



DESIGNING MACHINE LEARNING

A Multi-Disciplinary Approach



Where are we?

you



*I'm in the middle of this massive, ambiguous design
project with no way out*

*I'm not a technologist, and you're giving me all this
new information*

*I am a technologist, but you aren't giving me enough time to
build something*

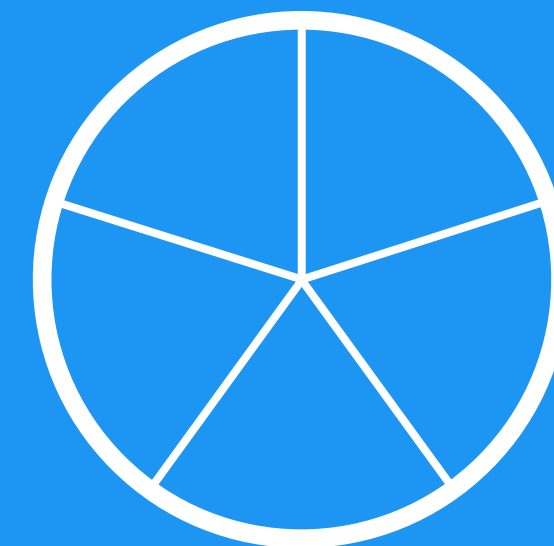


*The best way to see through the fog is
to first look at where you are standing*



Why design ML?

*deconstructing ML
systems as decision
making systems*



Does ML fit the problem?

*Why
design ML?*

deconstructing ML
systems as decision
making systems



*The data science
pipeline &
understanding data*



How do I turn ML to UX?

*Does ML fit
the problem?*

*The data science
pipeline &
understanding data*



*Adjacent thinking &
recommendation
systems*

NETFLIX



Can ML help me design?

*How do I turn
ML to UX?*

Adjacent thinking &
recommendation
systems

NETFLIX

*Clustering and
visualizing data*

Meetup



Empower my imagination

*Can ML help
me design?*

*Clustering and
visualizing data*

meetup

*Neural systems &
complex inference*



Course Overview

*“engineer/scientist who
wants to make products
more human-centered”*

*“designer who wants
to work with
technical people”*

*“product manager
who wants to
prototype ML
solutions”*

*“non-technical person who wants
to understand what’s going on
inside the system”*

*“business person who wants to
know what is possible with ML”*

Course Overview

*Integrate
Diverse Values*

*Collaborate
Effectively*

*Prototype &
Roadmap*

*Deconstruct
Systems*

*Imagine &
Envision*

*Integrate
Diverse Values*

*Collaborate
Effectively*

*Prototype &
Roadmap*

data designer

*Deconstruct
Systems*

*Imagine &
Envision*



Empower my imagination



Can ML help
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meetur

*Neural systems &
complex inference*



data *ux*

data = Machine Learning, AI, Data Analysis, Statistical Inference, and more
ux = User Experience Design, Research, Interaction Design, Info Architecture, and more



Idealistic

~~Crafting~~

No engineering chops

~~Researching~~

Can't turn ideas into specs

Creative

Descriptive

~~Mapping~~

Black Box / Opaque System

~~Monitoring~~

Product too customized

Realistic



Crafting

Researching



Mapping

Monitoring

Crafting

Researching



Mapping

Monitoring

Crafting

Researching



Mapping

Monitoring



Crafting

Researching



Mapping

Monitoring



Crafting

Researching

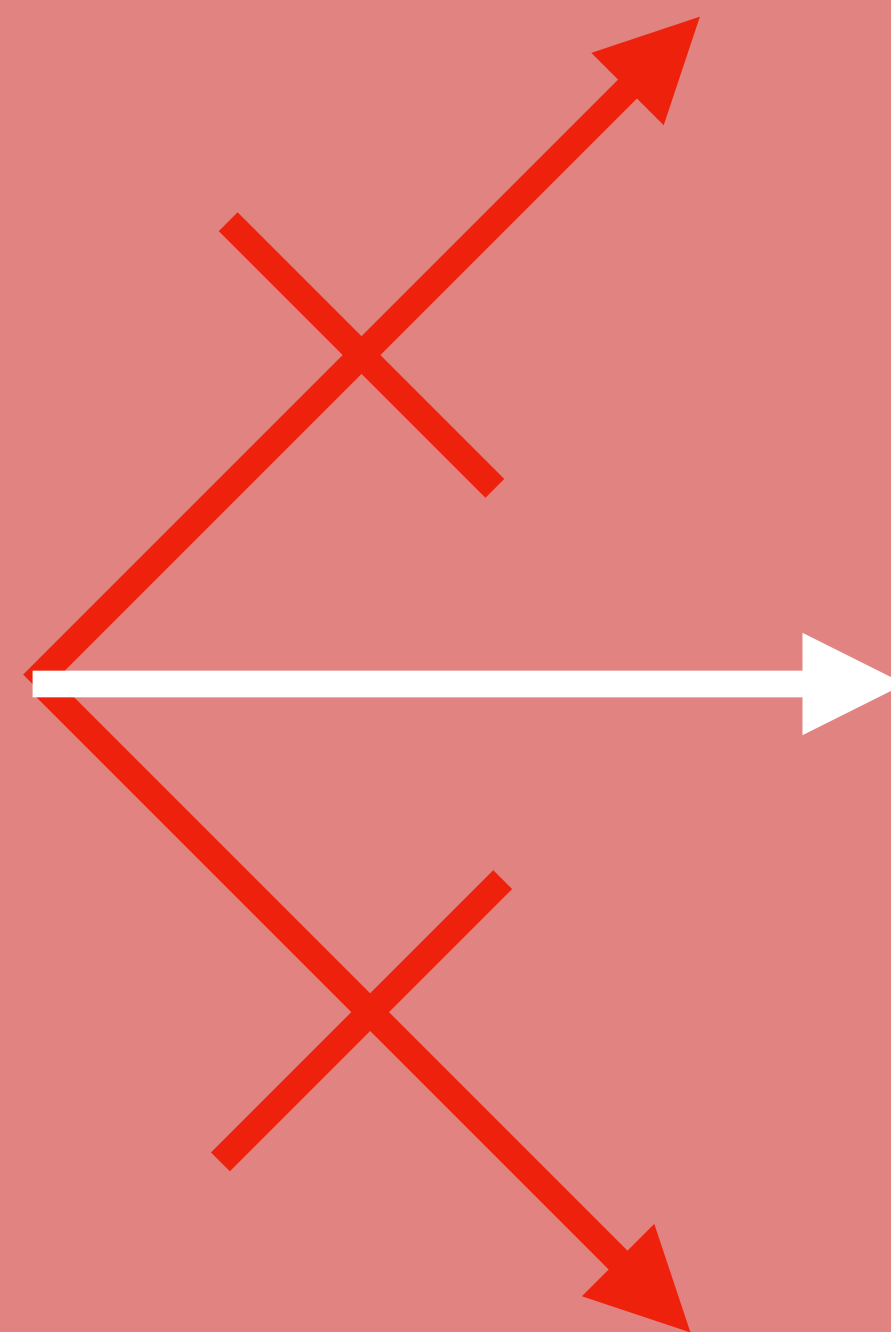


Mapping

Monitoring



ML is not just part
of your *product*, it
can be part of
your *process*



Mindlessly trust
your algorithmic
conclusions

ML is not just part
of your *product*, it
can be part of
your *process*

Use the data to
validate your
existing opinions

*(clustering
demos)*



Empower my imagination

*Can ML help
me design?*

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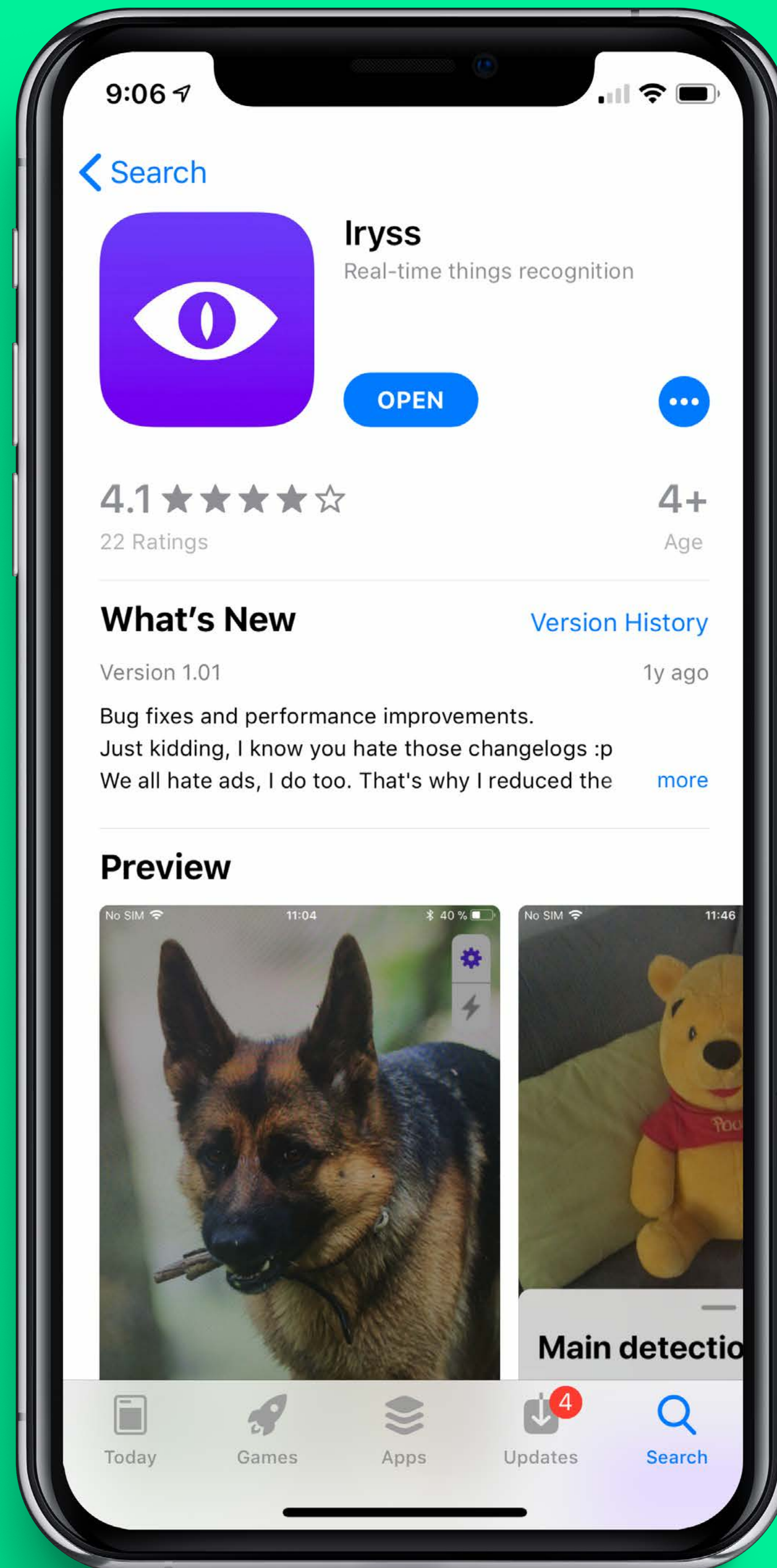
Deep Neural Systems

Instead of being taught what deep neural systems are, we're going to start by experiencing them for ourselves...



Iryss

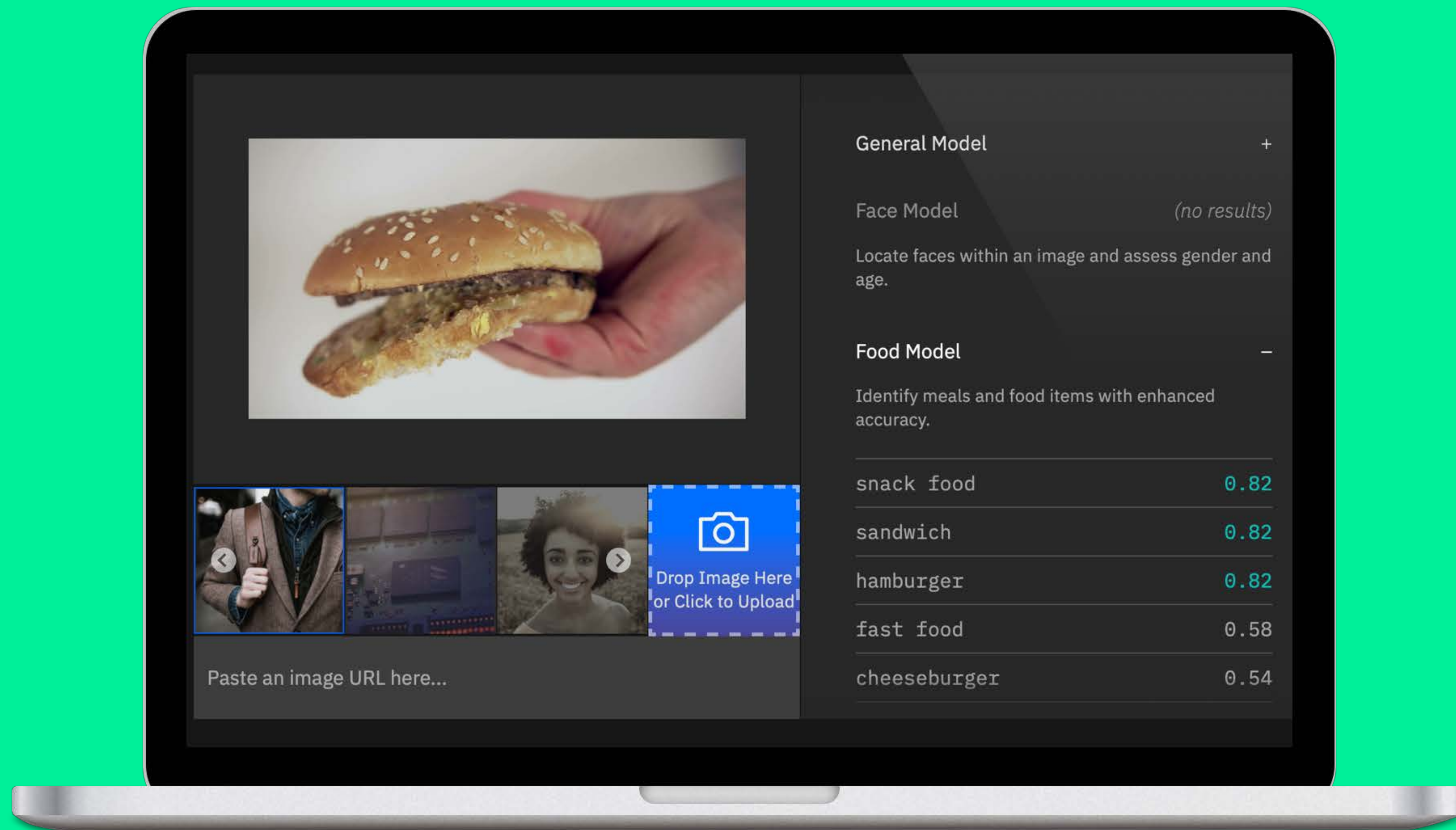
*A real-time object
detection app
that works right
on your phone*



Iryss

*A real-time object
detection app
that works right
on your phone*





IBM Visual Recognition

A descriptive meta-data service that identifies various hierarchical features



IBM Visual Recognition

*A descriptive meta-
data service that
identifies various
hierarchical features*

Neural Systems

Quick Primer

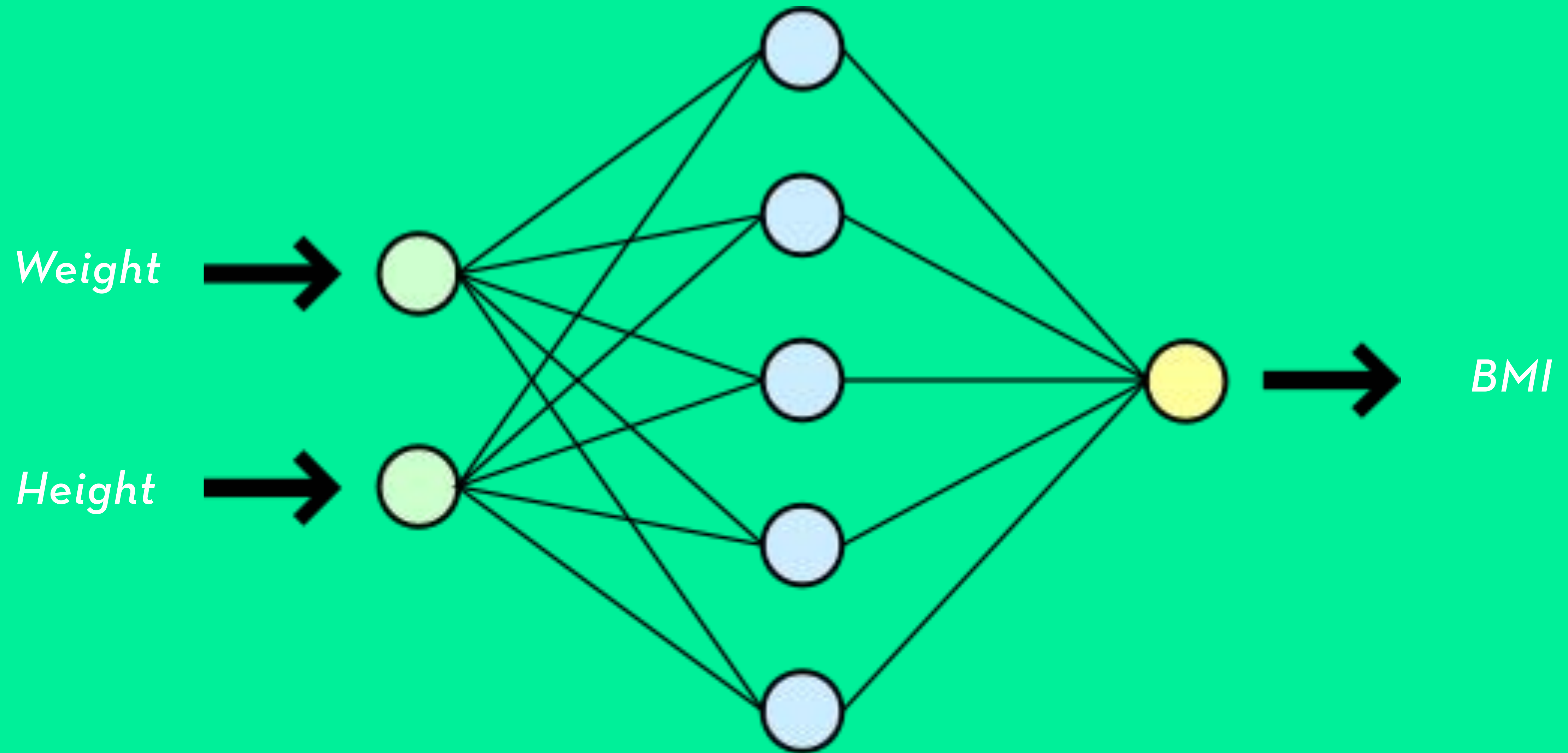
$$Y = f(x)$$

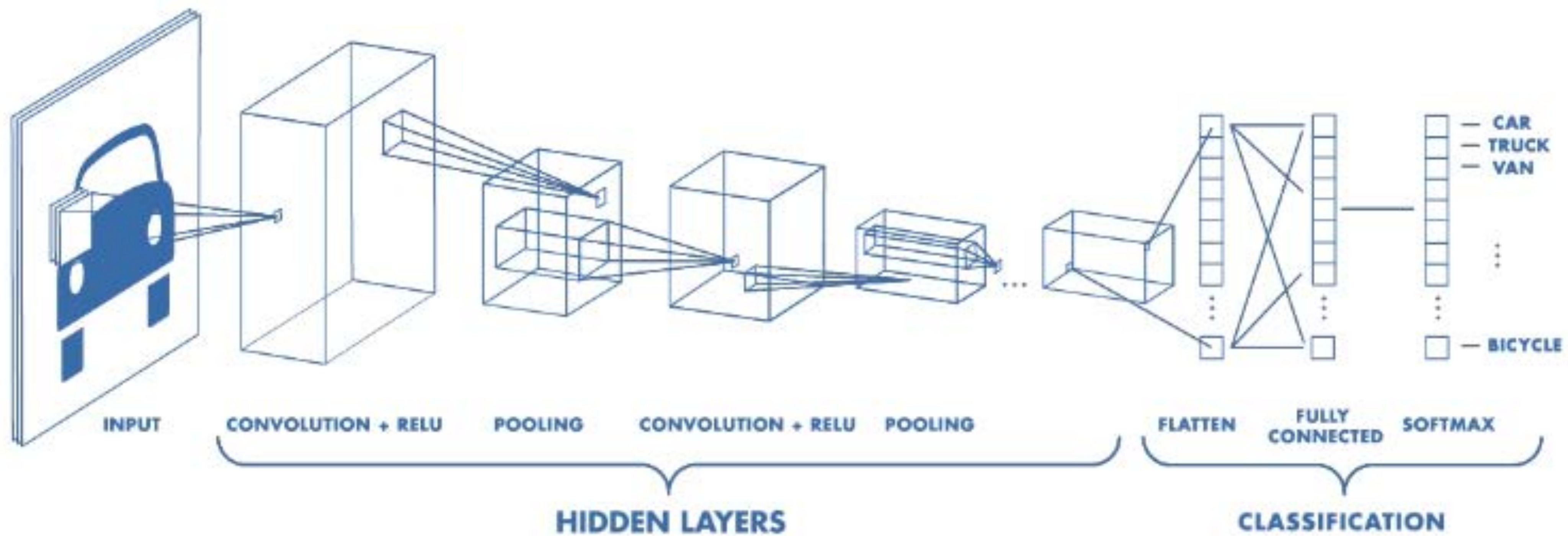
$$Y = f(x_1, x_2)$$

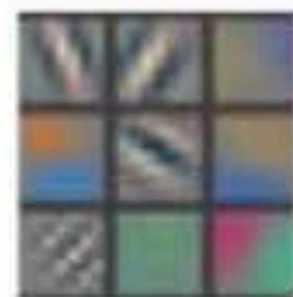
BMI

Weight

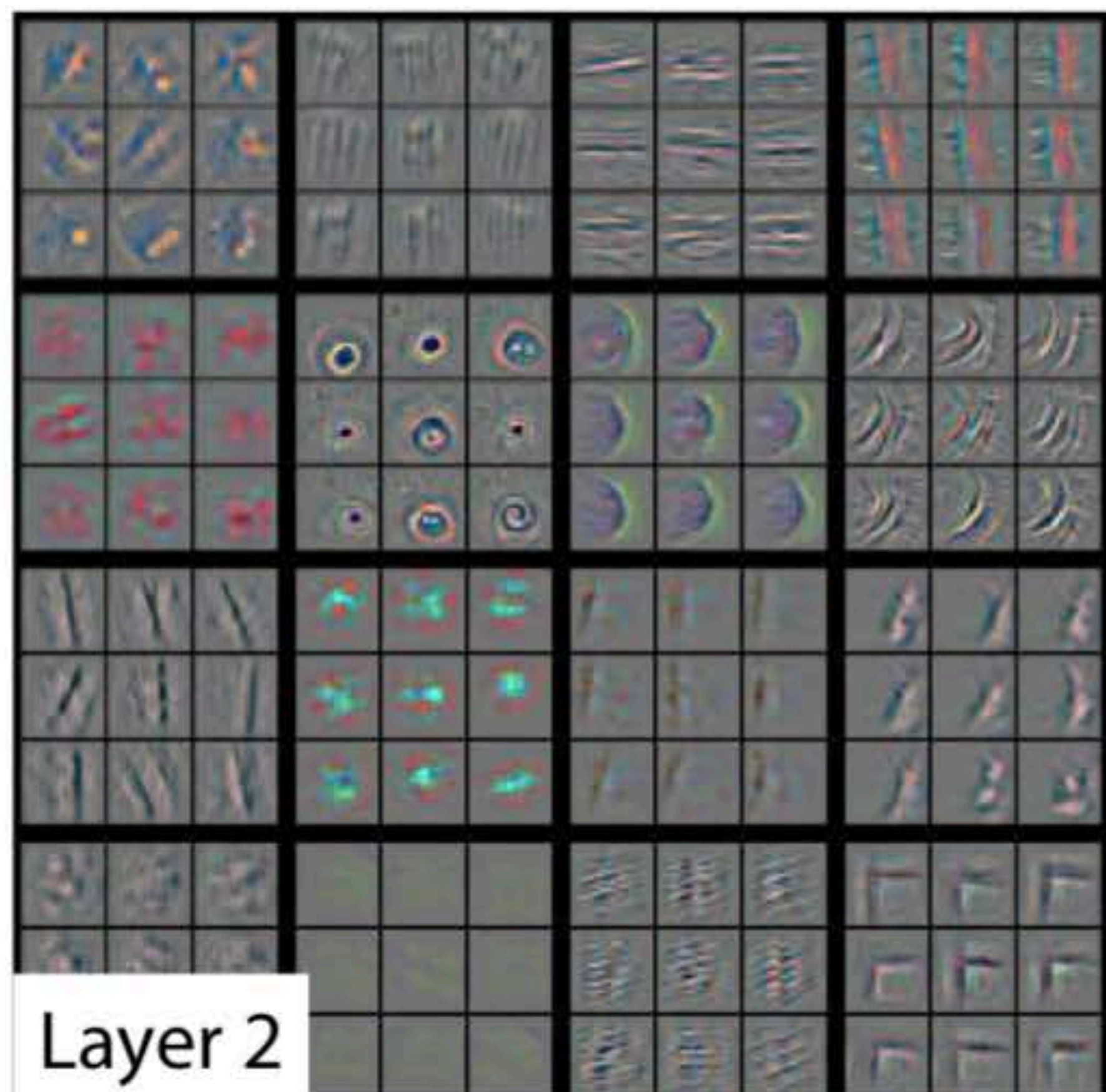
Height



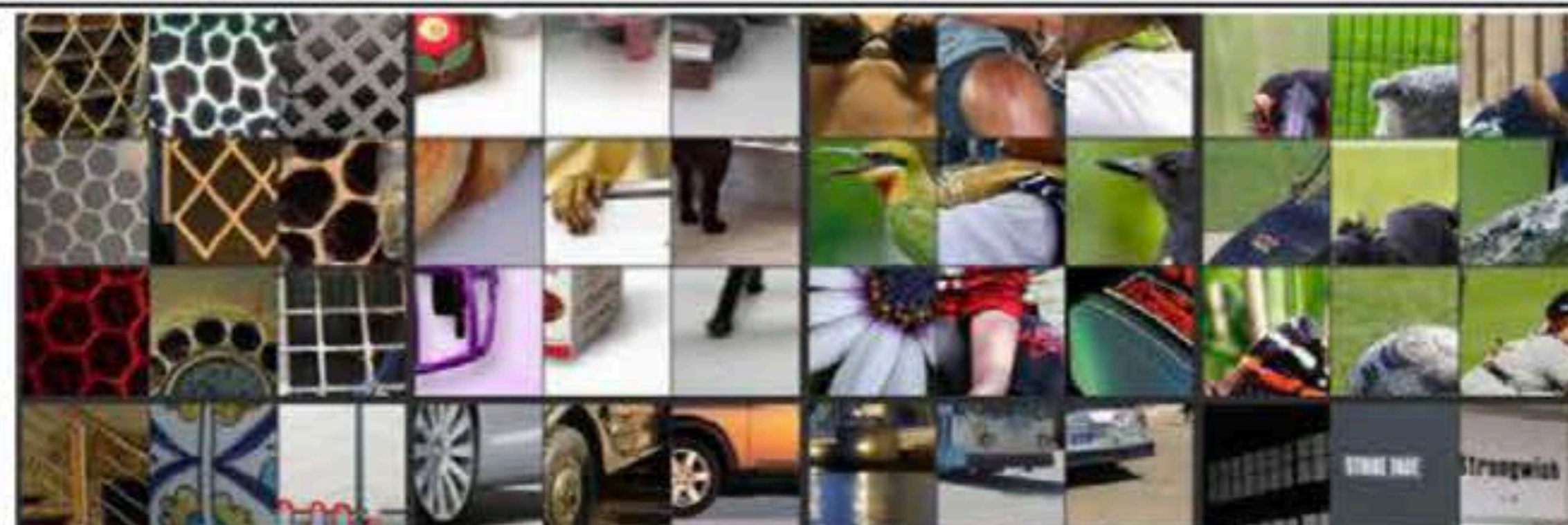




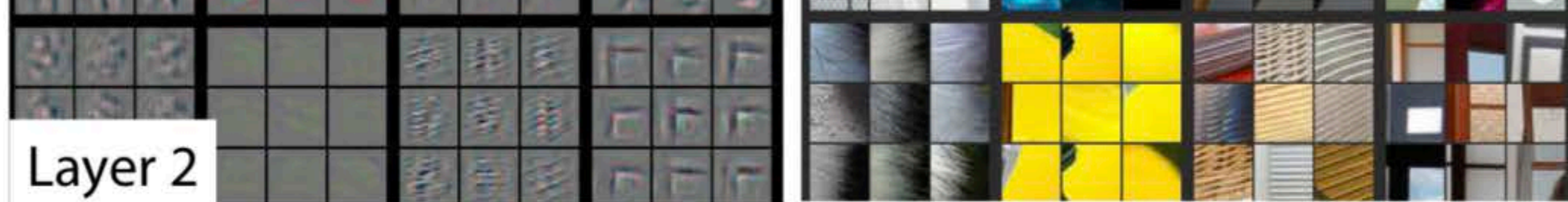
Layer 1



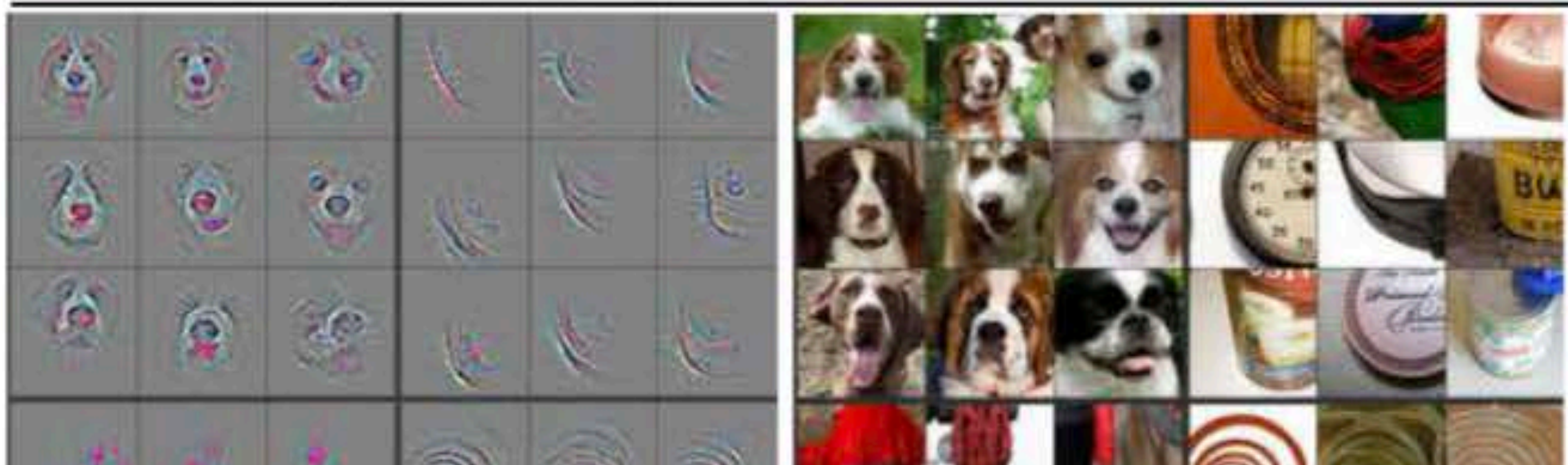
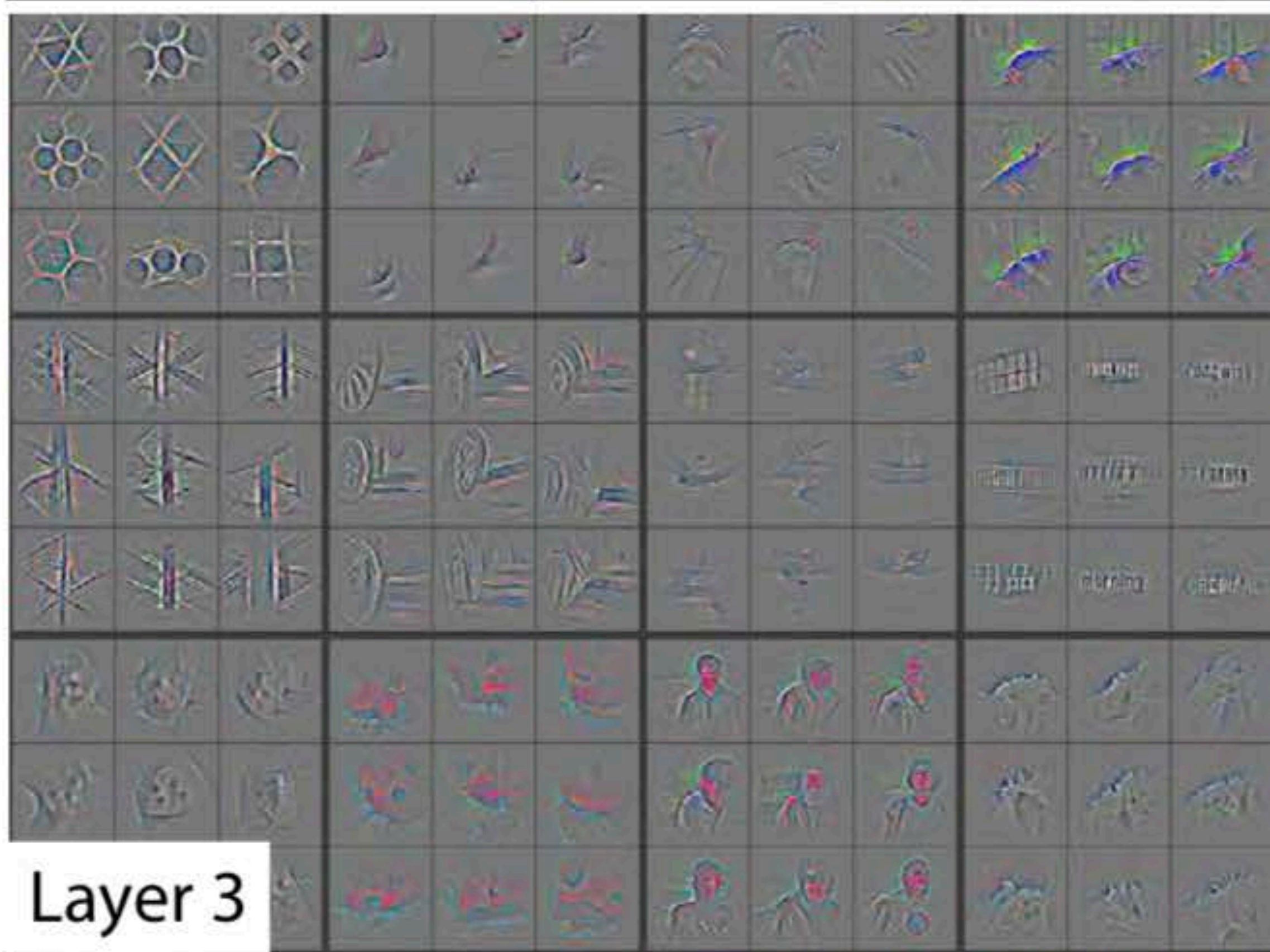
Layer 2

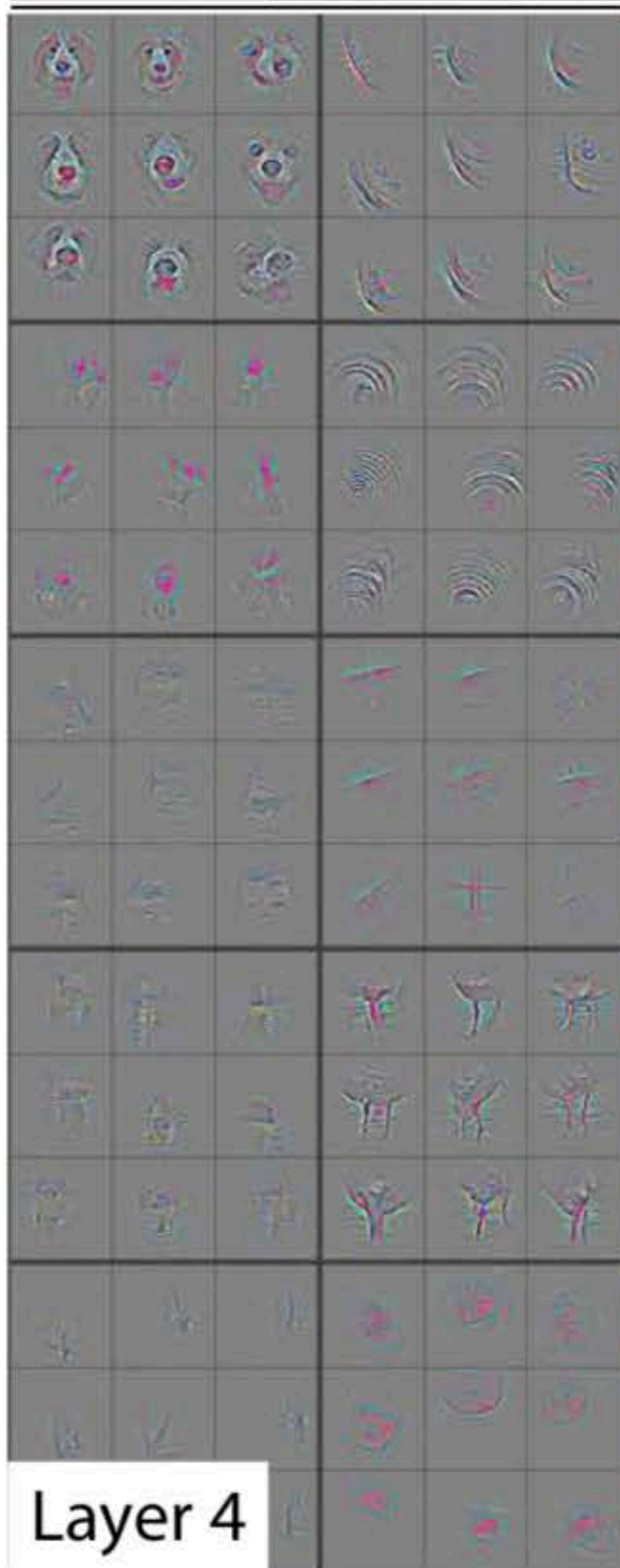


Layer 2

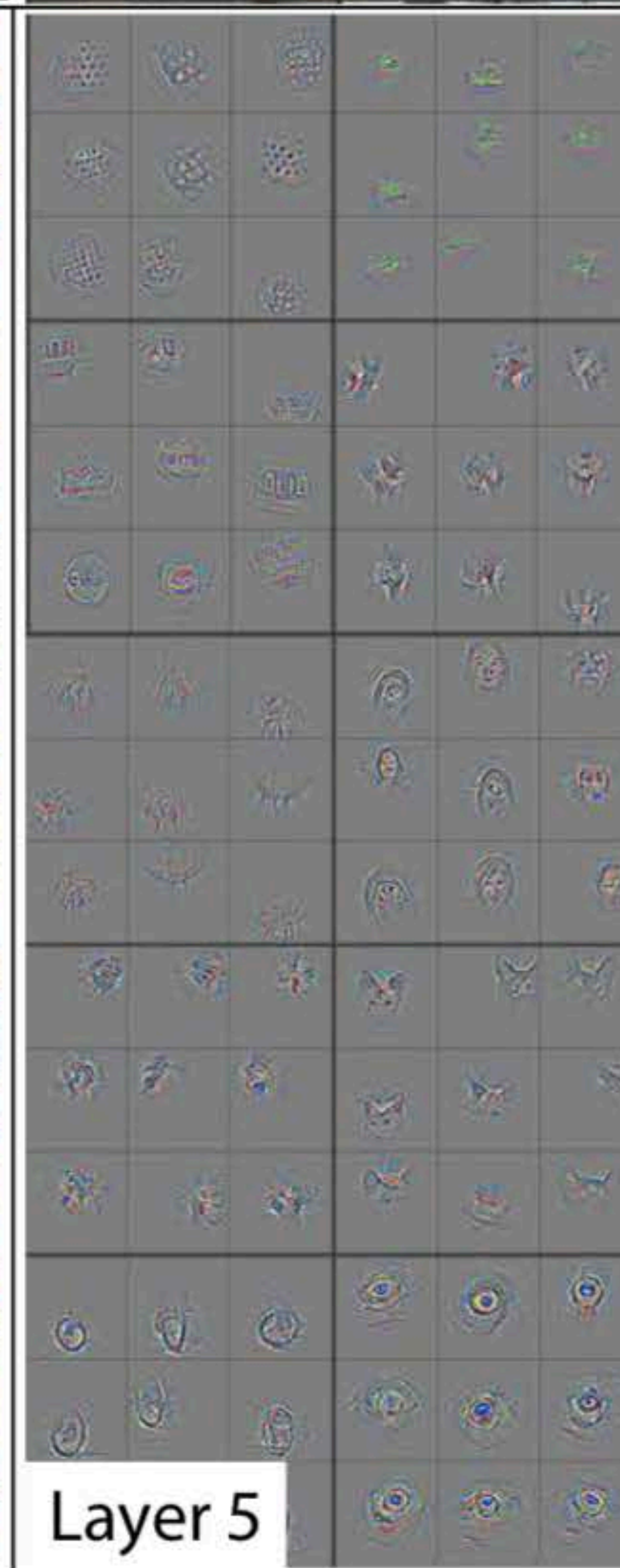


Layer 3

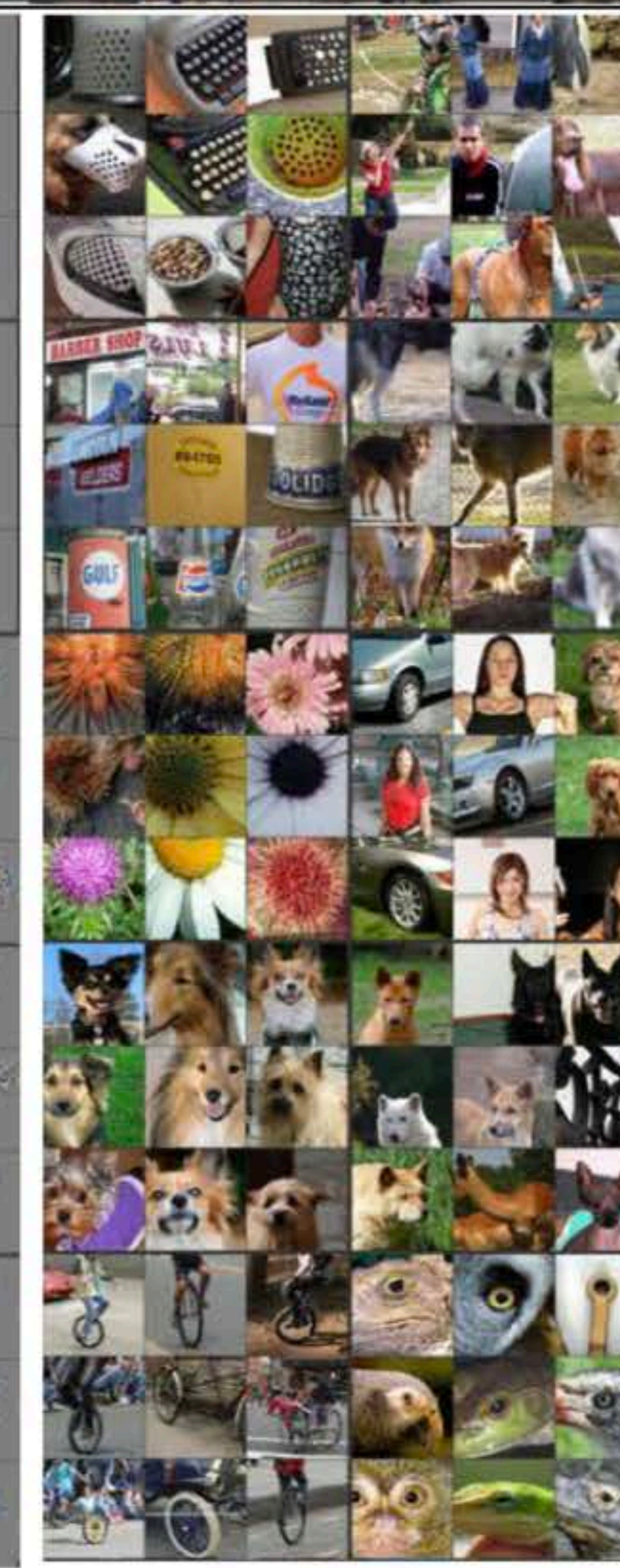




Layer 4



Layer 5



*Now you're an expert
(seriously)*



I think it's a plate of food sitting on top of a wooden table.



CaptionBot.ai

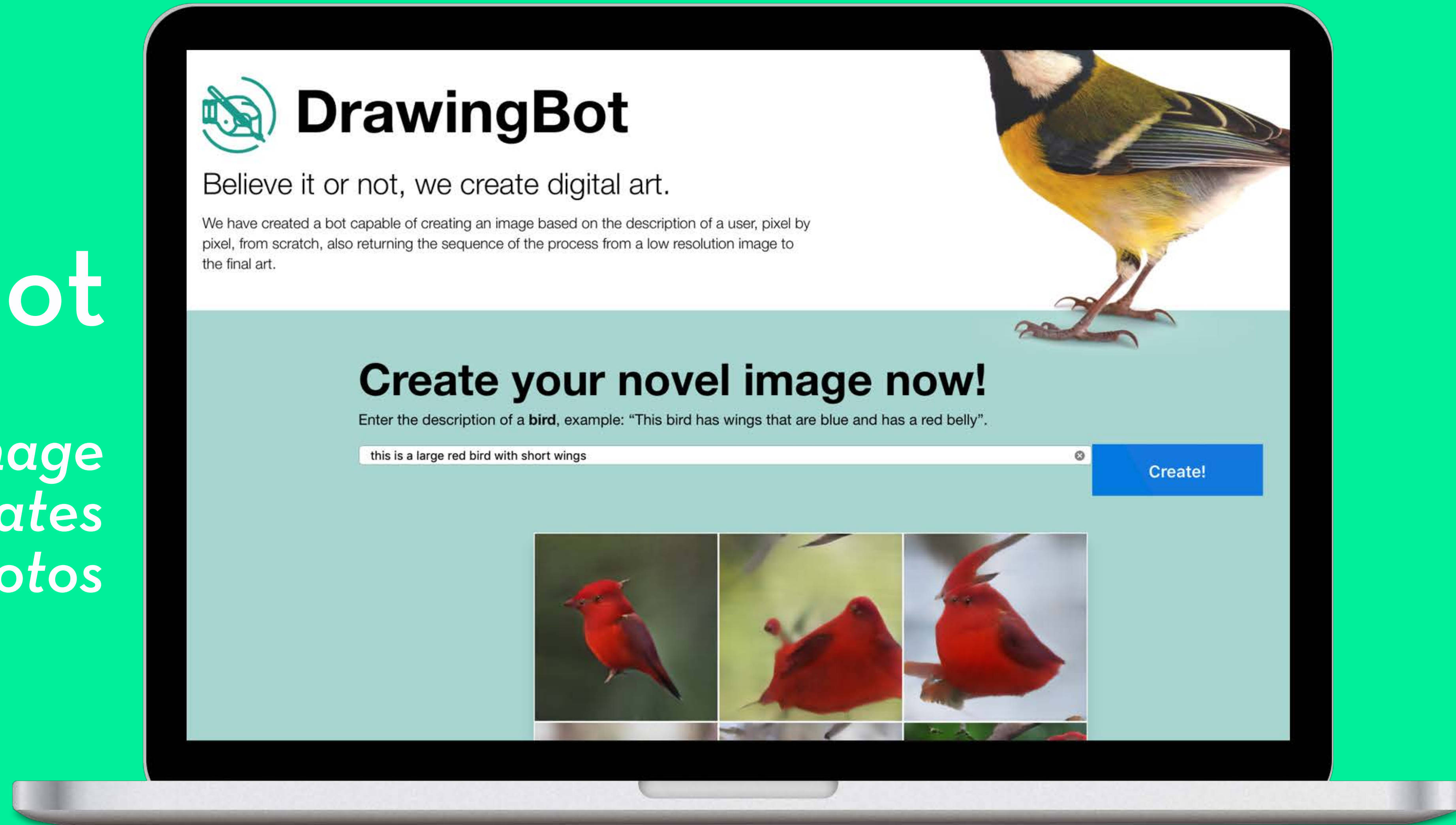
An automated image-labelling service that generates plausible caption sentences

CaptionBot.ai

*An automated image-
labelling service that
generates plausible
caption sentences*

DrawingBot

*A caption-to-image
service that generates
plausible bird photos*

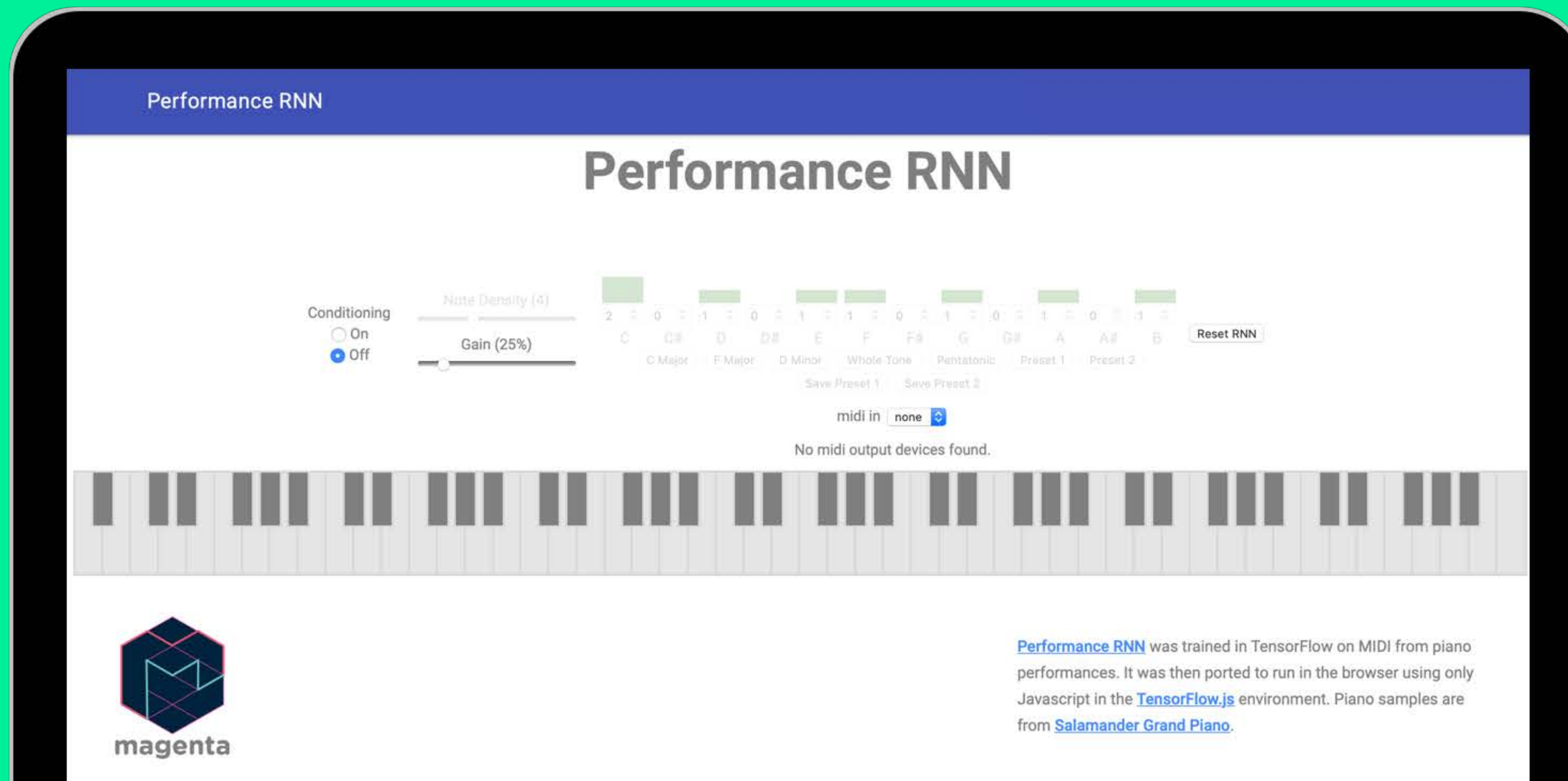


DrawingBot

*A caption-to-image
service that generates
plausible bird photos*

PerformanceRNN

A keyboard trained on piano performances to play music on its own



PerformanceRNN

*A keyboard trained on
piano performances to
play music on its own*

Style Transfer

*Arbitrary style transfer
of a photo to another*



Content image size ?



chicago



Style image size ?



towers



Style Transfer

*Arbitrary style transfer
of a photo to another*

General Learnings

machine > human
or machine + human?