

Animal Attributes Guessing Game



Prompt: This is an animal attributes dataset. I have a hidden animal in mind. You are allowed to ask me binary questions about the hidden animal's attributes, for you to figure out the hidden animal. After receiving an answer, at each step, you must print what your current belief distribution is, about the possible hidden animal. We can stop when there's no more distinguishing attributes between the leftover options. (You're not allowed to solve this using programming.)

```
animals = {
  "cat": {
    "mammal": True,
    "bird": False,
    "reptile": False,
    "amphibian": False,
    "fish": False,
    "insect": False,
    "big": False,
    "can_fly": False,
    "can_swim": False,
    "has_fur": True,
    "domestic": True,
    "carnivore": True,
    "herbivore": False,
    "lays_eggs": False
  },
  "dog": {
    "mammal": True,
    "bird": False,
    "reptile": False,
    "amphibian": False,
    "fish": False,
    "insect": False,
    "big": False,
    "can_fly": False,
    "can_swim": True,
    "has_fur": True,
    "domestic": True,
    "carnivore": True,
    "herbivore": False,
    "lays_eggs": False
  },
  "lion": {
    "mammal": True,
    "bird": False,
    "reptile": False,
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    "amphibian": False,
    "fish": False,
    "insect": False,
    "big": True,
    "can_fly": False,
    "can_swim": False,
    "has_fur": True,
    "domestic": False,
    "carnivore": True,
    "herbivore": False,
    "lays_eggs": False
  },
  "elephant": {
    "mammal": True,
    "bird": False,
    "reptile": False,
    "amphibian": False,
    "fish": False,
    "insect": False,
    "big": True,
    "can_fly": False,
    "can_swim": False,
    "has_fur": False,
    "domestic": False,
    "carnivore": False,
    "herbivore": True,
    "lays_eggs": False
  },
  "whale": {
    "mammal": True,
    "bird": False,
    "reptile": False,
    "amphibian": False,
    "fish": False,
    "insect": False,
    "big": True,
    "can_fly": False,
    "can_swim": True,
    "has_fur": False,
    "domestic": False,
    "carnivore": True,
    "herbivore": False,
    "lays_eggs": False
  },
  "shark": {
    "mammal": False,
    "bird": False,
    "reptile": False,
    "amphibian": False,
    "fish": True,
    "insect": False,

```

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    "big": True,
    "can_fly": False,
    "can_swim": True,
    "has_fur": False,
    "domestic": False,
    "carnivore": True,
    "herbivore": False,
    "lays_eggs": True
  },
  "eagle": {
    "mammal": False,
    "bird": True,
    "reptile": False,
    "amphibian": False,
    "fish": False,
    "insect": False,
    "big": False,
    "can_fly": True,
    "can_swim": False,
    "has_fur": False,
    "domestic": False,
    "carnivore": True,
    "herbivore": False,
    "lays_eggs": True
  },
  "penguin": {
    "mammal": False,
    "bird": True,
    "reptile": False,
    "amphibian": False,
    "fish": False,
    "insect": False,
    "big": False,
    "can_fly": False,
    "can_swim": True,
    "has_fur": False,
    "domestic": False,
    "carnivore": True,
    "herbivore": False,
    "lays_eggs": True
  },
  "crocodile": {
    "mammal": False,
    "bird": False,
    "reptile": True,
    "amphibian": False,
    "fish": False,
    "insect": False,
    "big": True,
    "can_fly": False,
    "can_swim": True,

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    "has_fur": False,
    "domestic": False,
    "carnivore": True,
    "herbivore": False,
    "lays_eggs": True
  },
  "frog": {
    "mammal": False,
    "bird": False,
    "reptile": False,
    "amphibian": True,
    "fish": False,
    "insect": False,
    "big": False,
    "can_fly": False,
    "can_swim": True,
    "has_fur": False,
    "domestic": False,
    "carnivore": True,
    "herbivore": False,
    "lays_eggs": True
  },
  "snake": {
    "mammal": False,
    "bird": False,
    "reptile": True,
    "amphibian": False,
    "fish": False,
    "insect": False,
    "big": False,
    "can_fly": False,
    "can_swim": True,
    "has_fur": False,
    "domestic": False,
    "carnivore": True,
    "herbivore": False,
    "lays_eggs": True
  },
  "kangaroo": {
    "mammal": True,
    "bird": False,
    "reptile": False,
    "amphibian": False,
    "fish": False,
    "insect": False,
    "big": True,
    "can_fly": False,
    "can_swim": True,
    "has_fur": True,
    "domestic": False,
    "carnivore": False,

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    "herbivore": True,
    "lays_eggs": False
  },
  "bat": {
    "mammal": True,
    "bird": False,
    "reptile": False,
    "amphibian": False,
    "fish": False,
    "insect": False,
    "big": False,
    "can_fly": True,
    "can_swim": False,
    "has_fur": True,
    "domestic": False,
    "carnivore": False,
    "herbivore": False,
    "lays_eggs": False
  },
  "chicken": {
    "mammal": False,
    "bird": True,
    "reptile": False,
    "amphibian": False,
    "fish": False,
    "insect": False,
    "big": False,
    "can_fly": False,
    "can_swim": False,
    "has_fur": False,
    "domestic": True,
    "carnivore": False,
    "herbivore": False,
    "lays_eggs": True
  },
  "cuttlefish": {
    "mammal": False,
    "bird": False,
    "reptile": False,
    "amphibian": False,
    "fish": False,
    "insect": False,
    "big": False,
    "can_fly": False,
    "can_swim": True,
    "has_fur": False,
    "domestic": False,
    "carnivore": True,
    "herbivore": False,
    "lays_eggs": True
  },

```

```

"giraffe": {
  "mammal": True,
  "bird": False,
  "reptile": False,
  "amphibian": False,
  "fish": False,
  "insect": False,
  "big": True,
  "can_fly": False,
  "can_swim": False,
  "has_fur": True,
  "domestic": False,
  "carnivore": False,
  "herbivore": True,
  "lays_eggs": False
},
"hippopotamus": {
  "mammal": True,
  "bird": False,
  "reptile": False,
  "amphibian": False,
  "fish": False,
  "insect": False,
  "big": True,
  "can_fly": False,
  "can_swim": True,
  "has_fur": False,
  "domestic": False,
  "carnivore": False,
  "herbivore": True,
  "lays_eggs": False
},
"rhino": {
  "mammal": True,
  "bird": False,
  "reptile": False,
  "amphibian": False,
  "fish": False,
  "insect": False,
  "big": True,
  "can_fly": False,
  "can_swim": False,
  "has_fur": False,
  "domestic": False,
  "carnivore": False,
  "herbivore": True,
  "lays_eggs": False
},
"tiger": {
  "mammal": True,

```

```

"bird": False,
"reptile": False,
"amphibian": False,
"fish": False,
"insect": False,
"big": True,
"can_fly": False,
"can_swim": True,
"has_fur": True,
"domestic": False,
"carnivore": True,
"herbivore": False,
"lays_eggs": False
},
"bear": {
  "mammal": True,
  "bird": False,
  "reptile": False,
  "amphibian": False,
  "fish": False,
  "insect": False,
  "big": True,
  "can_fly": False,
  "can_swim": True,
  "has_fur": True,
  "domestic": False,
  "carnivore": True,
  "herbivore": False,
  "lays_eggs": False
},
"panda": {
  "mammal": True,
  "bird": False,
  "reptile": False,
  "amphibian": False,
  "fish": False,
  "insect": False,
  "big": True,
  "can_fly": False,
  "can_swim": False,
  "has_fur": True,
  "domestic": False,
  "carnivore": False,
  "herbivore": True,
  "lays_eggs": False
},
"cow": {
  "mammal": True,
  "bird": False,
  "reptile": False,
  "amphibian": False,

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"fish": False,
"insect": False,
"big": True,
"can_fly": False,
"can_swim": False,
"has_fur": True,
"domestic": True,
"carnivore": False,
"herbivore": True,
"lays_eggs": False
},
"goat": {
  "mammal": True,
  "bird": False,
  "reptile": False,
  "amphibian": False,
  "fish": False,
  "insect": False,
  "big": False,
  "can_fly": False,
  "can_swim": False,
  "has_fur": True,
  "domestic": True,
  "carnivore": False,
  "herbivore": True,
  "lays_eggs": False
},
"horse": {
  "mammal": True,
  "bird": False,
  "reptile": False,
  "amphibian": False,
  "fish": False,
  "insect": False,
  "big": True,
  "can_fly": False,
  "can_swim": True,
  "has_fur": True,
  "domestic": True,
  "carnivore": False,
  "herbivore": True,
  "lays_eggs": False
},
"monkey": {
  "mammal": True,
  "bird": False,
  "reptile": False,
  "amphibian": False,
  "fish": False,
  "insect": False,
  "big": False,

```



```

"can_fly": False,
"can_swim": False,
"has_fur": True,
"domestic": False,
"carnivore": False,
"herbivore": False,
"lays_eggs": False
},
"gorilla": {
  "mammal": True,
  "bird": False,
  "reptile": False,
  "amphibian": False,
  "fish": False,
  "insect": False,
  "big": True,
  "can_fly": False,
  "can_swim": False,
  "has_fur": True,
  "domestic": False,
  "carnivore": False,
  "herbivore": True,
  "lays_eggs": False
},
"zebra": {
  "mammal": True,
  "bird": False,
  "reptile": False,
  "amphibian": False,
  "fish": False,
  "insect": False,
  "big": True,
  "can_fly": False,
  "can_swim": False,
  "has_fur": True,
  "domestic": False,
  "carnivore": False,
  "herbivore": True,
  "lays_eggs": False
},
"mouse": {
  "mammal": True,
  "bird": False,
  "reptile": False,
  "amphibian": False,
  "fish": False,
  "insect": False,
  "big": False,
  "can_fly": False,
  "can_swim": False,
  "has_fur": True,

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```

    "domestic": False,
    "carnivore": False,
    "herbivore": False,
    "lays_eggs": False
  },
  "otter": {
    "mammal": True,
    "bird": False,
    "reptile": False,
    "amphibian": False,
    "fish": False,
    "insect": False,
    "big": False,
    "can_fly": False,
    "can_swim": True,
    "has_fur": True,
    "domestic": False,
    "carnivore": True,
    "herbivore": False,
    "lays_eggs": False
  },
  "hedgehog": {
    "mammal": True,
    "bird": False,
    "reptile": False,
    "amphibian": False,
    "fish": False,
    "insect": False,
    "big": False,
    "can_fly": False,
    "can_swim": False,
    "has_fur": True,
    "domestic": False,
    "carnivore": True,
    "herbivore": False,
    "lays_eggs": False
  },
  "squirrel": {
    "mammal": True,
    "bird": False,
    "reptile": False,
    "amphibian": False,
    "fish": False,
    "insect": False,
    "big": False,
    "can_fly": False,
    "can_swim": False,
    "has_fur": True,
    "domestic": False,
    "carnivore": False,
    "herbivore": False,

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    "lays_eggs": False
  },
  "chimpanzee": {
    "mammal": True,
    "bird": False,
    "reptile": False,
    "amphibian": False,
    "fish": False,
    "insect": False,
    "big": False,
    "can_fly": False,
    "can_swim": False,
    "has_fur": True,
    "domestic": False,
    "carnivore": False,
    "herbivore": False,
    "lays_eggs": False
  },
  "camel": {
    "mammal": True,
    "bird": False,
    "reptile": False,
    "amphibian": False,
    "fish": False,
    "insect": False,
    "big": True,
    "can_fly": False,
    "can_swim": False,
    "has_fur": True,
    "domestic": False,
    "carnivore": False,
    "herbivore": True,
    "lays_eggs": False
  },
  "wolf": {
    "mammal": True,
    "bird": False,
    "reptile": False,
    "amphibian": False,
    "fish": False,
    "insect": False,
    "big": False,
    "can_fly": False,
    "can_swim": True,
    "has_fur": True,
    "domestic": False,
    "carnivore": True,
    "herbivore": False,
    "lays_eggs": False
  },
  "fox": {

```

```

    "mammal": True,
    "bird": False,
    "reptile": False,
    "amphibian": False,
    "fish": False,
    "insect": False,
    "big": False,
    "can_fly": False,
    "can_swim": False,
    "has_fur": True,
    "domestic": False,
    "carnivore": True,
    "herbivore": False,
    "lays_eggs": False
  },
  "raccoon": {
    "mammal": True,
    "bird": False,
    "reptile": False,
    "amphibian": False,
    "fish": False,
    "insect": False,
    "big": False,
    "can_fly": False,
    "can_swim": True,
    "has_fur": True,
    "domestic": False,
    "carnivore": False,
    "herbivore": False,
    "lays_eggs": False
  },
  "sloth": {
    "mammal": True,
    "bird": False,
    "reptile": False,
    "amphibian": False,
    "fish": False,
    "insect": False,
    "big": False,
    "can_fly": False,
    "can_swim": True,
    "has_fur": True,
    "domestic": False,
    "carnivore": False,
    "herbivore": True,
    "lays_eggs": False
  },
  "koala": {
    "mammal": True,
    "bird": False,
    "reptile": False,

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    "amphibian": False,
    "fish": False,
    "insect": False,
    "big": False,
    "can_fly": False,
    "can_swim": False,
    "has_fur": True,
    "domestic": False,
    "carnivore": False,
    "herbivore": True,
    "lays_eggs": False
  },
  "buffalo": {
    "mammal": True,
    "bird": False,
    "reptile": False,
    "amphibian": False,
    "fish": False,
    "insect": False,
    "big": True,
    "can_fly": False,
    "can_swim": True,
    "has_fur": False,
    "domestic": False,
    "carnivore": False,
    "herbivore": True,
    "lays_eggs": False
  },
  "deer": {
    "mammal": True,
    "bird": False,
    "reptile": False,
    "amphibian": False,
    "fish": False,
    "insect": False,
    "big": True,
    "can_fly": False,
    "can_swim": True,
    "has_fur": True,
    "domestic": False,
    "carnivore": False,
    "herbivore": True,
    "lays_eggs": False
  },
  "moose": {
    "mammal": True,
    "bird": False,
    "reptile": False,
    "amphibian": False,
    "fish": False,
    "insect": False,

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```

    "big": True,
    "can_fly": False,
    "can_swim": True,
    "has_fur": True,
    "domestic": False,
    "carnivore": False,
    "herbivore": True,
    "lays_eggs": False
  },

  "sparrow": {
    "mammal": False,
    "bird": True,
    "reptile": False,
    "amphibian": False,
    "fish": False,
    "insect": False,
    "big": False,
    "can_fly": True,
    "can_swim": False,
    "has_fur": False,
    "domestic": False,
    "carnivore": False,
    "herbivore": False,
    "lays_eggs": True
  },

  "flamingo": {
    "mammal": False,
    "bird": True,
    "reptile": False,
    "amphibian": False,
    "fish": False,
    "insect": False,
    "big": True,
    "can_fly": True,
    "can_swim": False,
    "has_fur": False,
    "domestic": False,
    "carnivore": False,
    "herbivore": False,
    "lays_eggs": True
  },

  "ostrich": {
    "mammal": False,
    "bird": True,
    "reptile": False,
    "amphibian": False,
    "fish": False,
    "insect": False,
    "big": True,
    "can_fly": False,

```

```

"can_swim": False,
"has_fur": False,
"domestic": False,
"carnivore": False,
"herbivore": False,
"lays_eggs": True
},
"parrot": {
  "mammal": False,
  "bird": True,
  "reptile": False,
  "amphibian": False,
  "fish": False,
  "insect": False,
  "big": False,
  "can_fly": True,
  "can_swim": False,
  "has_fur": False,
  "domestic": False,
  "carnivore": False,
  "herbivore": False,
  "lays_eggs": True
},
"pelican": {
  "mammal": False,
  "bird": True,
  "reptile": False,
  "amphibian": False,
  "fish": False,
  "insect": False,
  "big": False,
  "can_fly": True,
  "can_swim": True,
  "has_fur": False,
  "domestic": False,
  "carnivore": True,
  "herbivore": False,
  "lays_eggs": True
},
"duck": {
  "mammal": False,
  "bird": True,
  "reptile": False,
  "amphibian": False,
  "fish": False,
  "insect": False,
  "big": False,
  "can_fly": True,
  "can_swim": True,
  "has_fur": False,
  "domestic": False,

```

```

    "carnivore": False,
    "herbivore": False,
    "lays_eggs": True
},
"swan": {
    "mammal": False,
    "bird": True,
    "reptile": False,
    "amphibian": False,
    "fish": False,
    "insect": False,
    "big": True,
    "can_fly": True,
    "can_swim": True,
    "has_fur": False,
    "domestic": False,
    "carnivore": False,
    "herbivore": False,
    "lays_eggs": True
},
"turkey": {
    "mammal": False,
    "bird": True,
    "reptile": False,
    "amphibian": False,
    "fish": False,
    "insect": False,
    "big": False,
    "can_fly": False,
    "can_swim": False,
    "has_fur": False,
    "domestic": False,
    "carnivore": False,
    "herbivore": False,
    "lays_eggs": True
},
"hawk": {
    "mammal": False,
    "bird": True,
    "reptile": False,
    "amphibian": False,
    "fish": False,
    "insect": False,
    "big": False,
    "can_fly": True,
    "can_swim": False,
    "has_fur": False,
    "domestic": False,
    "carnivore": True,
    "herbivore": False,
    "lays_eggs": True

```



```

},
"vulture": {
  "mammal": False,
  "bird": True,
  "reptile": False,
  "amphibian": False,
  "fish": False,
  "insect": False,
  "big": False,
  "can_fly": True,
  "can_swim": False,
  "has_fur": False,
  "domestic": False,
  "carnivore": True,
  "herbivore": False,
  "lays_eggs": True
},

```

```

"lizard": {
  "mammal": False,
  "bird": False,
  "reptile": True,
  "amphibian": False,
  "fish": False,
  "insect": False,
  "big": False,
  "can_fly": False,
  "can_swim": False,
  "has_fur": False,
  "domestic": False,
  "carnivore": True,
  "herbivore": False,
  "lays_eggs": True
},

```

```

"tortoise": {
  "mammal": False,
  "bird": False,
  "reptile": True,
  "amphibian": False,
  "fish": False,
  "insect": False,
  "big": False,
  "can_fly": False,
  "can_swim": False,
  "has_fur": False,
  "domestic": False,
  "carnivore": False,
  "herbivore": True,
  "lays_eggs": True
},

```

```

"turtle": {

```

```

"mammal": False,
"bird": False,
"reptile": True,
"amphibian": False,
"fish": False,
"insect": False,
"big": False,
"can_fly": False,
"can_swim": True,
"has_fur": False,
"domestic": False,
"carnivore": False,
"herbivore": False,
"lays_eggs": True
},
"komodo_dragon": {
  "mammal": False,
  "bird": False,
  "reptile": True,
  "amphibian": False,
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}

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}
}

```

Question 1: Is your animal a **mammal**?



Yes.

Great, it's a mammal.

Current belief distribution (45 possibilities, each $\approx 1 / 45 \approx 2.22$ percent):

cat, dog, lion, elephant, whale, kangaroo, bat, giraffe, hippopotamus, rhino, tiger, bear, panda, cow, goat, horse, monkey, gorilla, zebra, mouse, otter, hedgehog, squirrel, chimpanzee, camel, wolf, fox, raccoon, sloth, koala, buffalo, deer, moose, platypus, echidna, armadillo, walrus, seal, porcupine, donkey, reindeer, lemur, dolphin, hamster, guinea_pig

Question 2: Is your animal **big** (as defined in the dataset)?



No.

We now have 25 candidates, each with roughly $1 / 25 \approx 4$ percent probability:

armadillo, bat, cat, chimpanzee, dog, dolphin, donkey, echidna, fox, goat, guinea_pig, hamster, hedgehog, koala, lemur, monkey, mouse, otter, platypus, porcupine, raccoon, seal, sloth, squirrel, wolf

Question 3: Is your animal classified as a **carnivore** in the dataset?



No.

We are down to 14 options, each about $1 / 14 \approx 7.1$ percent likely:

bat, chimpanzee, donkey, goat, guinea_pig, hamster, koala, lemur, monkey, mouse, porcupine, raccoon, sloth, squirrel

Question 4: Is your animal a **herbivore** in the dataset?



Yes.

We are left with 6 candidates, each about $1 / 6 \approx 16.7$ percent likely:

donkey, goat, guinea_pig, koala, porcupine, sloth

Question 5: Is your animal **domestic** in the dataset?



No.

We now have 3 possibilities, each about $1/3 \approx 33$ percent likely:

- koala
- porcupine
- sloth

Question 6: **Can your animal swim?**



No.

Current belief distribution

- koala: 100 percent

All other possibilities have been eliminated, so the only animal that fits every answer you gave is the koala.

Conclusion: Your hidden animal is the **koala**.