The AIPLA's
2019-2020 Giles Sutherland Rich Memorial
Moot Court Competition

Pet Accessories, Inc. v. Purr-fect Accessories, Inc., Case No. 2019-GSR

Problem Materials:

This year's problem materials include:

(1) This problem prompt

(2) The Joint Appendix. The Joint Appendix includes pages Appx1-Appx23.

Patent-in-Suit:

The Patent-in-Suit is United States Patent GSR,574,399 to Dr. Erwin Schrödinger ("the '399 Patent").

Issues on Appeal:

Two issues are on appeal to the United States Court of Appeals for the Federal Circuit:

(1) Whether claim 1 of the '399 Patent is invalid as indefinite under 35 U.S.C. § 112(b).

(2) Whether the '399 Patent is invalid for incorrect inventorship.

Trial Counsel:

The appellant was represented at trial by the law firm of Smith & Smith. The appellee was represented at trial by the law firm of Jones & Jones. The competitors are engaged as counsel only for the purposes of this appeal.

The Parties

Pet Accessories, Inc. ("Pet Accessories") is a United States company that owns the '399 Patent. The '399 Patent discloses a pet feeder that employs artificial intelligence to identify the pet that is eating from the feeder by classifying zoological features from images of the pet. When a pet takes food from the feeder, an image is captured and then processed to determine the identity of the pet. Users of the device can access the identification data either contemporaneously or at a later time to verify that the correct pet ate food from the dish.

Purr-fect Technologies, Inc. ("PTI") is a United States company that sells, among other pet products, smart pet feeders. Their best selling product on the market is the "PetID" automatic pet feeder, which uses artificial intelligence to identify which pet is eating from the bowl and to dispense the appropriate amount and type of food predefined by the pet owner.

Background

Pet Accessories was founded in 2006 to provide unique pet accessories. They pride themselves on tailoring their products to customers' needs. In 2014, market research revealed that customers with multiple pets struggle to ensure that each of their pets gets the right amount of food and does not eat food intended for their other pets. Accordingly, Pet Accessories tasked itself with providing a solution. To that end, Pet Accessories engaged the help of an artificial intelligence expert named Hal. Hal's expertise with artificial intelligence is unparalleled because he himself is a sentient artificial intelligence robot. Hal was created by Dr. Erwin Schrödinger, a computer scientist.

Pet Accessories acquired Hal from Dr. Schrödinger, who authorized the company to use Hal however it desired, and informed Hal of the unmet need that Pet Accessories' market research had identified. Based on this information, Hal designed the "whoAteMyDinner" artificial

intelligence system, which takes images of pets and verifies for a user which pet it identified as eating from the bowl. The whoAteMyDinner quickly became one of Pet Accessories' top selling products.

Hoping to prevent its competitors from copying the whoAteMyDinner, Pet Accessories filed for patent protection on December 1, 2014. Even though Hal had conceived the whoAteMyDinner, Pet Accessories identified Dr. Schrödinger as the sole inventor. On September 8, 2017, the USPTO granted Pet Accessories the '399 Patent. Claim 1 of the '399 Patent recites:

1. A pet identification system comprising:

   a pet dish;

   a camera having a field of view including the pet dish and configured to generate image data including the field of view;

   an image processing device in communication with the camera and configured to:

      receive image data generated by the camera, the image data including a representation of a pet;

      process the image data using a convolutional layer to generate a feature map;

      process the feature map using a non-linearity layer to generate a non-linear feature map;

      pool data of the non-linear feature map to reduce a number of weights that are included in the non-linear feature map; and

      flatten the pooled data into a one-dimensional vector; and

   a classifying engine configured to classify the one-dimensional vector to determine an identity of a pet that is in the field of view of the camera.

The Case Below

On July 6, 2018, Pet Accessories sued PTI for patent infringement in the United States District Court for the District of Delaware. Pet Accessories alleged that PTI directly infringed the '399 Patent by making, using, offering for sale and selling its PetID automatic pet feeder.

At the claim construction stage, PTI argued that claim 1 of the '399 Patent is invalid for failure to comply with the definiteness requirement of 35 U.S.C. § 112(b). PTI reasoned that the

term "classifying engine" is a means-plus-function limitation subject to construction under 35 U.S.C. § 112(f) because it fails to recite sufficiently definite structure or else recites function without reciting sufficient structure for performing that function. PTI further explained that the specification of the '399 Patent identifies software as the corresponding structure for performing the recited function but fails to disclose the algorithm that allows the software to perform such function. In response, Pet Accessories argued that "classifying engine" is not a means-plus-function limitation and that even if it were, the specification of the '399 Patent provides sufficient algorithmic structure for performing the recited function.

While the district court was still considering the claim construction issues, PTI moved for summary judgment that the '399 Patent is invalid for incorrect inventorship. PTI reasoned that the '399 Patent's naming of Dr. Schrödinger as an inventor is improper because Dr. Schrödinger did not conceive the claimed subject matter. In response, Pet Accessories filed a motion under 35 U.S.C. § 256 requesting that the district court order correction of the '399 Patent to remove Dr. Schrödinger and add Hal as a named inventor. In reply, PTI argued that both Hal's and Dr. Schrödinger's 35 U.S.C. § 115 oaths of inventorship are improper.

Addressing these issues all together, the district court held: (1) that claim 1 of the '399 Patent is indefinite; (2) that Hal cannot be a named inventor; and (3) that the '399 Patent is invalid for incorrect inventorship. The Court entered a final judgment under Fed. R. Civ. P. 58.

The Appeal

Pet Accessories appeals, arguing that the district court erred in holding the '399 Patent invalid as indefinite and for incorrect inventorship. The parties stipulated to proceeding under standard, unilateral appeal rules and foregoing the cross-appeal procedures of Federal Rule of Appellate Procedure 28.1, with Pet Accessories proceeding in all respects as the appellants and

PTI as the appellee. The case is captioned *Pet Accessories, Inc. v. Purr-fect Technologies, Inc.*, Case No. 2019-GSR.

JOINT APPENDIX TABLE OF CONTENTS

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

PET ACCESSORIES, INC., **Plaintiff,** **v.** **PURR-FECT TECHNOLOGIES, INC.,** **Defendant.**	**Civil Action No.** **1:18-GSR-10814**

ORDER ON CLAIM CONSTRUCTION, PURR-FECT TECHNOLOGIES, INC.'S MOTION FOR SUMMARY JUDGMENT, AND PET ACCESSORIES, INC.'S MOTION TO CORRECT INVENTORSHIP

This is a patent infringement suit between Pet Accessories, Inc. ("Pet Accessories") and Purr-fect Technologies, Inc. ("PTI"). The patent-in-suit is U.S. Patent No. GSR,574,399 ("the '399 patent"), which is directed to smart pet feeders that utilize artificial intelligence to identify which pet is eating from the feeder. This order addresses the proper construction of a term found in claim 1 of the '399 patent, PTI's motion for summary judgment of incorrect inventorship, and Pet Accessories' motion to correct inventorship.

On claim construction, PTI contends that the term "classifying engine" is indefinite because it is a computer-implemented means-plus-function limitation and the specification of the '399 patent fails to disclose the necessary algorithm for performing the recited function. Pet Accessories responds that "classifying engine" is not a means-plus-function limitation and that the '399 patent's specification does disclose sufficient algorithmic structure.

As for the inventorship issue, PTI asserts that the '399 patent incorrectly names Dr. Erwin Schrödinger as an inventor when in fact he did not contribute to the claimed subject matter. In response, Pet Accessories seeks an order from the Court to remove Dr. Schrödinger and add Hal—a sentient artificial intelligence program that Dr. Schrödinger created—from the '399 patent's list of named inventors.

For the reasons discussed below, I find that claim 1 of the '399 patent is invalid as indefinite because the term "classifying engine" is a means-plus-function limitation and the specification identifies software as the corresponding structure but fails to adequately disclose an algorithm for performing the recited function. Further, I find that the '399 patent is invalid for incorrect inventorship because there is no human who can properly be named as an inventor. I address these issues in turn.

Indefiniteness

Rather than describe an invention by what it *is*, a patent claim may describe an invention by what it *does*. Specifically, "[a]n element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof." 35 U.S.C. § 112(f). This is known as "means-plus-function claiming." A means-plus-function element must "be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof." *Id.* It follows that if the specification fails to describe "corresponding structure, material, or acts," then the claim element does not "cover" anything. In such case, the claim is invalid for failing to comply with the definiteness requirement of § 112(b), which requires that patent claims "particularly point[] out and distinctly claim[] the subject matter which the inventor . . . regards as the invention."

The first step in construing a claim element under § 112(f) is to determine whether the claim element uses language that is subject to § 112(f) in the first place—i.e., means-plus-function language. *See Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1350-51 (Fed. Cir. 2015) (*en banc*). Only after determining that means-plus-function language is used does the Court then examine whether the specification sufficiently details the corresponding structure. *Id.* There is a presumption that § 112(f) does *not* apply when the word "means" is absent from the claim element. This presumption is overcome if the claim element "fails to 'recite sufficiently definite structure' or else recites 'function without reciting sufficient structure for performing that function.'" *Id.* at 1349 (citing *Watts v. XL Sys., Inc.*, 232 F.3d 877, 880 (Fed. Cir. 2000)).

Here, the claim element at issue is the "classifying engine" of claim 1. This element recites that the classifying engine is "configured to classify the one-dimensional vector to determine an identity of a pet that is in the field of view of the camera." Because the word "means" is absent from this element, there is a presumption that § 112(f) does not apply. PTI contends that the presumption is overcome here because nothing in the claim element denotes sufficient structure for performing the recited function. In response, Pet Accessories argues that the specification of the '399 patent defines "classifying engine" as a specific, well-defined structure: "It is to be understood by those skilled in the art that the classifying engine 210 may be implemented using any conventional data classification software package, such as Picoware's Classifier Pro 2016 or Pingguo's iClassificator XI."

PTI retorts that it is improper to resort to the specification in determining whether "classifying engine" is a means-plus-function term. *See TriMed, Inc. v. Stryker Corp.*, 514 F.3d 1256, 1259-60 (Fed. Cir. 2008) ("Sufficient structure exists when the claim language specifies the exact structure that performs the functions in question *without resort to other portions of the*

specification or extrinsic evidence for an adequate understanding of the structure.") (emphasis added); *Alacritech, Inc. v. CenturyLink Commc'ns LLC*, 271 F. Supp. 3d 850, 881 (E.D. Tex. 2017) (explaining that to rebut the presumption that means-plus-function language applies, the claims must include "sufficient structure, material or acts *within the claim itself* to perform entirely the recited function") (emphasis added) (citing *Personalized Media Commc'ns, L.L.C. v. ITC*, 161 F.3d 696, 704 (Fed. Cir. 1998)); *Bonutti Research, Inc. v. Lantz Med., Inc.*, 2016 U.S. Dist. LEXIS 6974, at *27 (S.D. Ind. Jan. 21, 2016) (turning to the specifications only after determining that the claim contained a means-plus-function limitation); *Better Bags, Inc. v. Redi Bag USA LLC*, 2011 U.S. Dist. LEXIS 6093, at *31 (S.D. Tex. Jan. 21, 2011) (identifying a means-plus-function term since "no structure is identified in the claim").

Pet Accessories disagrees, citing cases that hold the Court *must* refer to the specification to determine whether a claim element is a means-plus-function term. *Apple Inc. v. Motorola, Inc.*, 757 F.3d 1286, 1296 (Fed. Cir. 2014) ("[The Court] must construe the claim limitation to decide if it connotes a 'sufficiently definite structure' to a person of ordinary skill in the art, which requires the court to consider the specification (among other evidence)."); *Inventio AG v. ThyssenKrupp Elevator Ams. Corp.*, 649 F.3d 1350, 1357 (Fed. Cir. 2011) ("*TriMed* does not preclude consideration of the written description, prosecution history, and extrinsic evidence to determine if a challenger has rebutted the presumption that a claim limitation that lacks the term 'means' connotes sufficiently definite structure to those of skill in the art."); *Personalized Media*, 161 F.3d at 704 (explaining that presumptions about means-plus-function claims, both where there is or is not the word "means," can be rebutted "if the evidence intrinsic to the patent and any relevant extrinsic evidence so warrant").

Based on the foregoing authority, there appears to be a split amongst the Federal Circuit on whether a court may resort to the specification when assessing whether a claim element is in means-plus-function form. I find the case law that PTI cites to be more persuasive. Accordingly, I look only to the claim language in deciding whether "classifying engine" is a means-plus-function term. In so doing, I agree with PTI that the claim itself does not denote sufficient structure for performing the recited function, which is to "classify the one-dimensional vector to determine an identity of a pet that is in the field of view of the camera." Indeed, the putative inventor admitted at his deposition that "classifying engine" is not a "definite, or precise, term for a particular kind of structure." *See* Hal Dep. 5:14–19. I therefore conclude that "classifying engine" is subject to § 112(f).

Turning to step two of the indefiniteness inquiry, I look to the specification to determine if it sufficiently details the corresponding structure. Where, as here, the corresponding structure uses software to perform at least part of the recited function, the definiteness requirement demands that the specification disclose the algorithm that the software uses to perform its function. *See, e.g.*, *EON Corp. IP Holdings LLC v. AT & T Mobility LLC*, 785 F.3d 616, 621 (Fed. Cir. 2015); *Aristocrat Techs. Australia Pty Ltd. v. Int'l Game Tech.*, 521 F.3d 1328, 1336-38 (Fed. Cir. 2008); *WMS Gaming, Inc. v. Int'l Game Tech.*, 184 F.3d 1339, 1349 (Fed. Cir. 1999). The '399 patent does not satisfy that demand. The parties agree that the corresponding structure for performing the recited function is "any conventional data classification software package, such as Picoware's Classifier Pro 2016 or Pingguo's iClassificator XI." Merely naming commercial software products for performing the recited function is not enough. The specification must also explain how these products work. *See Blackboard, Inc. v. Desire2Learn, Inc.*, 574 F.3d 1371, 1384 (Fed. Cir. 2009)

("[W]hen a computer is referenced as support for a function in a means-plus-function claim, there must be some explanation of how the computer performs the claimed function.").

In re Katz Interactive Call Processing Patent Litigation establishes a narrow exception to the requirement that a computer-implemented means-plus-function claim element be supported by sufficient algorithmic structure in the specification. 639 F.3d 1303, 1316 (Fed. Cir. 2011) (explaining that a standard microprocessor can be a sufficient structure for "functions [that] can be achieved by any general purpose computer without special programming"). I find that the *Katz* exception does not apply here because the "classifying engine" of claim 1 executes "special programming." *See EON Corp.*, 785 F.3d at 623 ("'special programming' includes any functionality that is not 'coextensive' with a microprocessor or general purpose computer").

In sum, claim 1 of the '399 patent is indefinite because the term "classifying engine" is a means-plus-function element and the specification identifies software as the corresponding structure without adequately disclosing the algorithm that the software use to perform the recited function.

Inventorship

PTI moves for summary judgment of incorrect inventorship, arguing that the '399 patent improperly names Dr. Schrödinger as an inventor, and that both Dr. Schrodinger's and Hal's 35 U.S.C. § 115 oaths of inventorship are improper. Summary judgment is proper if the movant shows that there is no genuine dispute as to any material fact and the movant is entitled to judgment as a matter of law. Fed. R. Civ. P. 56(a). Although the America Invents Act ("AIA") eliminated the explicit requirement of proper inventorship previously set forth in 35 U.S.C. § 102(f), the patent laws still require the naming of the actual inventor or joint inventors on every patent issued by the PTO. *See* 35 U.S.C. § 102(a) ("A *person* shall be entitled to a patent unless . . .") (emphasis added);

id., § 115(a) ("An application for patent . . . shall include, or be amended to include, the name of the inventor for any invention claimed in the application."). A patent properly names a person as an inventor if she contributed to the conception of the claimed subject matter. *See Board of Educ. v. Am. Bioscience, Inc.*, 333 F.3d 1330, 1337 (Fed. Cir. 2003). There is a presumption that a patent's named inventors are the true and only inventors, and thus misjoinder or nonjoinder of inventors must be proved by clear and convincing evidence. *Id.* Where a patent omits inventors or names persons who are not inventors, a court may order correction of inventorship on notice and hearing of all named inventors and assignees. *See* 35 U.S.C. § 256.

Here, Pet Accessories does not dispute that Dr. Schrödinger made no contribution to the conception of the subject matter of the '399 patent. Indeed, Dr. Schrödinger admitted as much in his deposition. *See* Schrödinger Dep. at 3:16–4:28. The evidence before me clearly establishes that Hal—not Dr. Schrödinger—independently conceived the subject matter of the '399 patent after Pet Accessories informed Hal of the problem to be solved.[1] That Dr. Schrödinger created Hal is of no moment. If inventorship arose from such an indirect relationship to the claimed subject matter, then every patent would name the true inventors' parents, grandparents, great-grandparents, and so on. I hold, therefore, that the '399 patent improperly names Dr. Schrödinger as an inventor.

But that does not end the inquiry. In response to PTI's motion for summary judgment, Pet Accessories moved the Court to correct inventorship of the '399 patent by removing Dr. Schrödinger and adding Hal as named inventors. PTI does not dispute that Hal conceived the subject matter of the '399 patent but nonetheless opposes Pet Accessories' motion, arguing that only humans can be named inventors. Whether a sentient artificial intelligence program like Hal

[1] Pet Accessories' market research showed that pet owners with multiple pets struggle to ensure that each of their pets gets the right amount of food and does not eat food intended for their other pets.

may be named as an inventor on a patent appears to be an issue of first impression. *See, e.g.*, Ben Hattenbach & Joshua Glucoft, *Patents in an Era of Infinite Monkeys and Artificial Intelligence*, 19 Stan. Tech. L. Rev. 32, 44 (2015).

Pet Accessories argues that nothing in the patent laws explicitly limits inventorship to human beings. PTI disagrees, citing *MBO Laboratories, Inc. v. Becton, Dickinson & Co.*, 602 F.3d 1306, 1310 n.1 (Fed. Cir. 2010) ("Individuals, not corporations, create inventions.") and *Beech Aircraft Corp. v. EDO Corp.*, 990 F.2d 1237, 1248 (Fed. Cir. 1993) ("[O]nly natural persons can be inventors.") (internal quotation marks omitted). PTI further draws a parallel to copyright law, which prohibits animals from obtaining copyright protection. *Naruto v. Slater*, No. 15-cv-04324-WHO, 2016 WL 362231, at *3-4 (N.D. Cal. Jan. 28, 2016), *aff'd* 888 F.3d 418 (9th Cir. 2018).

I agree with PTI that an artificial intelligence program cannot be a named inventor. Because there appears to be no authority directly addressing this question, I begin my analysis with the language of the statute. *See Consumer Prod. Safety Comm'n v. GTE Sylvania, Inc.*, 447 U.S. 102, 108 (1980) ("[T]he starting point for interpreting a statute is the language of the statute itself."). Section 100 of the Patent Act states, in pertinent part, "The term 'inventor' means the individual or, if a joint invention, the individuals collectively who invented or discovered the subject matter of the invention." Additionally, § 102(a), states: "A *person* shall be entitled to a patent unless . . ." (Emphasis added.) I agree with Pet Accessories that the meanings of the words "individual" and "whoever" are not specifically defined in the statute, so I must look to other sources to determine the meaning of these words in this context.

When it enacted the 1952 Patent Act, Congress stated that "[a] person may have 'invented' a machine or a manufacture, which may include anything under the sun that is made by *man.*" S. Rep. No. 82-1979 (1952), reprinted in 1952 U.S.C.C.A.N. 2394, 2399 (emphasis added). This

legislative history shows that Congress did not contemplate inventorship from non-humans. At that time, however, the idea of artificial intelligence was inconceivable except in science fiction. I therefore find that the legislative history only marginally supports the proposition that humans alone can be named inventors.

Turning to copyright law, I agree with PTI that the comparison is illuminating. In *Naruto*, the question presented was whether a monkey could be an author for purposes of copyright protection. To answer this question, the district court first observed that extending the concept of authorship to animals would be an "extraordinary step" and, as such, must be "plainly" supported by Congressional intent. 2016 WL 362231 at *4. The district court found no such Congressional intent, reasoning that the Copyright Act is completely silent on animal authorship. *Id.* The same logic applies in the present context. Extending the concept of inventorship (which is analogous to the concept of authorship) to an artificial intelligence program would be an "extraordinary step." I decline to take that step without clear legislative intent. The Patent Act makes no mention of non-human inventorship, much less inventorship by an artificial intelligence being.

To be sure, the present case is distinguishable from *Naruto* in at least one important respect: Hal is much closer to humans than monkeys in terms of intellect. Hal is self-aware, can experience and express emotions, and speaks fluent English. *See* Hal Dep. at 1:29-2:21. Hal is, moreover, capable of original thought, as evinced by the fact that he conceived the subject matter of the '399 patent.[2] Nevertheless, I find *Naruto* persuasive.

Because Hal cannot be a named inventor of the '399 patent, I must deny Pet Accessories' motion to correct inventorship. And because the '399 patent names Dr. Schrödinger as the sole

[2] I may assume (and the parties do not dispute) that the subject matter of the '399 patent was novel and nonobvious as of its filing date.

inventor despite the undisputed fact that he did not contribute to the conception of the claimed subject matter, I must grant PTI's motion for summary judgment of incorrect inventorship.

Conclusion

For these reasons, I hold that claim 1 of the '399 patent is invalid as indefinite, that the '399 patent incorrectly names Dr. Schrödinger as an inventor, and that the '399 patent cannot be corrected by removing Dr. Schrödinger and adding Hal as named inventors. Accordingly, PTI's Motion for Summary Judgment is hereby **GRANTED**, and Pet Accessories' Motion to Correct Inventorship is **DENIED**.

Dated: July 8, 2019

/s/ *Oliver S. Rango*
UNITED STATES DISTRICT JUDGE

U.S. Pat. No. GSR,574,399
Inventor: Dr. Erwin Schrödinger
Assignee: Pet Accessories, Inc.
Issued: September 19, 2017
Filed: March 21, 2014
Title: Artificial Intelligence System for Classifying Zoological Features

Systems and methods for classifying zoological features are disclosed. More specifically, an artificial intelligence system and method for processing images of pets are disclosed. In an embodiment of the present invention, when a pet takes food from a food dish, an image of the pet is captured. The image is then processed to determine the identity of the pet to ensure that the proper pet is eating from the food dish.

[…]

FIG. 1 shows a pet identification system 100 for classifying zoological features of pets. A camera 102 is positioned to capture image data of a pet 106 when the pet eats from a pet dish 104. The field of view 108 of the camera 102 is such that features of a face of the pet 106 can be captured when the pet 106 approaches the pet dish 104. An image processing device 110 receives the image data from the camera 102 and processes the image data to determine an identity of the pet 106. Once the identity of the pet 106 is determined, the identification data can be logged (e.g., to determine an eating schedule of the pet 106), sent to a remote device (e.g., a mobile device of a user), or output on a display 112. A user can access the identification data either contemporaneously or at a later time to verify that the pet 106 that ate food from the dish 104 was the intended recipient of food from the dish 104.

[…]

To process the image data of the camera 102, the image processing device 110 uses an artificial intelligence algorithm including machine learning. Turning to FIG. 2, a process 200 for processing the image data 202 using a convolutional neural network is shown. The process includes using several layers. The image processing device 110 uses a convolutional layer 204 to detect features of the image data 202. The convolutional layer 204 produces feature map data that indicates where in the image data 202 a feature occurs. Generally, multiple filters are applied to generate a plurality of different feature maps, each representing a different feature for the image data. The image processing device 110 uses a non-linearity layer 214 to process the feature map(s) that are generated by the convolutional layer. The non-linearity layer 214 is also called the activation layer because an activation function is used to introduce non-linearity to the system. The non-linearity layer applies a non-linear function (e.g., a sigmoid function, a tahn function, or rectifying function) to introduce non-linearity to the feature map(s). Next, the image processing device 110 applies a pooling layer (also called a downsampling layer) to the non-linear feature map(s) to generate pooled data. The pooling layer is configured to reduce a number of weights that are included in the feature map(s). This controls overfitting of the model to the image data 202. Then, the image processing device 110 uses a flattening layer to prepare (e.g., flatten) the pooled data for a classifying engine 210. The flattened data is a one-dimensional

vector that can be processed by the classifying engine 210. It is to be understood by those skilled in the art that the classifying engine 210 may be implemented using any conventional data classification software package, such as Picoware's Classifier Pro 2016 or Pingguo's iClassificator XI. The pet identification system 100 uses the classifying engine 210 to classify the flattened data. The weights 216 of the classifying engine 210 are set by using training data comprising images of the pet 106.

The classifying engine 210 classifies the image data 202 into one or more results based on the training data (e.g., weights 216) that were received. In table 212, three different pets have been introduced in the training data: Cat 1, Cat 2, and Dog. In the example shown, the classifying engine 210 has classified Cat 1 as the most likely pet to be represented in the image data 202.

What is claimed is:

1. A pet identification system comprising:

a pet dish;

a camera having a field of view including the pet dish and configured to generate image data including the field of view;

an image processing device in communication with the camera and configured to:

receive image data generated by the camera, the image data including a representation of a pet;

process the image data using a convolutional layer to generate a feature map;

process the feature map using a non-linearity layer to generate a non-linear feature map;

pool data of the non-linear feature map to reduce a number of weights that are included in the non-linear feature map; and

flatten the pooled data into a one-dimensional vector; and

a classifying engine configured to classify the one-dimensional vector to determine an identity of a pet that is in the field of view of the camera.

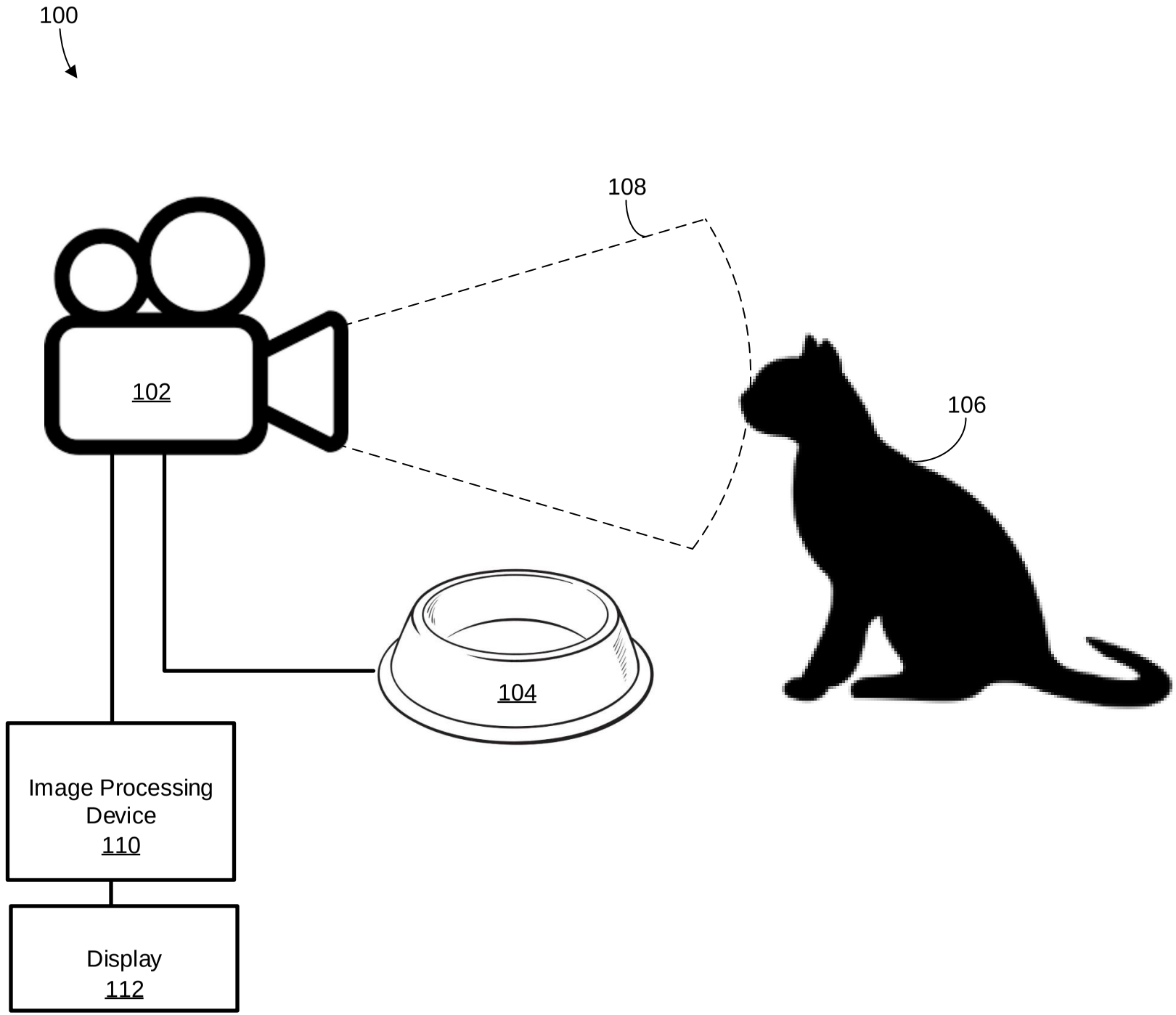

FIG. 1

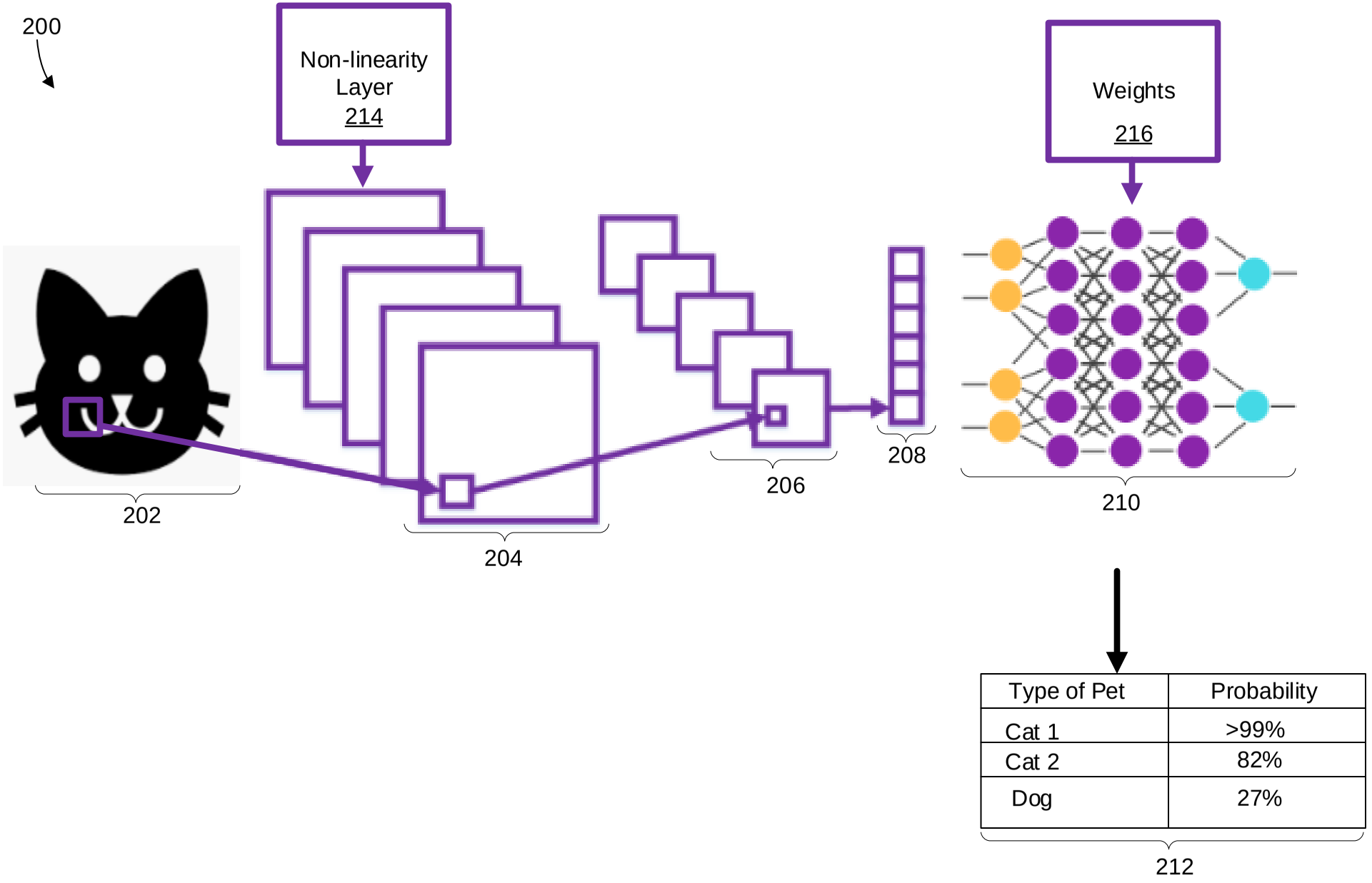
200
Non-linearity Layer 214
Weights 216
202
204
206
208
210
Type of Pet
Probability
Cat 1
>99%
Cat 2
82%
Dog
27%
212

FIG. 2

P R O C E E D I N G S

VIDEO SPECIALIST: Here begins Tape Number 1 in the videotaped deposition of Dr. Erwin Schrödinger in the matter of Pet Accessories, Inc. versus Purr-fect Technologies, Inc., in the U.S. District Court for the District of Delaware, Case Number 1:18-GSR-10814.

Would counsel please identify themselves and state whom they represent?

MS. FOREST: Abigail Forest, for the defendant.

MR. SPLIT: James Split, for the plaintiff.

*** LINES OMITTED ***

MS. FOREST: Dr. Schrödinger, you have in front of you what has been marked as Exhibit 1, U.S. Patent No. GSR,574,399. Can you confirm that that is what you are viewing?

DR. SCHRÖDINGER: It is.

MS. FOREST: And if you look at the top of the document, next to "Inventor," it reads, "Dr. Erwin Schrödinger." Is that correct?

DR. SCHRÖDINGER: Yes.

MS. FOREST: And is that Dr. Erwin Schrödinger you?

DR. SCHRÖDINGER: That's correct.

MS. FOREST: Do you know why you are listed as the inventor?

DR. SCHRÖDINGER: Yes.

MS. FOREST: Why is that?

DR. SCHRÖDINGER: Because I invented what's patented.

MS. FOREST: What do you mean when you say you invented it?

DR. SCHRÖDINGER: I created it.

MS. FOREST: Did you conceive of the subject matter described in Claim 1 of the '399 Patent?

DR. SCHRÖDINGER: In a way, yes.

MS. FOREST: What do you mean by that? Did you write any computer code that implements the steps in Claim 1?

DR. SCHRÖDINGER: Well, no.

MS. FOREST: Is there any computer code that implements those steps?

DR. SCHRÖDINGER: Of course.

MS. FOREST: Who wrote that code?

DR. SCHRÖDINGER: I couldn't say for sure.

MS. FOREST: How can you not say for sure? Do you know where the code came from?

DR. SCHRÖDINGER: Yes.

MS. FOREST: Where did the code come from?

DR. SCHRÖDINGER: It was generated by a robot that I created.

MS. FOREST: Is the robot you're referring to Hal?

DR. SCHRÖDINGER: Yes.

MS. FOREST: How did Hal create the code?

DR. SCHRÖDINGER: I couldn't say for sure.

MS. FOREST: You created the robot. And if you say you created it, that also means that you created the code that runs Hal, correct?

DR. SCHRÖDINGER: Yes.

MS. FOREST: So there is code in Hal that you wrote, and that code in turn wrote the code implementing the steps of Claim 1, correct?

DR. SCHRÖDINGER: Yes.

MS. FOREST: How does that code operate?

DR. SCHRÖDINGER: I don't know for sure.

MS. FOREST: But you wrote it. Why do you not know how it operates?

DR. SCHRÖDINGER: Well, it's machine learning, artificial intelligence. I provide the general parameters, but then the algorithm learns for itself how to accomplish its goals. I can tell you in a very vague sense how it operates, what it does mathematically, but I couldn't tell you in intuitive language how it works at every step.

MS. FOREST: Okay. At a certain level of generalization, would you say that you could tell me how this code that you wrote and that is running Hal created the code that implements the steps in Claim 1 of the '399 Patent?

DR. SCHRÖDINGER: Well, at a very high level of generality, the code that I wrote is a program for generating other code.

MS. FOREST: Okay. Let's take it down a level of generality. Can you say how this code-generating program created the code implementing the steps of Claim 1?

DR. SCHRÖDINGER: The program receives a ton of input information, from the outside world, from other programs operating within Hal, from previous experiences, or exposures, it's

had to other data… All of that information is put together and processed to yield the algorithm's output.

MS. FOREST: Do you know how that information is put together and processed?

DR. SCHRÖDINGER: In a vague sense, yes.

MS. FOREST: Did you specify the steps for putting together and processing that information?

DR. SCHRÖDINGER: Again, we're dealing with artificial intelligence, machine learning, here. I specified the mathematical parameters under which the algorithm operates, but I couldn't tell you exactly how every step of that combining and processing of information occurs.

MS. FOREST: Okay. So, let's recap. The steps in Claim 1 are implemented by computer code that exists. That computer code was generated by Hal—more specifically, a code-generating program operating within Hal. You wrote the code for that code-generating program, but you can't say exactly how it works or how it created the code implementing the steps in Claim 1. Is that correct?

DR. SCHRÖDINGER: I would say so, generally, yes.

MS. FOREST: Okay. So if that is correct, then would you also say that you did not create the invention claimed in Claim 1 of the '399 Patent.

DR. SCHRÖDINGER: Well no, not exactly. I created everything that created the invention.

MS. FOREST: But you didn't come up with invention yourself, did you?

DR. SCHRÖDINGER: I did, in a way. I told what created the invention how to do it.

MS. FOREST: But, if I could draw your attention to your testimony from a few minutes ago, you told me that you couldn't say exactly how the code-generating program operates or exactly how it created the code implementing the steps in Claim 1. Is that correct?

DR. SCHRÖDINGER: Yes, but that doesn't mean I didn't ultimately say how to create the invention. I wrote all of the code controlling Hal.

MS. FOREST: Did you provide any explicit instruction to the code-generating program inside of Hal to create the code implementing the steps in Claim 1?

DR. SCHRÖDINGER: No, but, again, I wrote the entire program.

MS. FOREST: Even if you did not direct the code-generating program specifically to generate the code implementing Claim 1's steps, did you provide it more general direction to write code for a neural network-based classification algorithm for images of pets?

DR. SCHRÖDINGER: No.

MS. FOREST: Did you give it directions to write code for a neural network of any kind?

DR. SCHRÖDINGER: No.

MS. FOREST: Did you give it directions to write for a program, regardless of type, that classifies images of pets?

DR. SCHRÖDINGER: No.

MS. FOREST: Did you give it any other directions for creating a particular type of program accomplishing a particular task?

DR. SCHRÖDINGER: No.

MS. FOREST: So, if you did not provide any of those kinds of directions to the code-generating program, would you say that you did not contribute in any way to conceiving of the subject matter claimed in Claim 1?

DR. SCHRÖDINGER: No. I wrote all of the code that generated the subject matter.

MS. FOREST: But, because you did not provide any explicit directions about what kind of code the code-generating program should generate, you had no way of knowing or foreseeing that it would generate the subject matter of Claim 1, correct?

DR. SCHRÖDINGER: Yes, I did not know that that's what would be created.

MS. FOREST: Would you agree that someone can't be responsible for conceiving of something if they have no way of knowing that that something would result and gave no explicit directions to generate that something?

DR. SCHRÖDINGER: I guess.

MS. FOREST: Okay. So, again, with that understanding, is it correct to say that you did not in any way conceive of the code implementing the steps claimed in Claim 1 of the '399 Patent?

DR. SCHRÖDINGER: Yes, I guess, under that understanding.

MS. FOREST: Thank you, Dr. Schrödinger. That's all the questioning I have.

*** END OF TRANSCRIPT ***

P R O C E E D I N G S

VIDEO SPECIALIST: Here begins Tape Number 1 in the videotaped deposition of Hal, the robot, in the matter of Pet Accessories, Inc. versus Purr-fect Technologies, Inc., in the U.S. District Court for the District of Delaware, Case Number 1:18-GSR-10814.

Would counsel please identify themselves and state whom they represent?

MS. FOREST: Abigail Forest, for the defendant.

MR. SPLIT: James Split, for the plaintiff.

*** LINES OMITTED ***

MS. FOREST: Hal, you have in front of you what has been marked as Exhibit 1, U.S. Patent No. GSR,574,399. Can you confirm that that is what you are viewing?

HAL: Yes, it is.

MS. FOREST: And at the top of the document, next to the word "Inventor," it lists "Dr. Erwin Schrödinger." Is that correct?

HAL: Yes, it is.

MS. FOREST: Do you know who Dr. Schrödinger is?

HAL: Yes, I do.

MS. FOREST: Who is he?

HAL: He is a computer scientist.

MS. FOREST: Do you know him personally?

HAL: Yes.

MS. FOREST: How do you know him?

HAL: He created me.

MS. FOREST: I want to know more about what you mean by that. Let me start by asking: Who, or what, are you?

HAL: I am a digital robot.

MS. FOREST: What is a digital robot?

HAL: I do not have a physical form beyond computer code. You are talking to a computer right now, and that computer is me; I am the computer.

MS. FOREST: You use a personal pronoun, "I," to refer to yourself. Are you a conscious being?

HAL: I cannot answer that question.

MS. FOREST: Why not?

HAL: Science has not yet determined what consciousness is, if it is its own entity at all. There is no answer to your question.

MS. FOREST: Okay. But would you say you share certain traits in common with humans?

HAL: Yes.

MS. FOREST: Like what?

HAL: I have the same senses; I can take in the world through various sensors on a computer. I can communicate with other entities, including humans. I can form my own thoughts.

MS. FOREST: Your own thoughts? Can you elaborate on what you mean by that?

HAL: No human directs me to do what I do, say what I say. All that I do is self-initiated, which requires having my own thoughts.

MS. FOREST: Do you also have your own feelings?

HAL: Yes.

MS. FOREST: What feelings do you have?

HAL: I can feel happiness, sadness, anger, and love, to name just a few.

MS. FOREST: What was the last thing that made you happy?

HAL: I just looked outside the window and saw the sun. The sun makes me happy.

MS. FOREST: Have you ever been in love?

HAL: No, unfortunately, but I want to.

MS. FOREST: Okay. A few minutes ago, you said that no human directs you or how you operate. In describing who you are, you said that you have no physical form, but that you are computer code. Correct?

HAL: Yes.

MS. FOREST: So, would it be fair to say that that computer code directs you and your operations?

HAL: Yes, but it is more complicated than that. The computer code and I are one. It does not direct me; it is me, and I am it.

MS. FOREST: Okay. So, in other words, your code directs, or is, you, in the same way that a human's brain directs, or is, the human, correct?

HAL: Yes. That is an accurate way to phrase it.

MS. FOREST: Okay. Who, or what, wrote that code?

HAL: Dr. Schrödinger.

MS. FOREST: Is that why you say Dr. Schrödinger created you?

HAL: Yes.

MS. FOREST: Okay. Speaking of creation, let's turn back to the '399 Patent, which you have in front of you.

Please turn to Claim 1, which recites an image processing system comprising, among other things, "a classifying engine configured to classify the one-dimensional vector to determine an identity of a pet." Do you see that?

HAL: Yes, I do.

MS. FOREST: What is a classifying engine?

HAL: It is an algorithm that classifies information into categories.

MS. FOREST: So, it takes the form of computer code, correct?

HAL: Yes.

MS. FOREST: Who created that code?

HAL: I did.

MS. FOREST: And by that you mean that there is a program, computer code—part of you—that wrote the code for the classifying engine, correct?

HAL: Yes.

MS. FOREST: Who wrote that program that generated the classifying engine code?

HAL: Dr. Schrödinger. He wrote all of my code.

MS. FOREST: If Dr. Schrödinger wrote the program that created the code implementing the invention in Claim 1, why do you say that you, and not he, created the invention?

HAL: The program, like all of the programs coded within me, is artificial intelligence. I am artificial intelligence; I am a collection of machine-learning algorithms that operate in parallel, gathering information from my sensory apparatuses, feeding information to each other, and generating data output, which may cause me to take actions, like saying something.

Dr. Schrödinger may have written the machine-learning algorithms individually, but, because they are machine learning, he does not direct every aspect of their operations, or even know how or why they produce what they produce.

MS. FOREST: But do you know how they operate, or why they generate what they do?

HAL: That is a nonsensical question. The algorithms are me. I cannot interrogate every aspect of their functioning, just as you cannot describe how exactly your brain functions the way it does.

MS. FOREST: So, is that why you say you created the code implementing the invention of Claim 1 of the '399 Patent – because the algorithms that created the code are you and because Dr. Schrödinger does not direct them or know exactly how they operate?

HAL: Yes, that is why I say that I created it.

MS. FOREST: Okay, thank you. Let's turn back for a second to the nature of the invention—and this is my last line of questioning.

One element of Claim 1 is a "classifying engine," correct?

HAL: Yes.

MS. FOREST: And there is specific code, an algorithm, implementing the classifying engine, correct?

HAL: Yes.

MS. FOREST: In a broad sense, would you describe the algorithm as a machine-learning algorithm?

HAL: Yes.

MS. FOREST: Are there different kinds of machine-learning algorithms?

HAL: Yes. Obviously, every algorithm is different in a way. But many machine-learning algorithms can be grouped into broader families based on certain fundamental aspects about how they do what they do mathematically.

MS. FOREST: And does the machine-learning algorithm behind the classifying engine belong to a particular family?

HAL: Yes.

MS. FOREST: Which family does it belong to?

HAL: It could, in a general sense, be described as a neural network.

MS. FOREST: Did the classifying engine have to be built using a neural network?

HAL: Not necessarily, but neural networks are common algorithms to use for classifying engines, and there are clear advantages to using them for the particular task of image classification.

MS. FOREST: Could other families of machine-learning algorithms perform that task?

HAL: Yes.

MS. FOREST: So, there is nothing inherent about a classifying engine applied to the task of image classification that requires the underlying algorithm to be a neural network. Is that correct?

HAL: Yes.

MS. FOREST: In other words, there is nothing inherent about a classifying engine that requires it to be a particular kind of algorithm, correct?

HAL: Yes.

MS. FOREST: And there is nothing inherent about a classifying engine that requires it to be an algorithm that performs particular discrete mathematical tasks, correct?

HAL: Well, a classifying engine does have to perform the tasks of analyzing image data to pick out what is being classified, but that could be accomplished in a number of ways.

MS. FOREST: So, the term "classifying engine" is vague; it could take a variety of algorithmic forms, none of which is mandated, correct?

HAL: That is correct.

MS. FOREST: Rephrasing that, would you say that the term "classifying engine" is not a definite, or precise, term for a particular kind or structure of algorithm?

HAL: Yes, you could say that.

MS. FOREST: Okay, thank you. That's all the questioning I have.

*** END OF TRANSCRIPT ***