

# Transfer Learning

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Leveraging pretrained models and adapting them to your problem

Jacob Idoko  
Electrical and Software Engineering  
Schulich School of Engineering

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# Outline

- Learning Goals
- Idea Behind Transfer Learning
- Step-by-step transfer learning procedure
- Summary

# Learning Goals

- Understand the motivation behind transfer learning approaches
- Understand the general transfer learning procedure

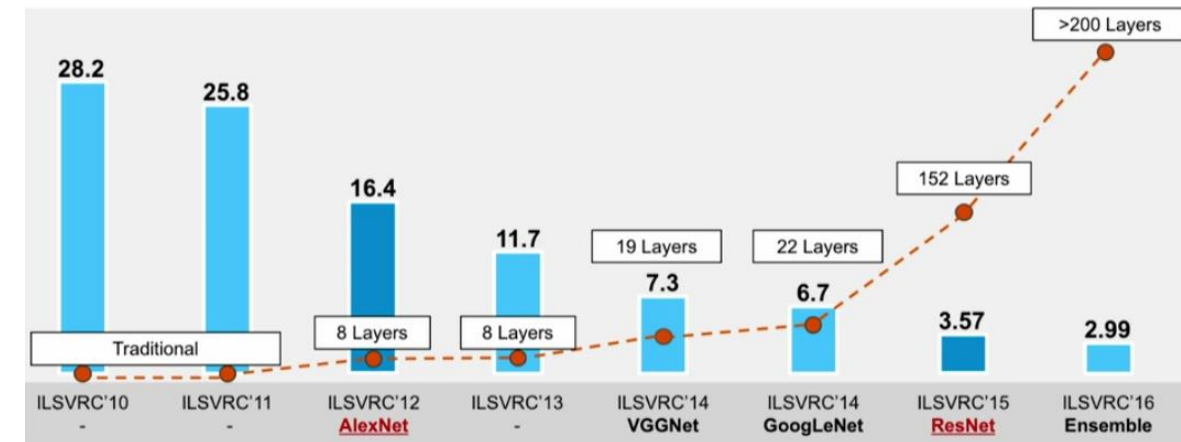
# Transfer Learning

- **Transfer learning** is the process of adapting a representation learned while solving one problem and adapting this representation to a different but related problem.
- It is very useful when you do not have large amounts of data to train your model from scratch.
- This Keras tutorial is highly recommended: [https://keras.io/guides/transfer\\_learning/](https://keras.io/guides/transfer_learning/)

# ImageNet Challenge



- ImageNet is a large scale object classification challenge
- >14,000,000 annotated images
- >20,000 classes



- In 2012 teams started using graphics processing units (GPUs)



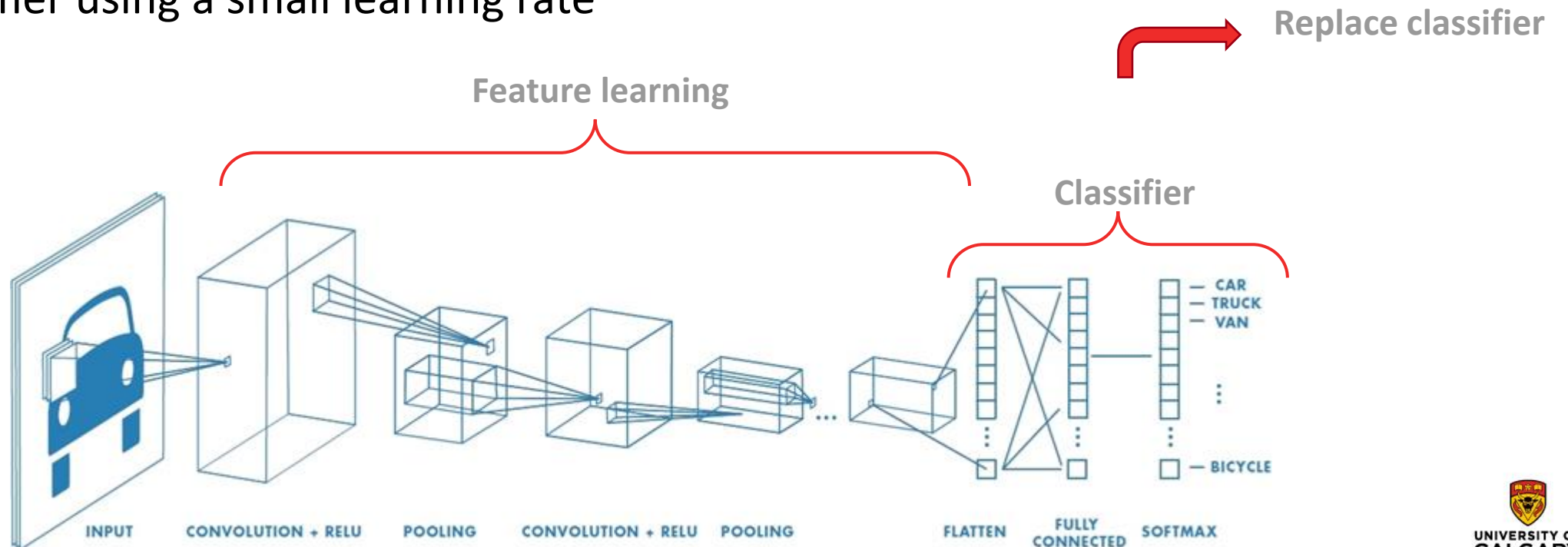
# Transfer Learning Intuition



**Lasagna or endocarditis?**

# Transfer Learning

- Use a model pre-trained for a different task and:
  - Freeze the feature learning layers and re-train the classifier on new data
  - Then, unfreeze the feature learning layers and retrain them along with the classifier using a small learning rate



# Summary

- Transfer learning is a powerful technique for situations where your dataset has too little data to train a full-scale model from scratch
- It relies on the assumption that the representation that you learned for one problem will be useful for a separate but related problem



# Thank you!



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