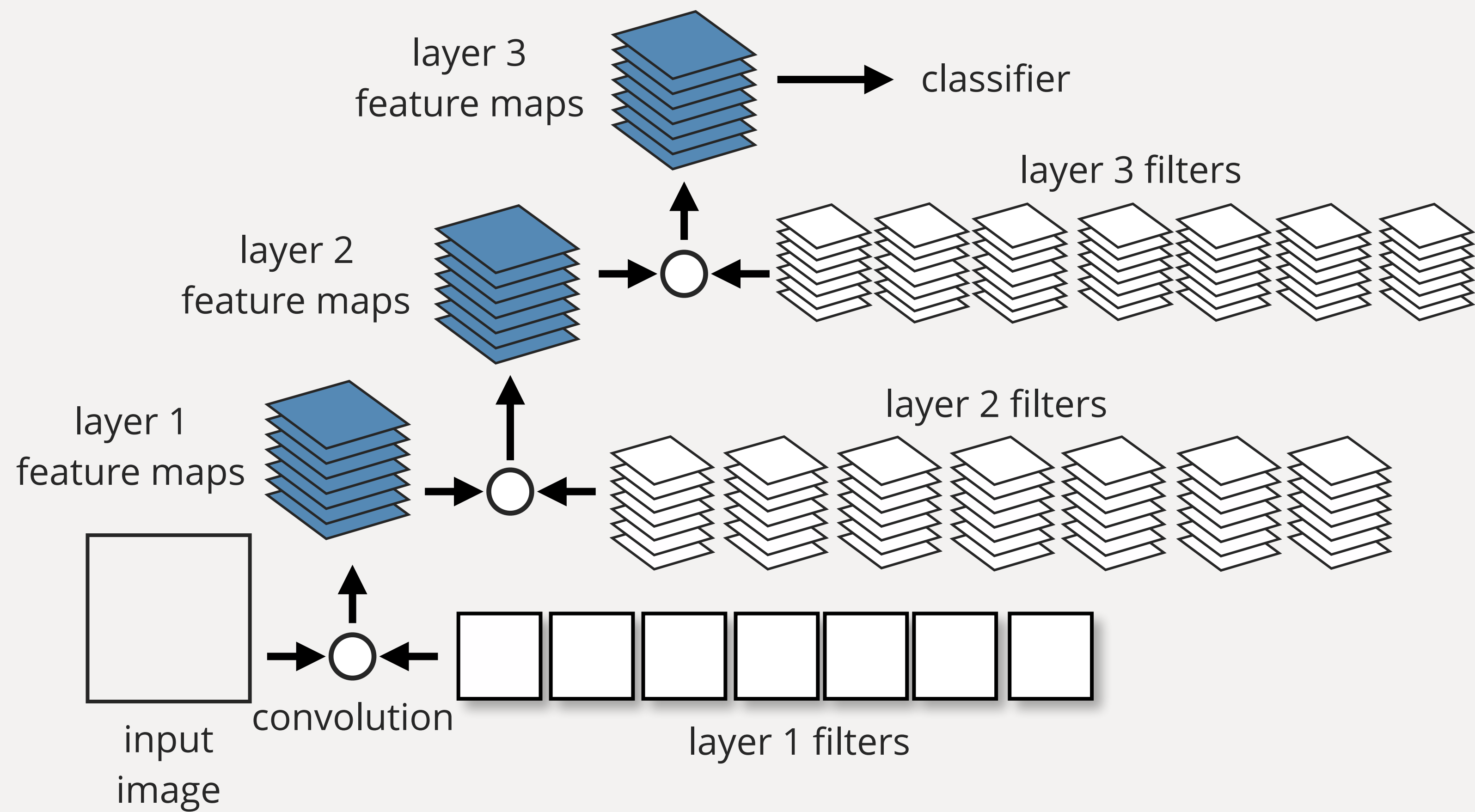




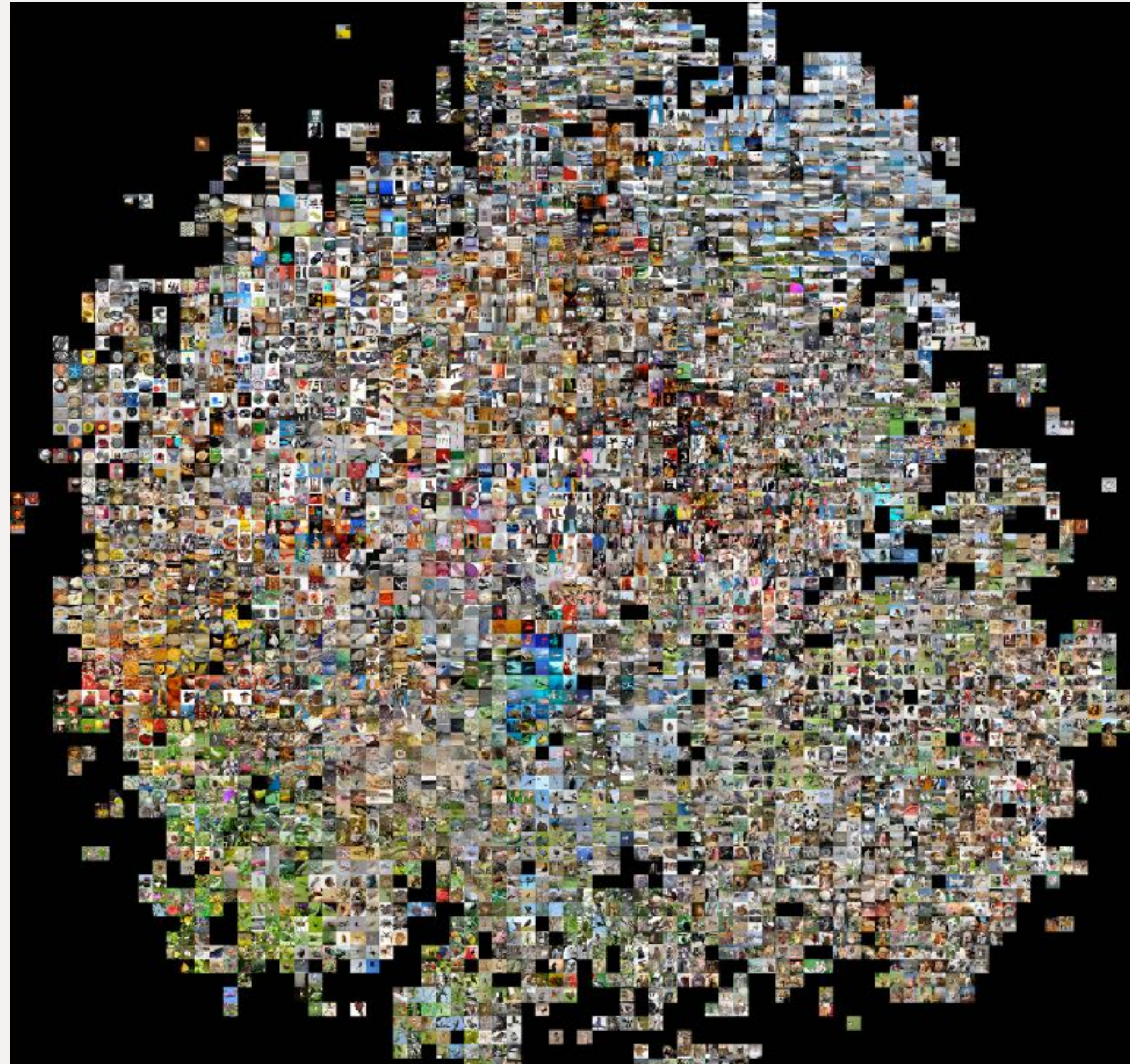
Applications in Use and Practice

How well does this technology perform
on real data at massive scale?



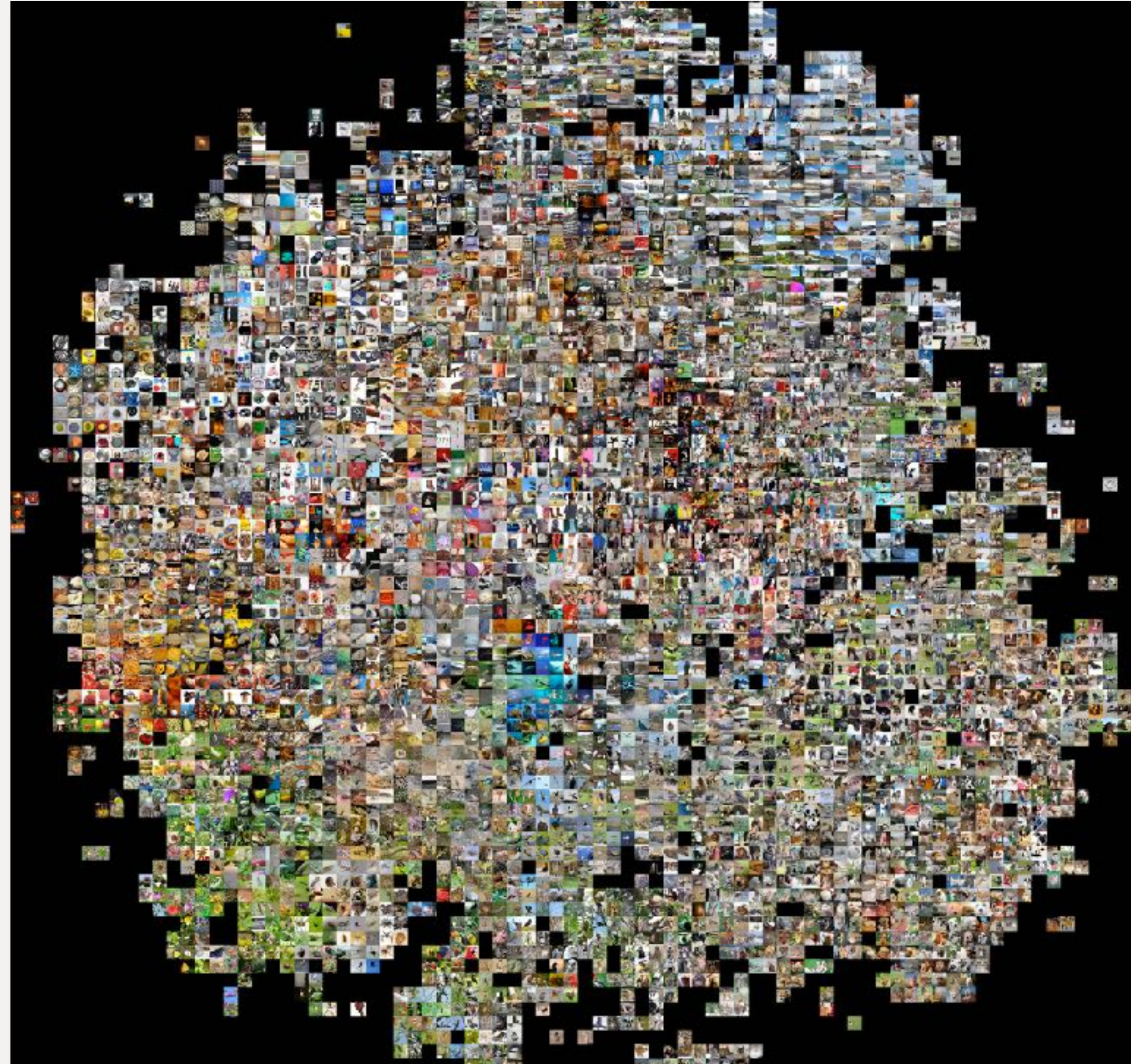
Deep Learning Developments

- Convolutional Neural Network
- Graphical processor unit



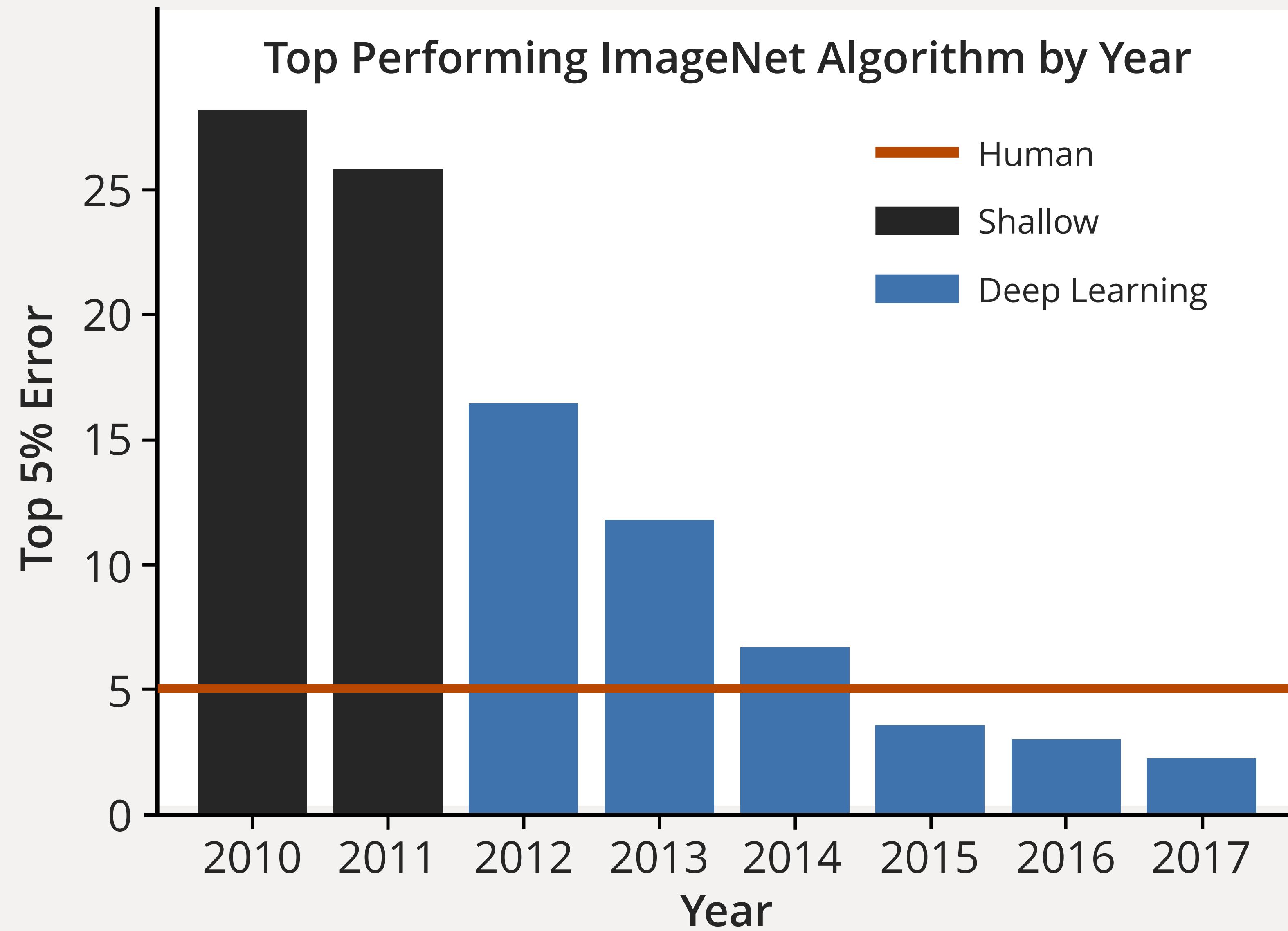
Deep Learning Developments

- Convolutional Neural Network
- Graphical processor unit
- Massive data at scale



ImageNet Dataset

- 1000 image classes
- 1000 training images per class
- 1.2 million training images
- Real life images





mite

container ship

motor scooter

leopard

← true image label

		mite		container ship		motor scooter		leopard
	black widow			lifeboat		go-kart		jaguar
	cockroach			amphibian		moped		cheetah
	tick			fireboat		bumper car		snow leopard
	starfish			drilling platform		golf cart		Egyptian cat

assigned labels by machine



grille

mushroom

cherry

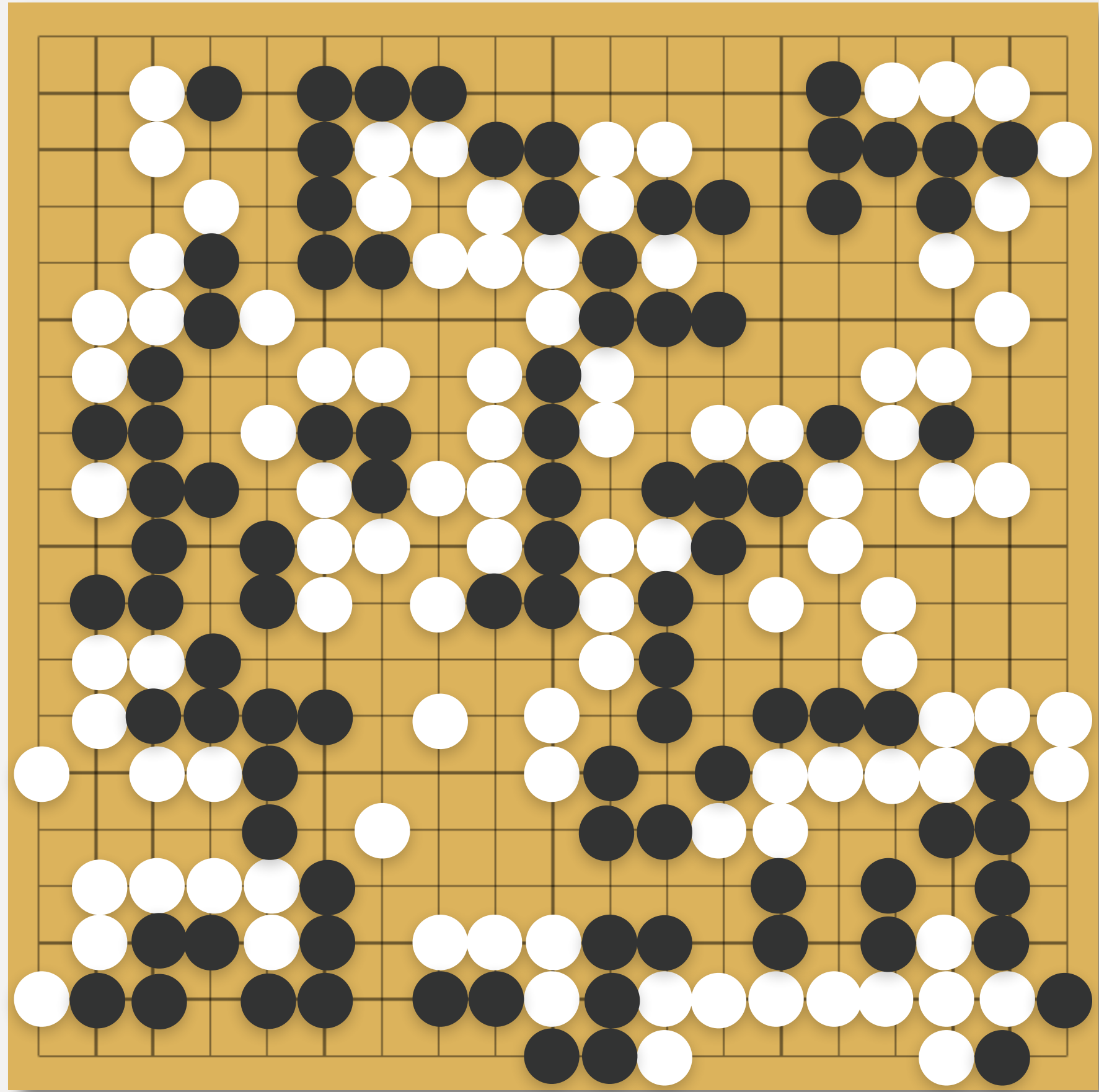
Madagascar cat

← true image label

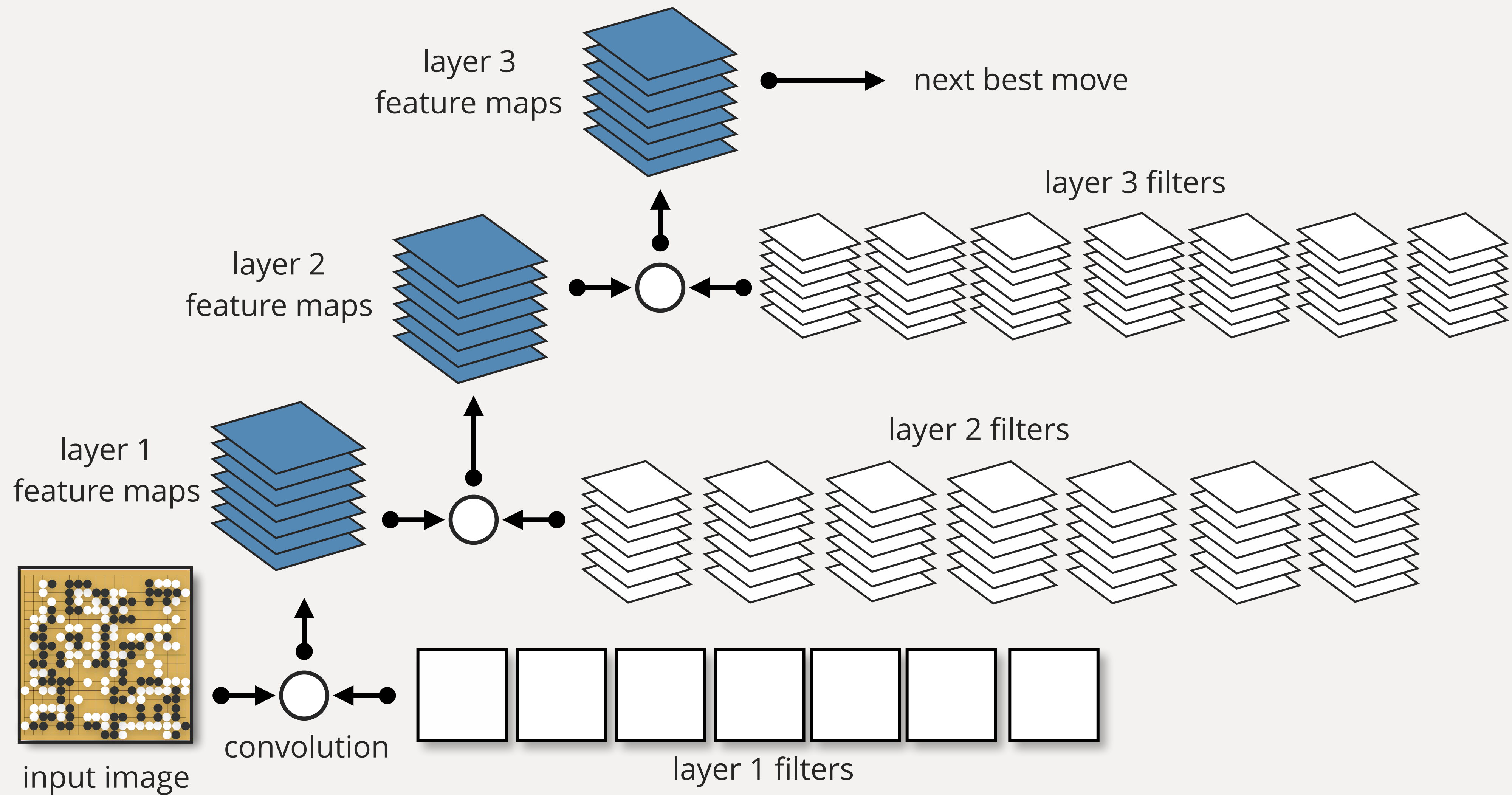
	convertible			agaric		dalmatian		squirrel monkey
	grille			mushroom		grape		spider monkey
	pickup			jelly fungus		elderberry		titi
	beach wagon			gill fungus		Staffordshire bullterrier		indri
	fire engine			dead-man's-fingers		currant		howler monkey

assigned labels by machine

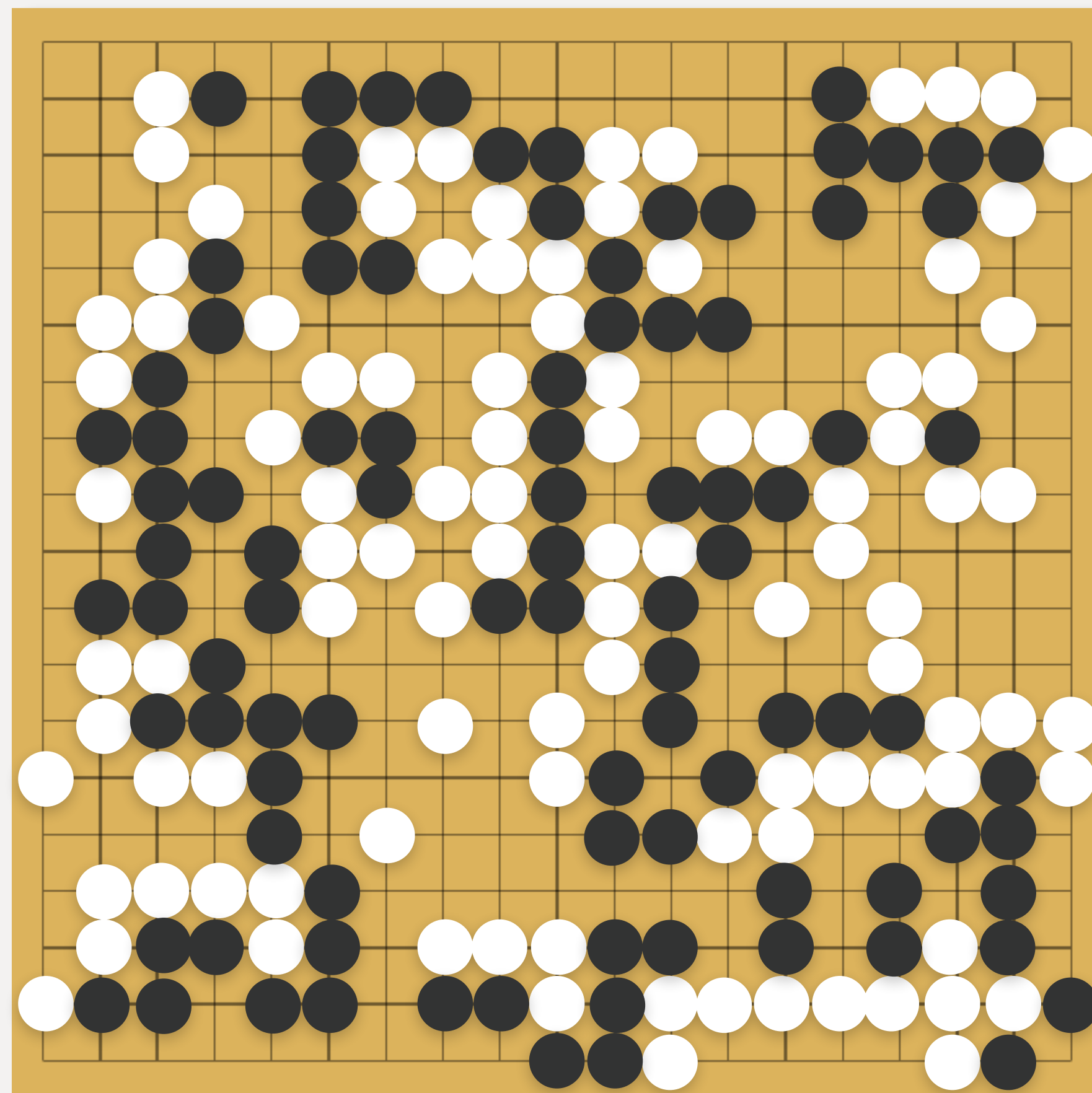
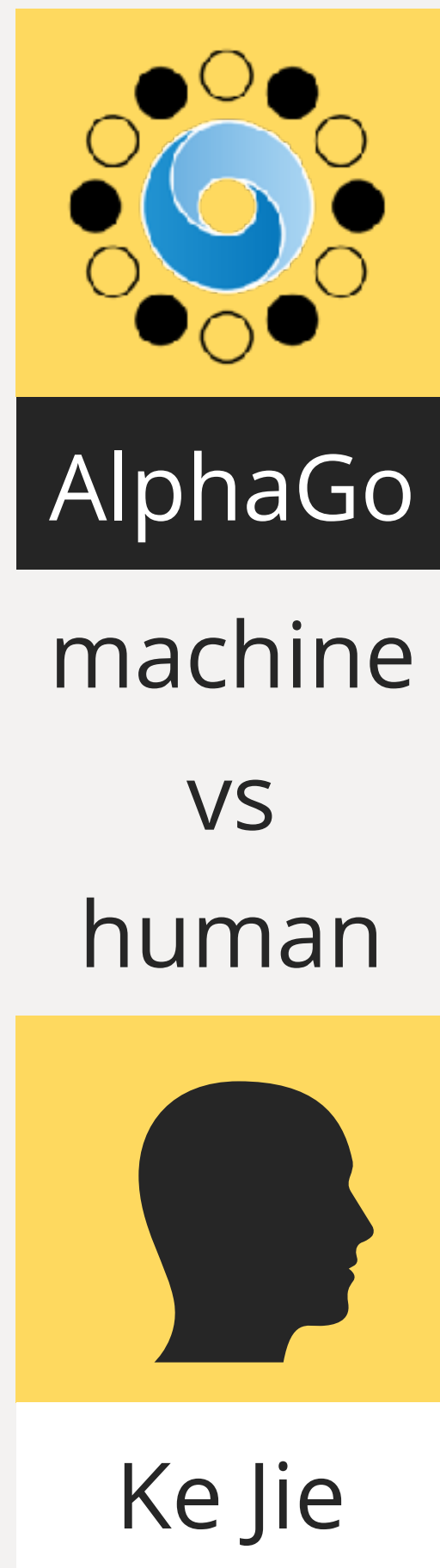
Deep Learning in Games



DeepMind



DeepMind



DeepMind



AlphaGo

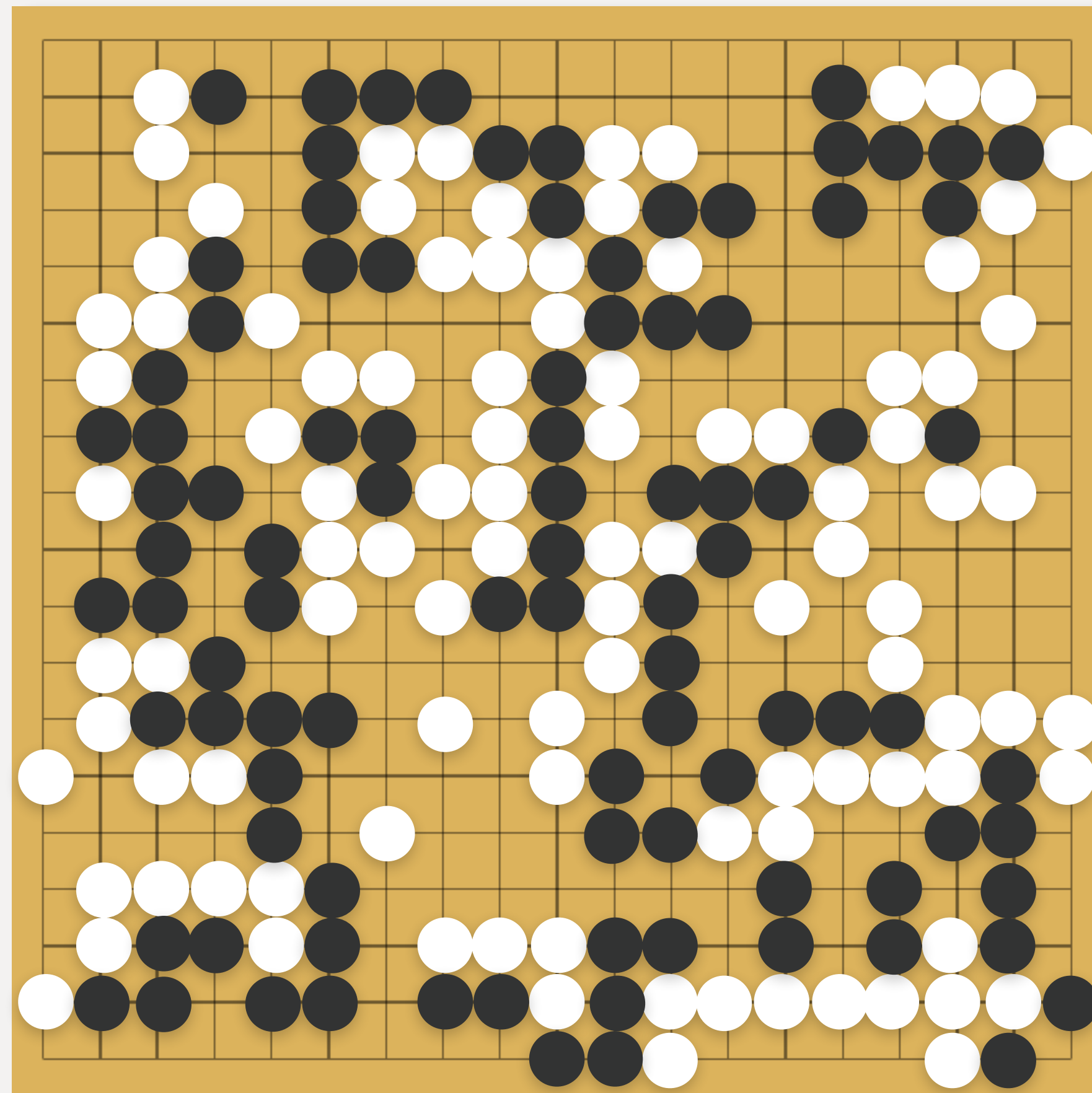
machine

vs

human



Ke Jie



Digit Recognition





a cat is eating some
kind of food



a big black dog standing on
the grass



a player holding a
hockey stick



a box full of apples
and oranges

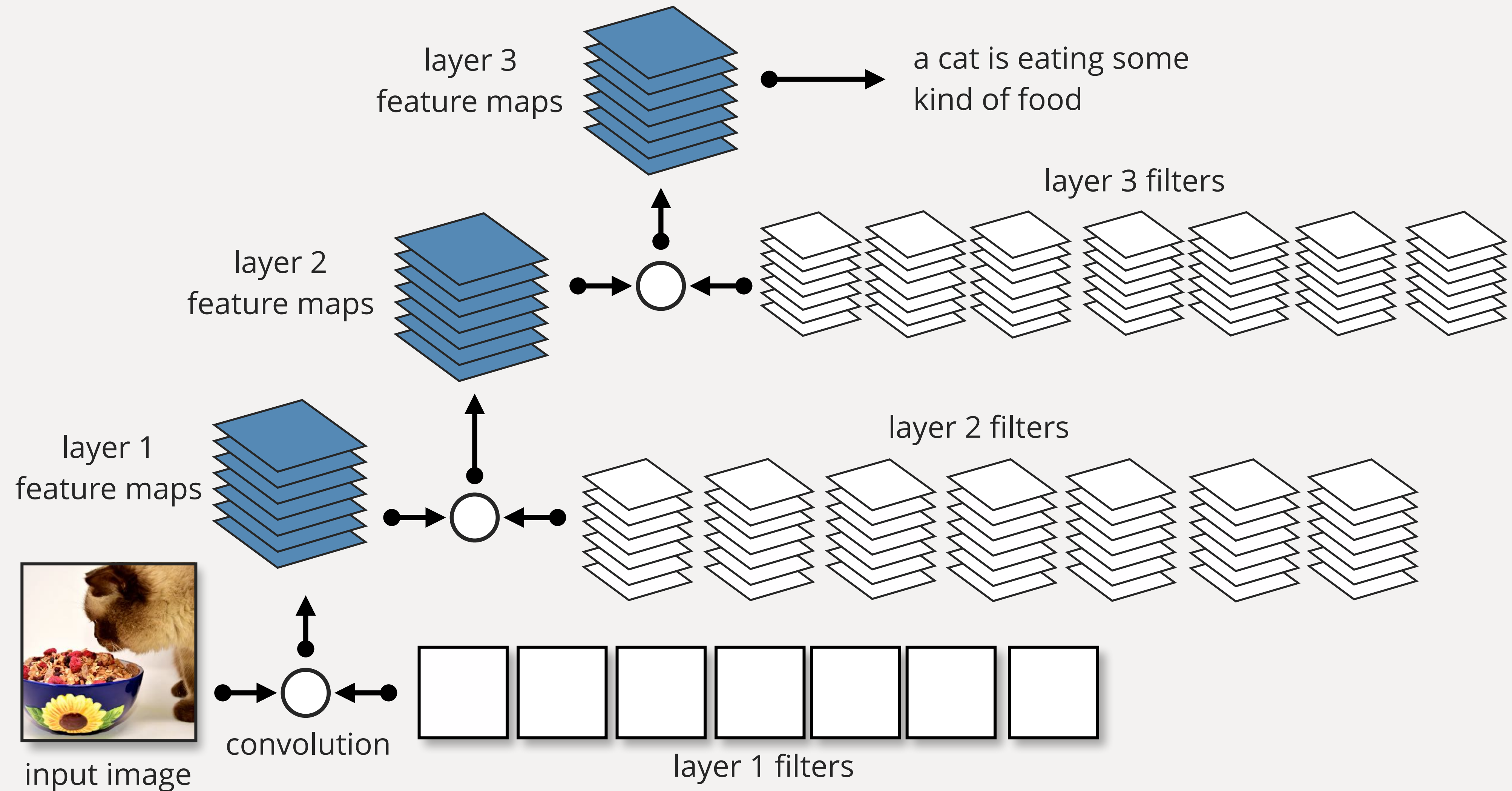


a group of elephants
standing next to each other

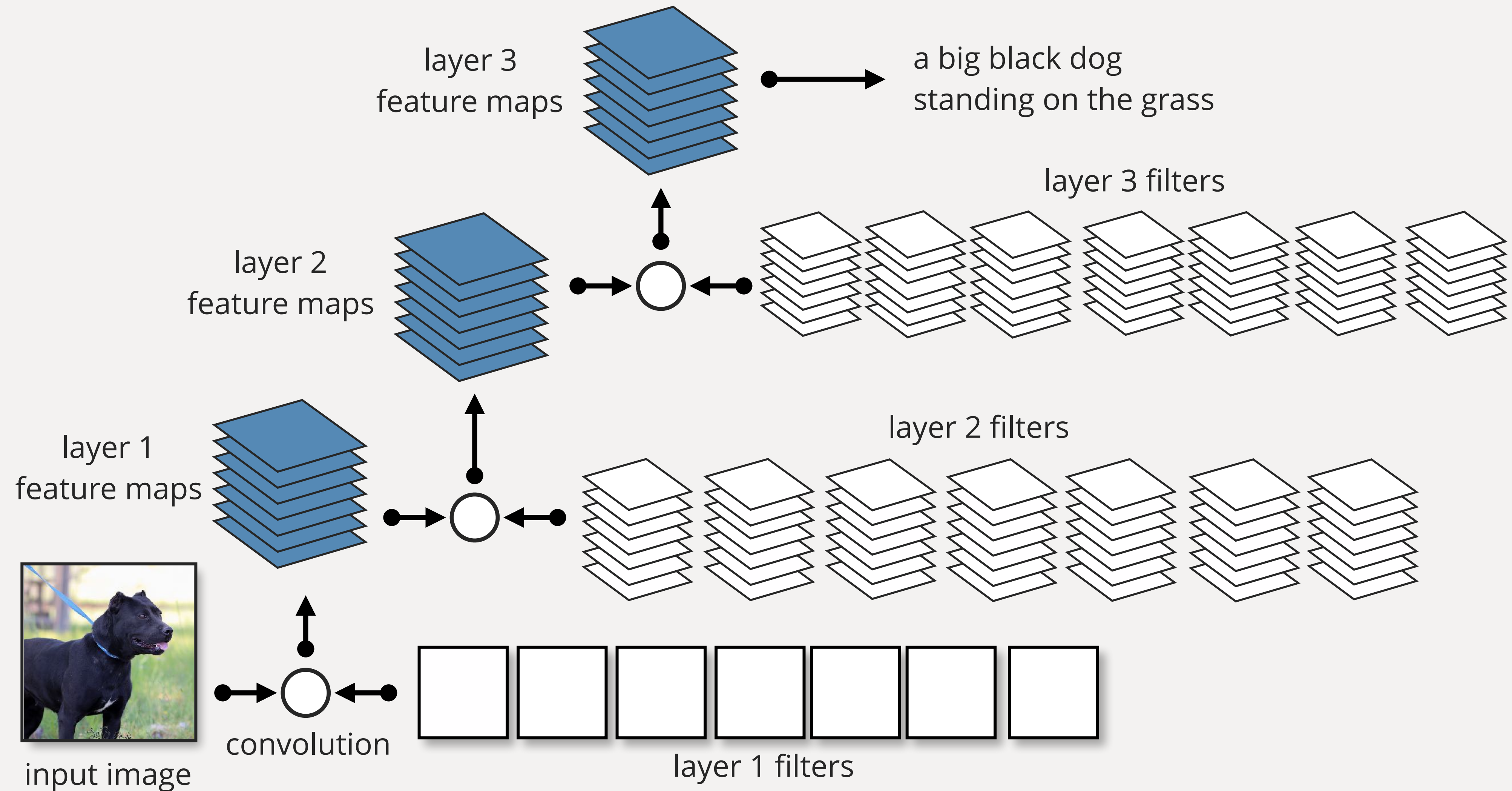


a keyboard on a desk

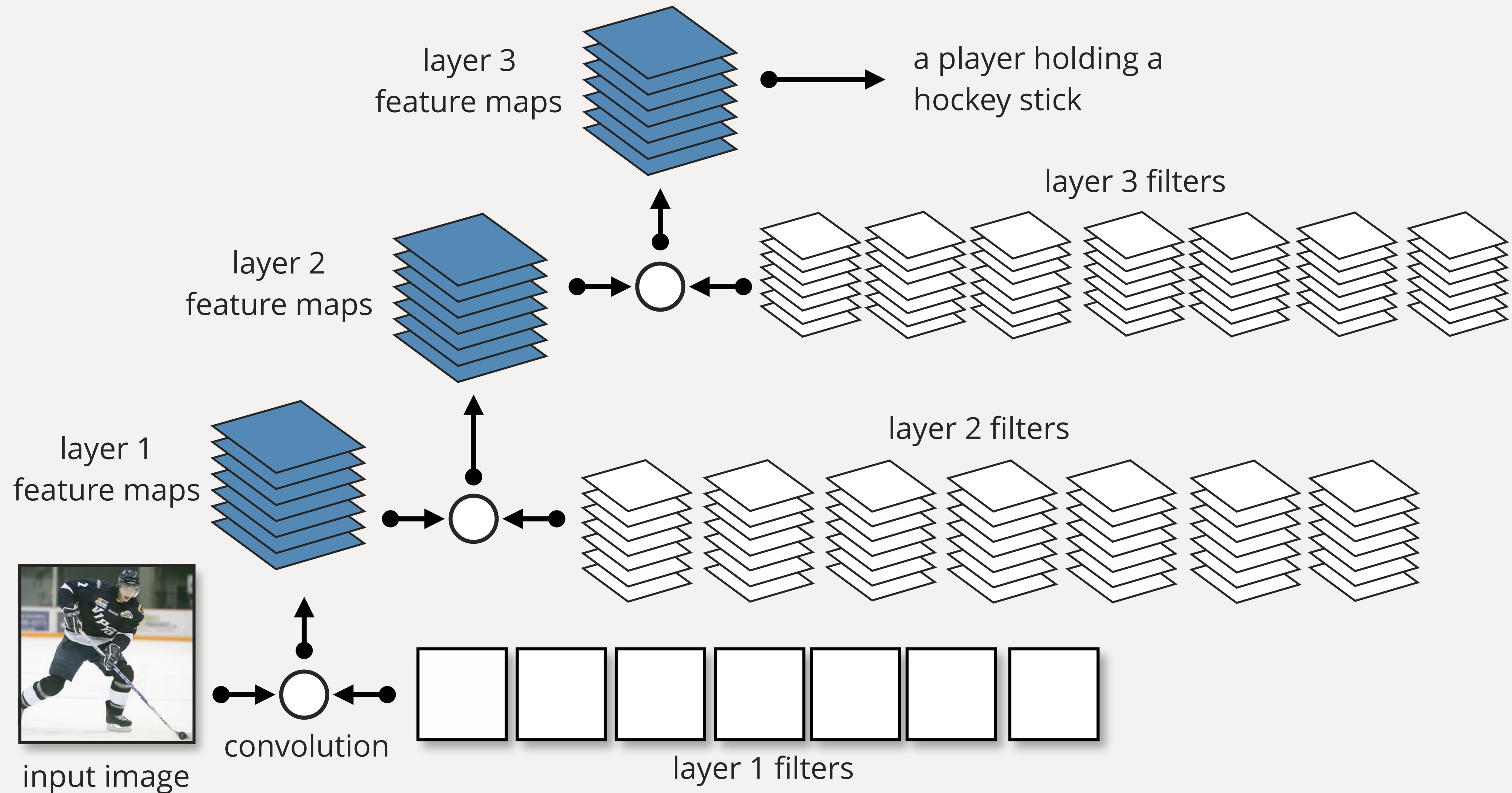
Convolutional Neural Network



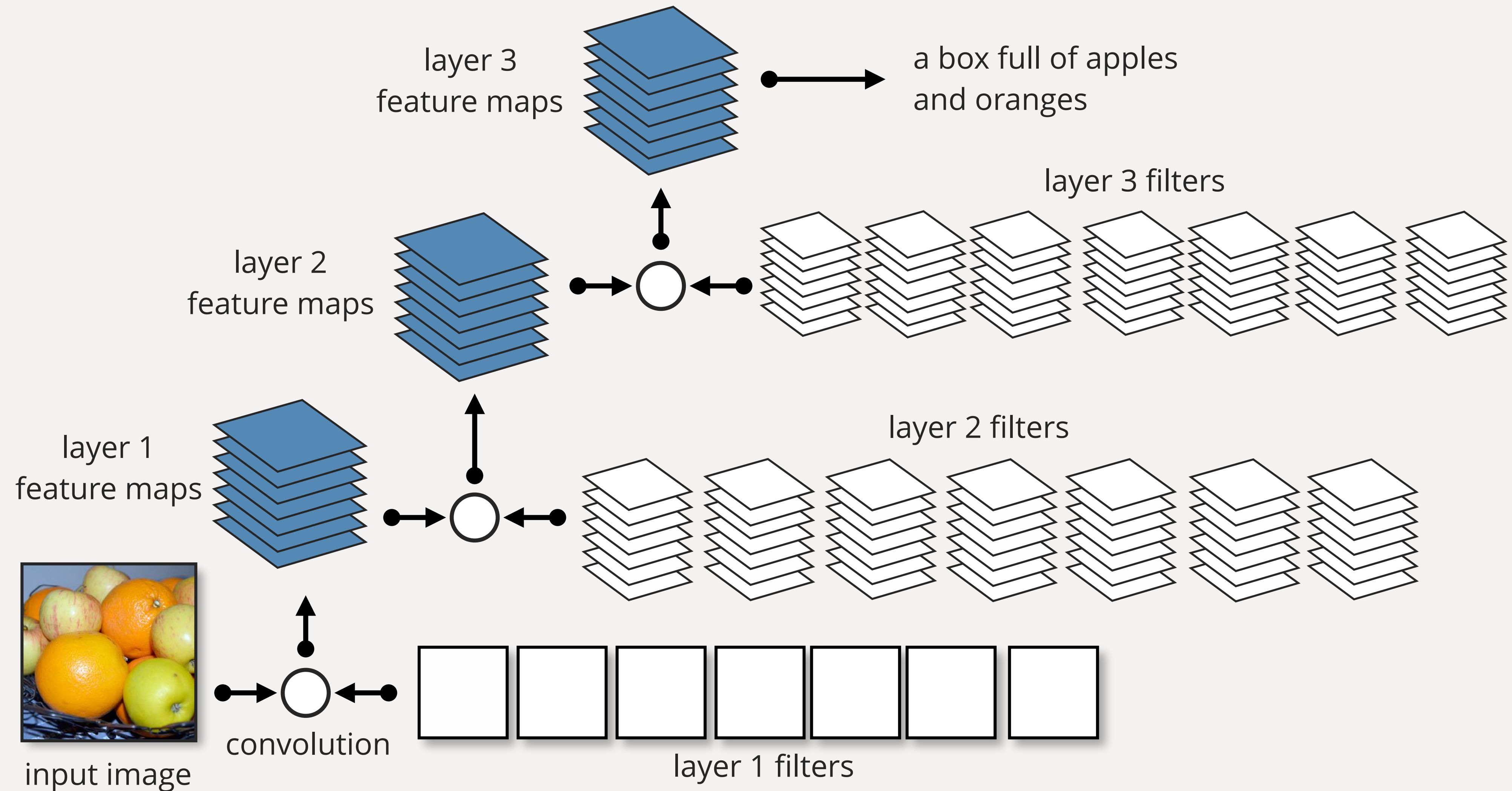
Convolutional Neural Network



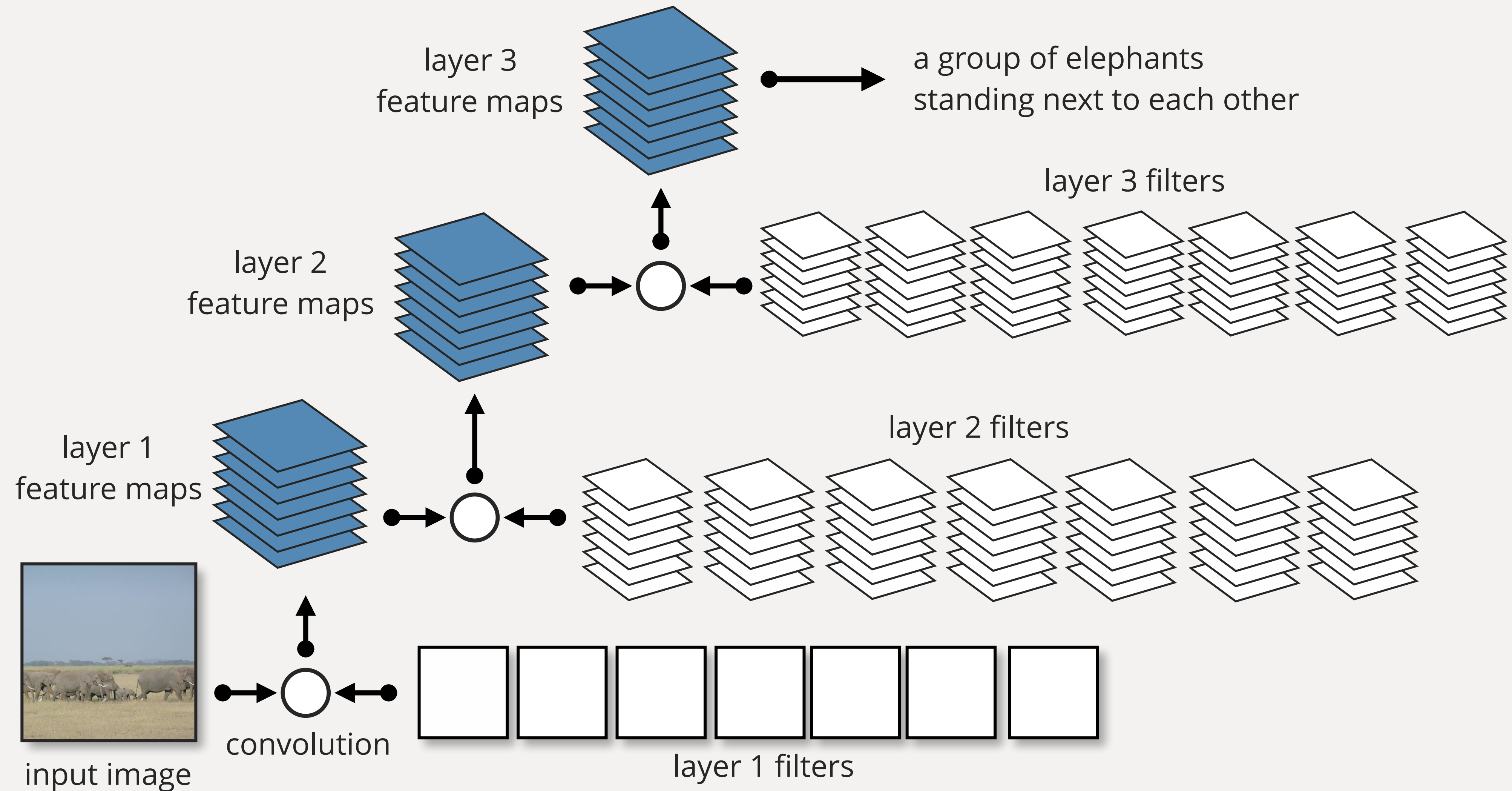
Convolutional Neural Network



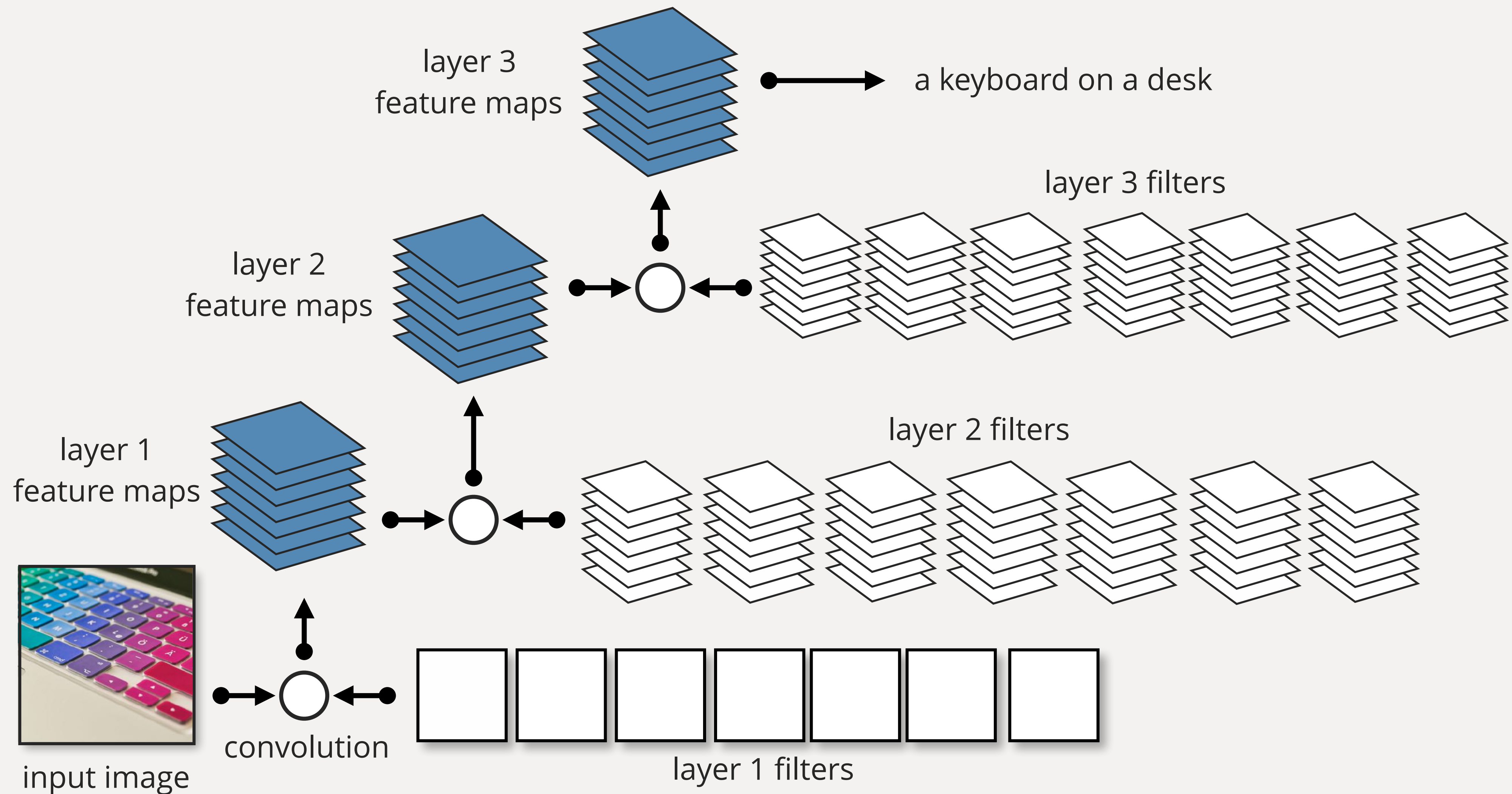
Convolutional Neural Network



Convolutional Neural Network



Convolutional Neural Network





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a keyboard on a desk

Credits

Black Dog Standing on Grass

LNB Photo CC-by-2.0

MNIST Dataset of Handwritten Digits (Images)

Yann LeCun (Courant Institute, NYU) and Corinna Cortes (Google Labs, New York) CC-by-SA 3.0

<http://yann.lecun.com/exdb/mnist/>