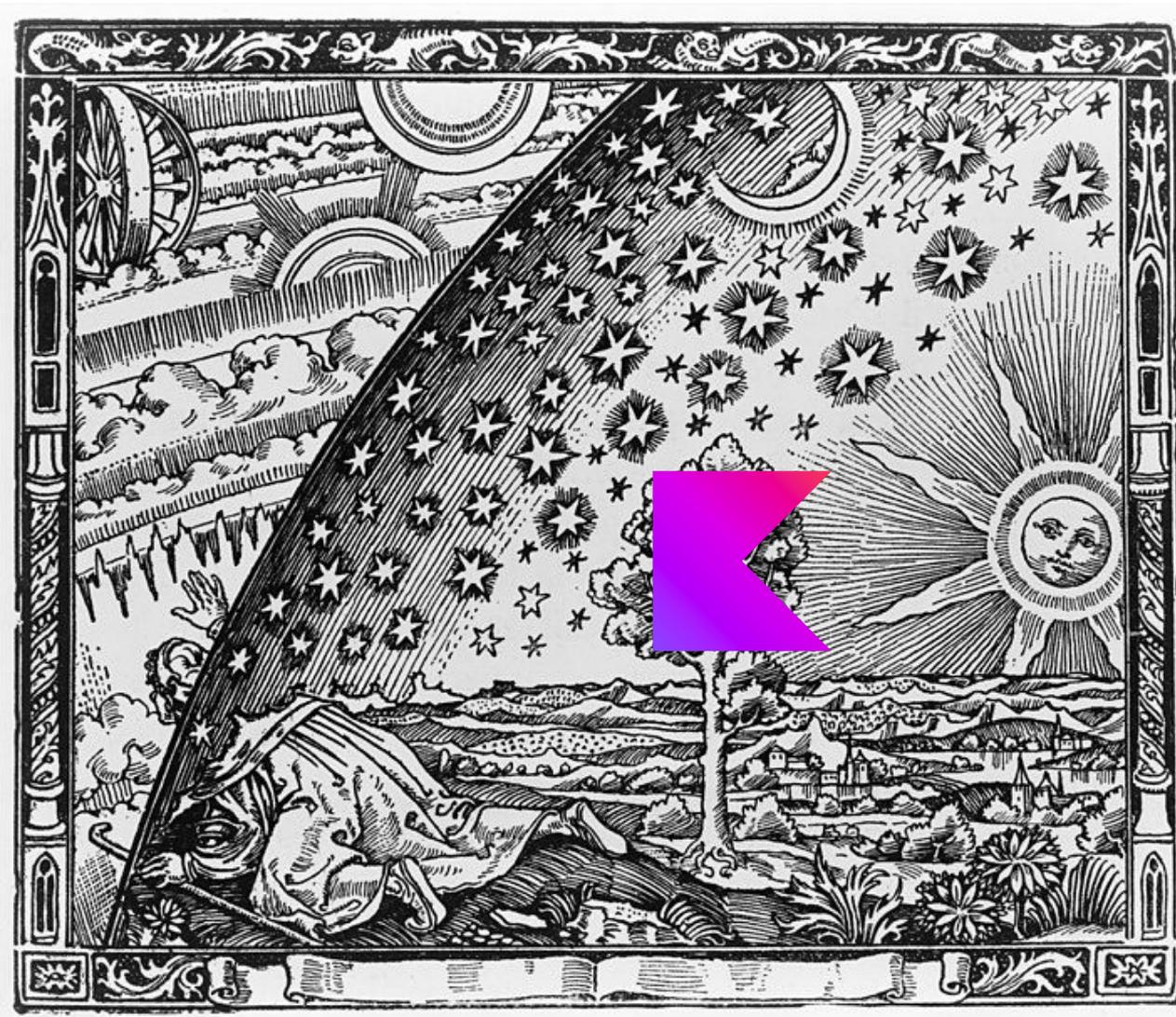
Do you have a product on Kotlin and need AI?

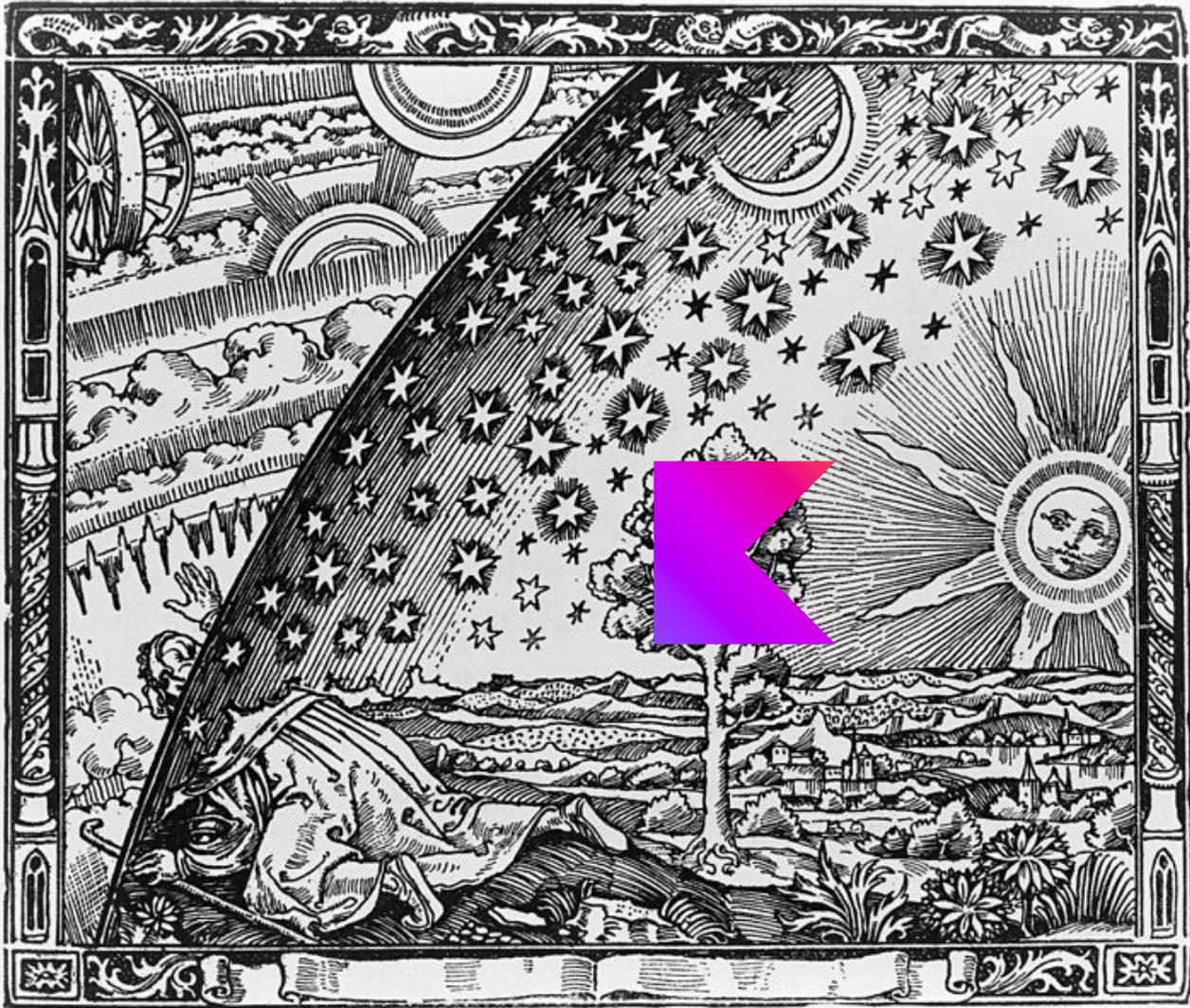




Python market:

- Notebooks with spaghetti-code
- No Kotlin API in DL frameworks
- A lot of models





Python market:

- Notebooks with spaghetti-code
- No Kotlin API in DL frameworks
- A lot of models

Kotlin market:

- Outdated examples
- Abandoned libraries
- No documentation

KotlinDL = Deep Learning Library for Kotliners

- Nice Kotlin-idiomatic API for beginners

KotlinDL = Deep Learning Library for Kotliners

- Nice Kotlin-idiomatic API for beginners
- Model Hub with the pretrained models in the Computer Vision Domain

KotlinDL = Deep Learning Library for Kotliners

- Nice Kotlin-idiomatic API for beginners
- Model Hub with the pretrained models in the Computer Vision Domain
- Embedded datasets

KotlinDL = Deep Learning Library for Kotliners

- Nice Kotlin-idiomatic API for beginners
- Model Hub with the pretrained models in the Computer Vision Domain
- Embedded datasets
- Kotlin DSL for Image Preprocessing

KotlinDL = Deep Learning Library for Kotliners

- Nice Kotlin-idiomatic API for beginners
- Model Hub with the pretrained models in the Computer Vision Domain
- Embedded datasets
- Kotlin DSL for Image Preprocessing
- A lot of tutorials and examples

KotlinDL = Deep Learning Library for Kotliners

- Nice Kotlin-idiomatic API for beginners
- Model Hub with the pretrained models in the Computer Vision Domain
- Embedded datasets
- Kotlin DSL for Image Preprocessing
- A lot of tutorials and examples
- Integration with Keras, TensorFlow and ONNX Runtime

KotlinDL = Deep Learning Library for Kotliners

- Nice Kotlin-idiomatic API for beginners
- Model Hub with the pretrained models in the Computer Vision Domain
- Embedded datasets
- Kotlin DSL for Image Preprocessing
- A lot of tutorials and examples
- Integration with Keras, TensorFlow and ONNX Runtime
- Android support

How it works?

Kotlin Application

How it works?

Kotlin Application

KotlinDL

How it works?

Kotlin Application



KotlinDL

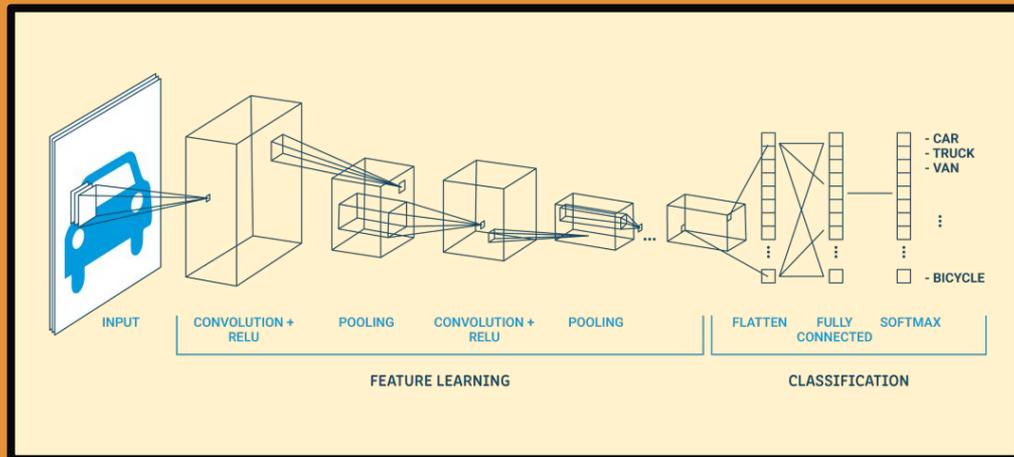
**ONNX Runtime
via Java API**

How it works?

Kotlin Application

KotlinDL

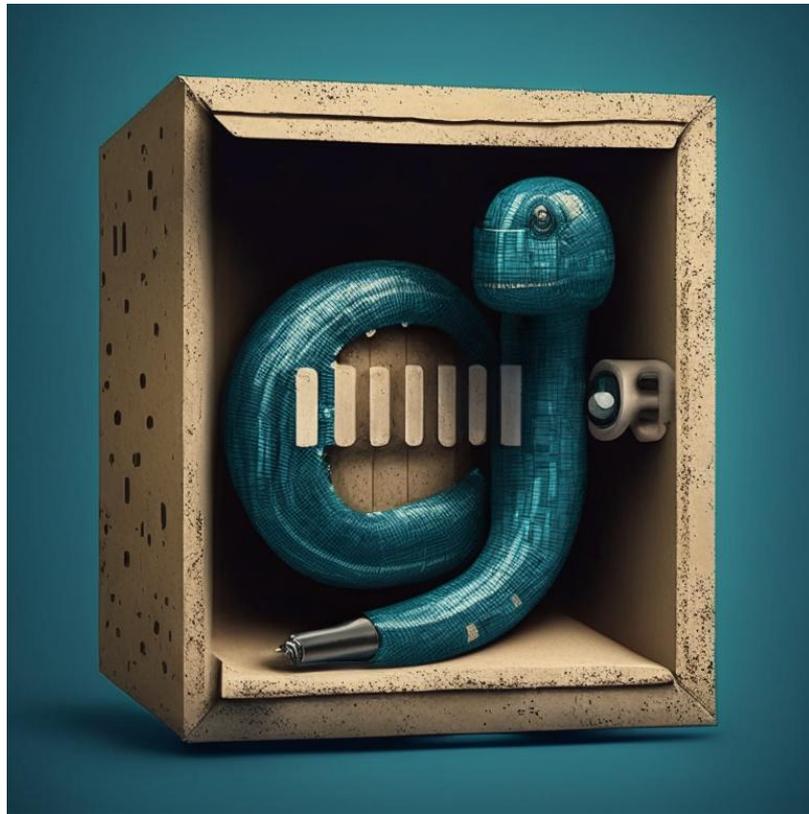
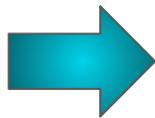
ONNX Runtime via Java API

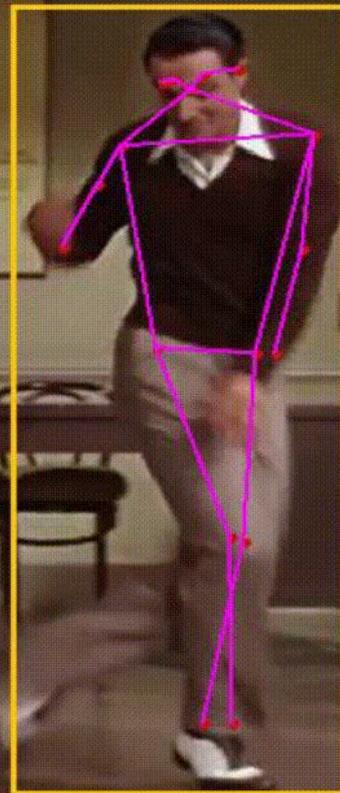
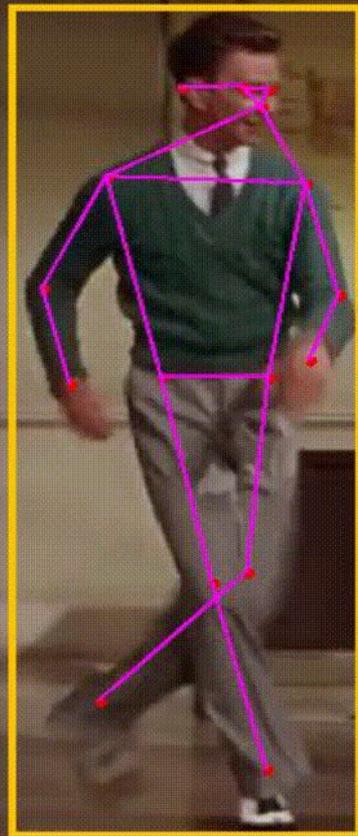


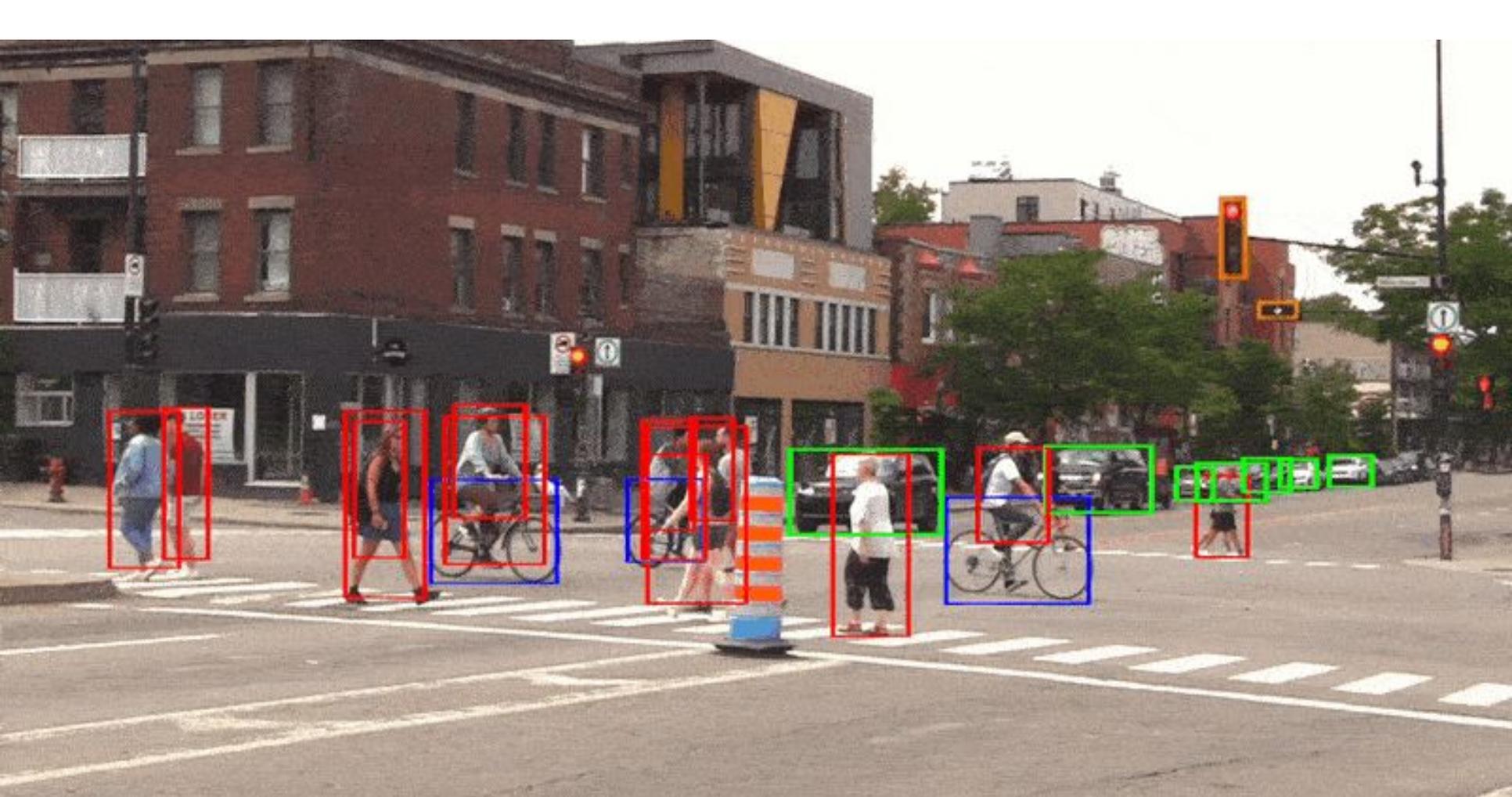
What if I have a PyTorch-trained model?



What if I have a PyTorch-trained model?

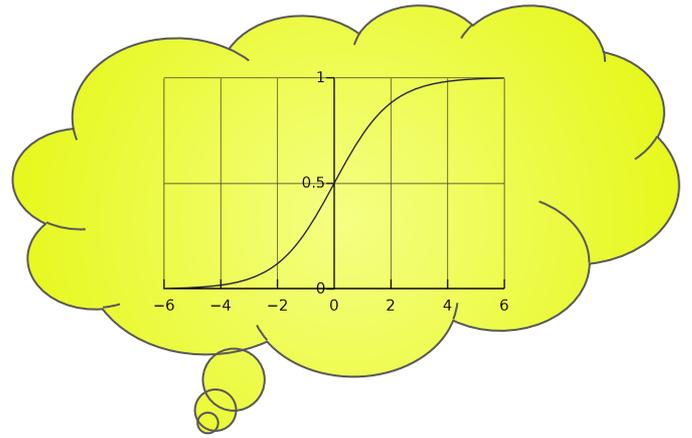






Demo

What about Android Apps?

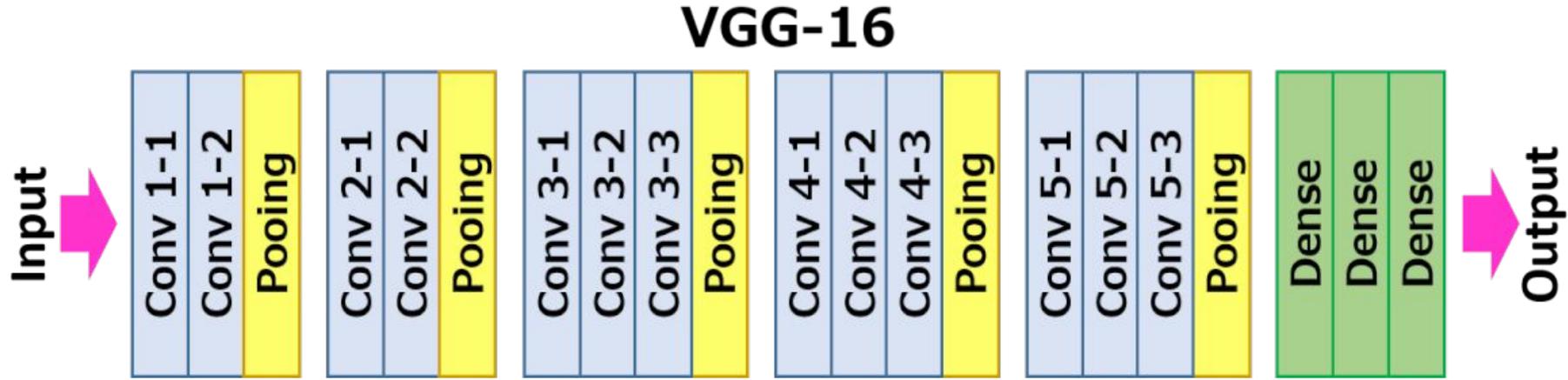


<https://github.com/Kotlin/kotlindl-app-sample>

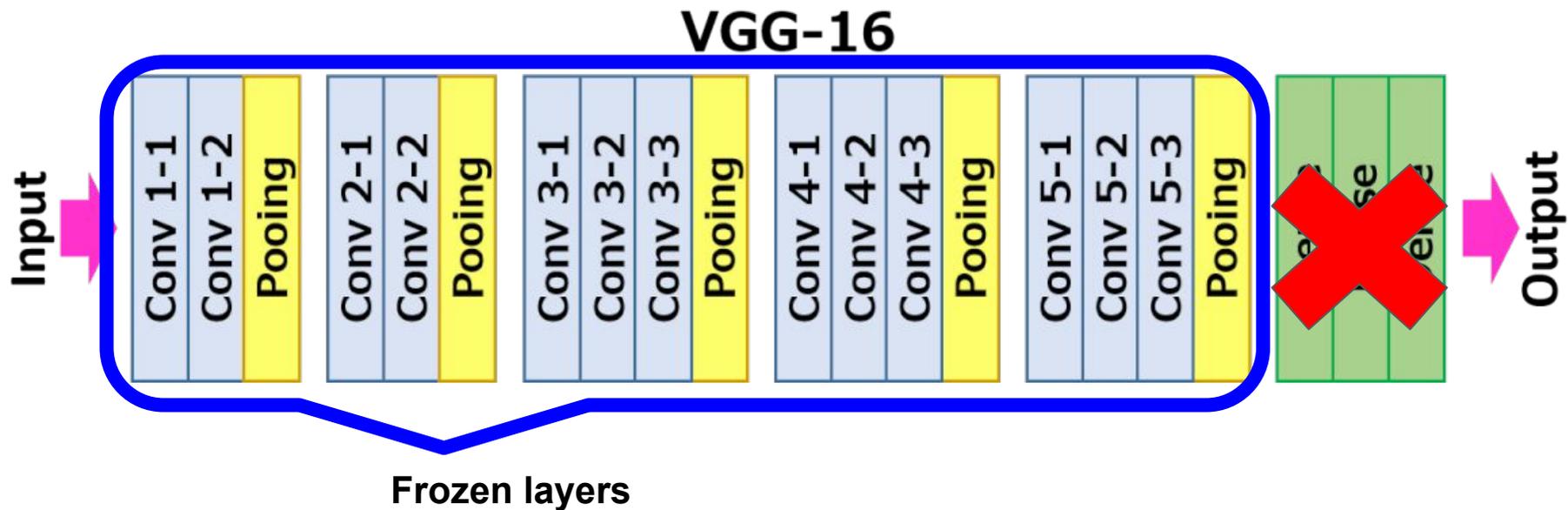
But sometimes you need to train your own models



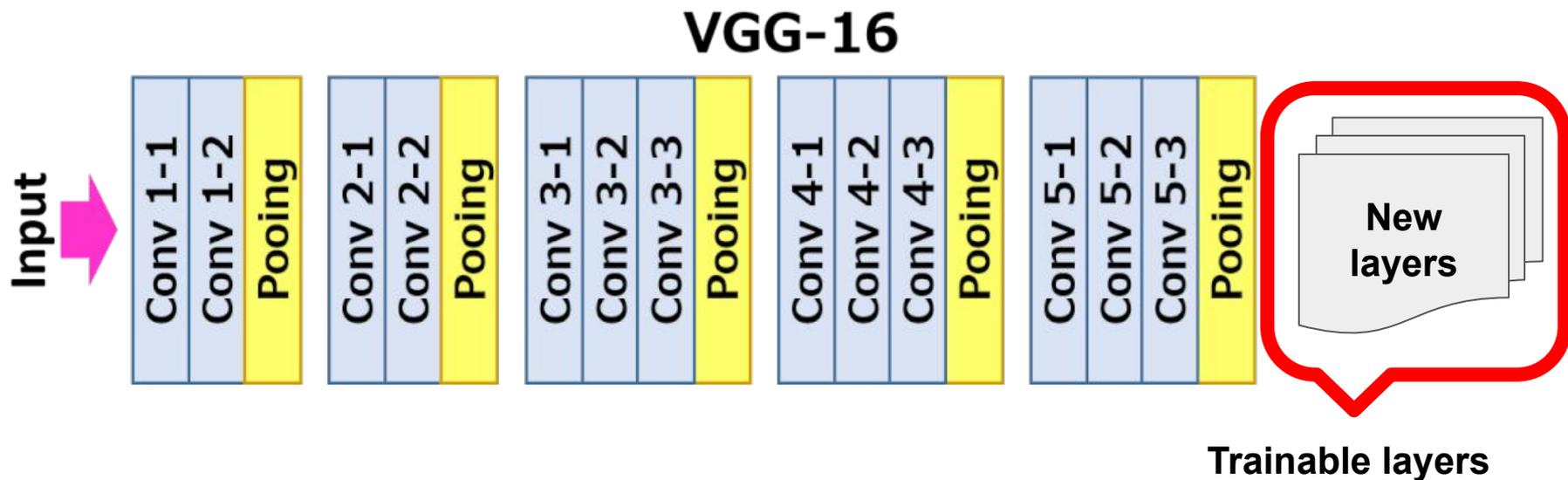
Transfer Learning: fine-tune the model



Transfer Learning: fine-tune the model



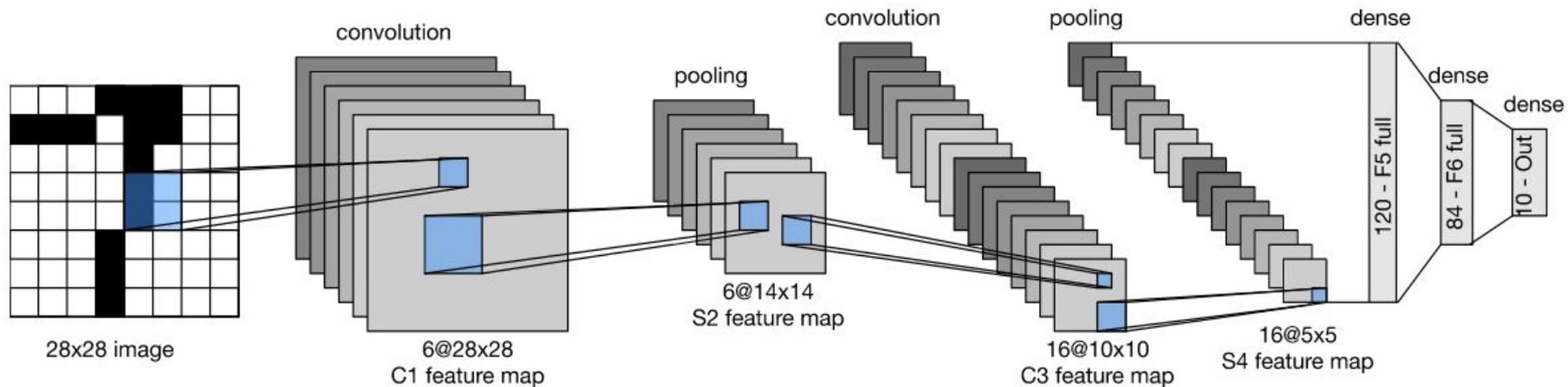
Transfer Learning: fine-tune the model



Transfer Learning: Demo



You can build your own Neural Network ([ref](#))



Summary

- Prediction is easy with KotlinDL
- Fine-tuning of the model is possible
- Training from scratch is possible
- We have other [items in the box](#) (DataFrame, plotting and Notebooks)
- Share your case and get the help from the KDS team

Follow me and KDS team

- [GitHub: @zaleslaw](#)
- [Twitter: @zaleslaw](#)
- [YouTube: KotlinDL playlist](#)
- [Medium: @zaleslaw](#)
- [Project GitHub - Kotlin/kotlindl](#)
- [Team Twitter: @KotlinForData](#)



Thank you, and don't forget to vote

@twitter
KotlinConf'23
Amsterdam

