

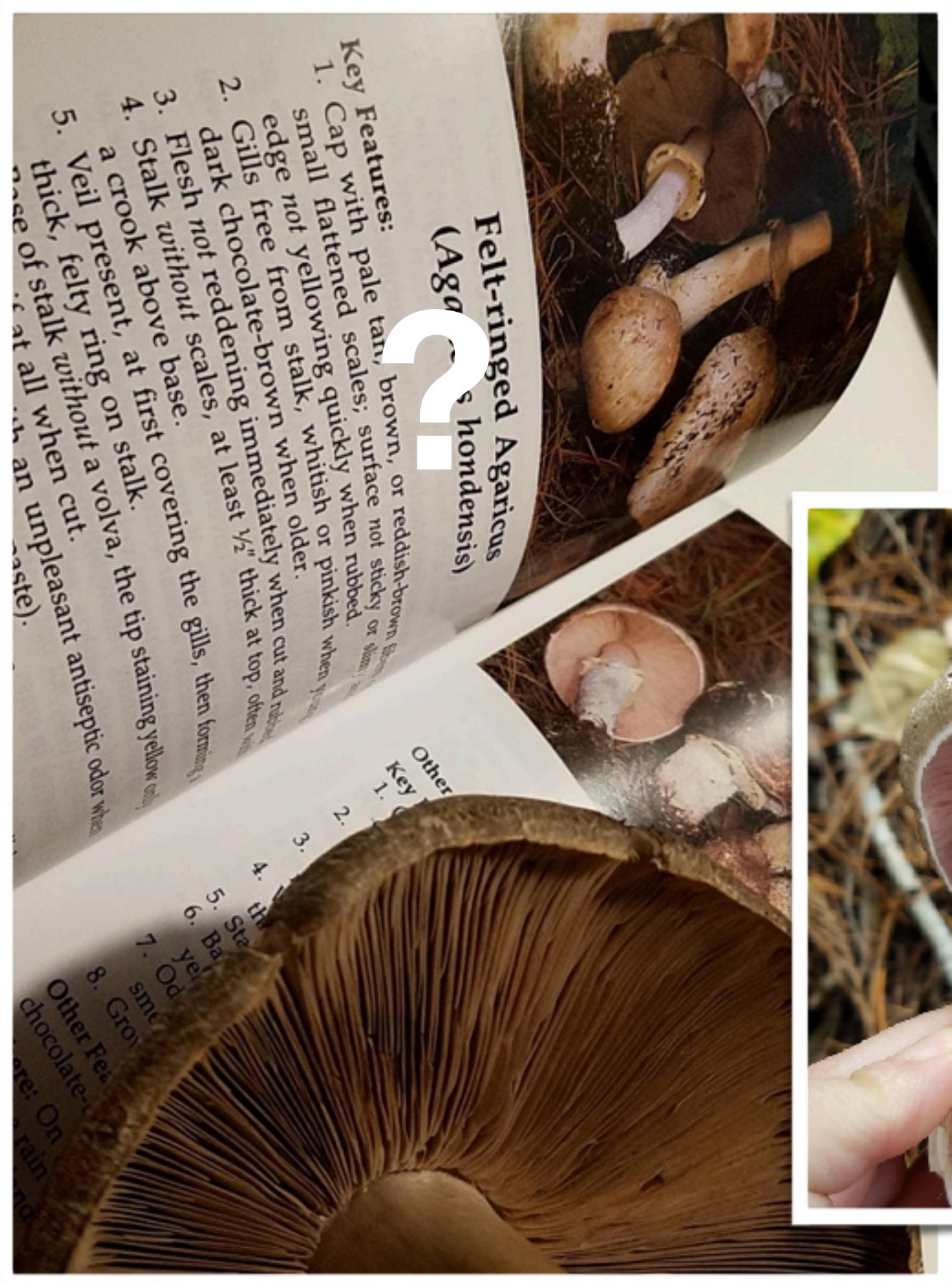
**“All mushrooms are edible.
But some you can only eat once.”**

— Natalia Bernardo
(The Brazilian Wisdom)



**Mushrooms: edible or not?
Data Analysis for App Development**

Mushroom foraging



Felt-ringed Agaricus
(Agaricus hondensis)

Key Features:

1. Cap with pale tan, brown, or reddish-brown, flattened scales; surface not sticky or shiny.
2. Small yellowing quickly when rubbed, edge not yellowing from stalk, whitish when older.
3. Gills free from stalk when older.
4. Dark chocolate-brown immediately when cut and often not reddening, at least $\frac{1}{2}$ " thick at top, often very dark.
5. Flesh without scales, then turning dark brown.
6. Stalk without base.
7. Stalk above base.
8. Stalk crooked above base.
9. Veil present, at first covering the gills, then torn.
10. A crook present, at first on stalk, then on cap.
11. Tip staining yellow when cut.
12. A thick, felty ring without a volva, the tip staining yellow when cut.
13. Odor unpleasant antiseptic when cut.
14. Taste: None.



Shaggy Parasol (*Lepiota rachodes*)
Other Names: Leppie, *Lepiota rhacodes*, *Macrolepiota rachodes*.

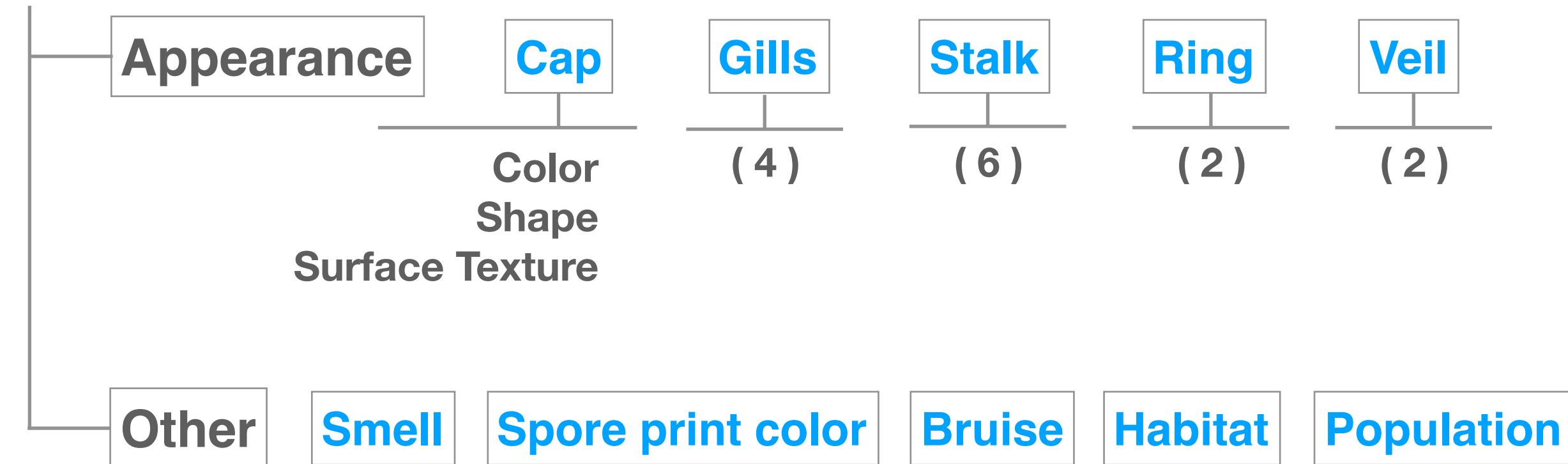


UCI dataset: mushrooms

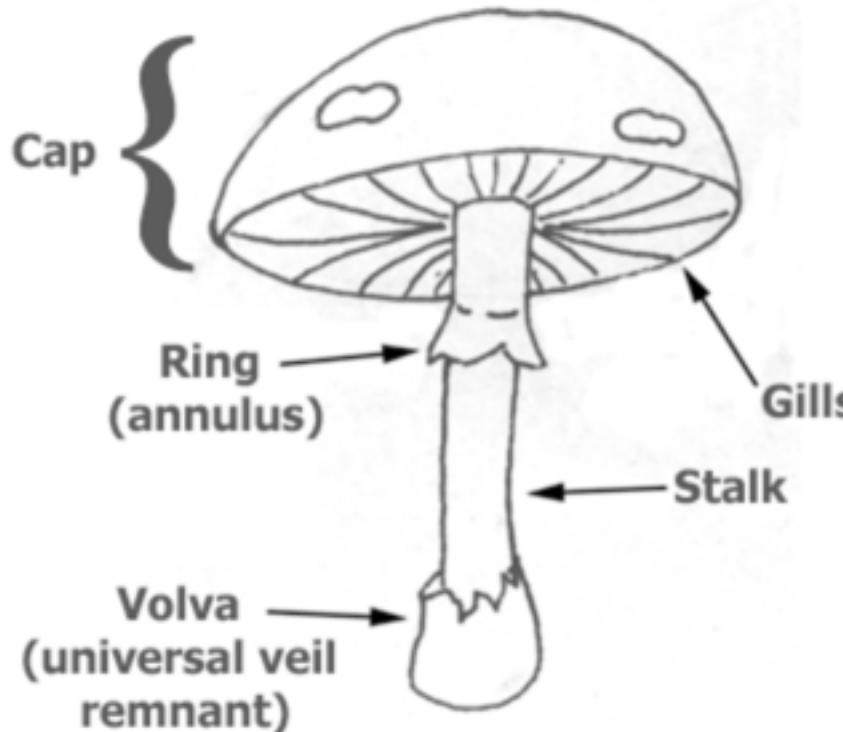
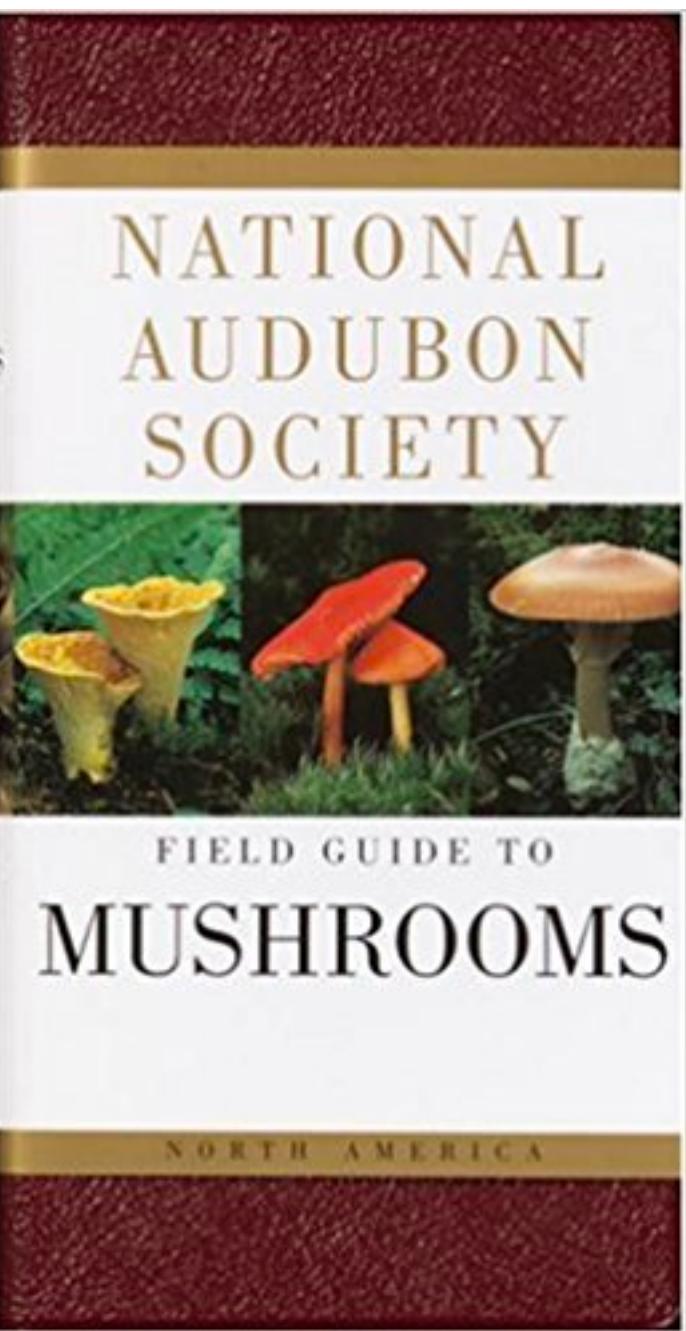
8124 Gilled Mushrooms



22 Attributes



The Audubon Society Field Guide to
North American Mushrooms (1981)
G. H. Lincoff (Pres.), New York



“Death Cap”

Data preparation

Demo AWS+PSQL

- Raw .csv file downloaded to AWS
- Fast table creation using “**pgfutter**” package
- Retrieve table data from AWS using **SQLAlchemy**

```
sealoving@ip-172-31-84-254:~$ ./pgfutter --db "mushroom" --schema "public" --table "mushroom" --user "sealoving" --pw "xxxxxxxx" csv ~/mushrooms.csv
```

```
In [8]: # df.to_sql('mushroom_raw.csv', cnx)
```

```
In [7]: pd.read_sql_query('''SELECT * FROM mushroom LIMIT 5''',cnx)
```

```
Out[7]:
```

	class	cap_shape	cap_surface	cap_color	bruises	odor	gill_attachment	gill_spacing	gill_size	gill_color	...
0	p	x	s	n	t	p	f	c	n	k	...
1	e	x	s	y	t	a	f	c	b	k	...
2	e	b	s	w	t	l	f	c	b	n	...
3	p	x	y	w	t	p	f	c	n	n	...
4	e	x	s	g	f	n	f	w	b	k	...

22 Attributes → 117 dummy variable features

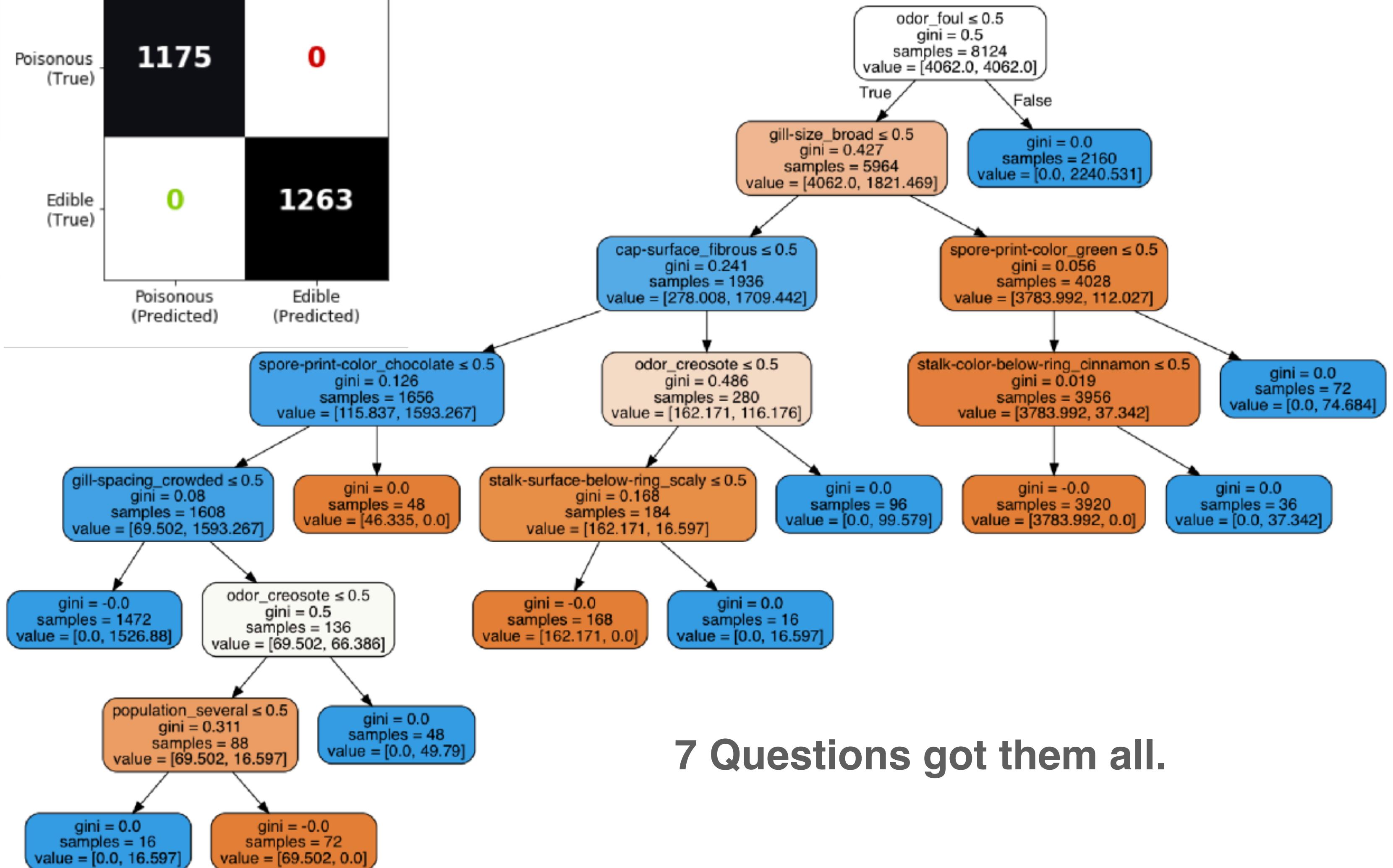
EDA – A perfect dataset?

Training set (70% data)

Poisonous (True)	2741	0
Edible (True)	0	2945
Poisonous (Predicted)		Edible (Predicted)

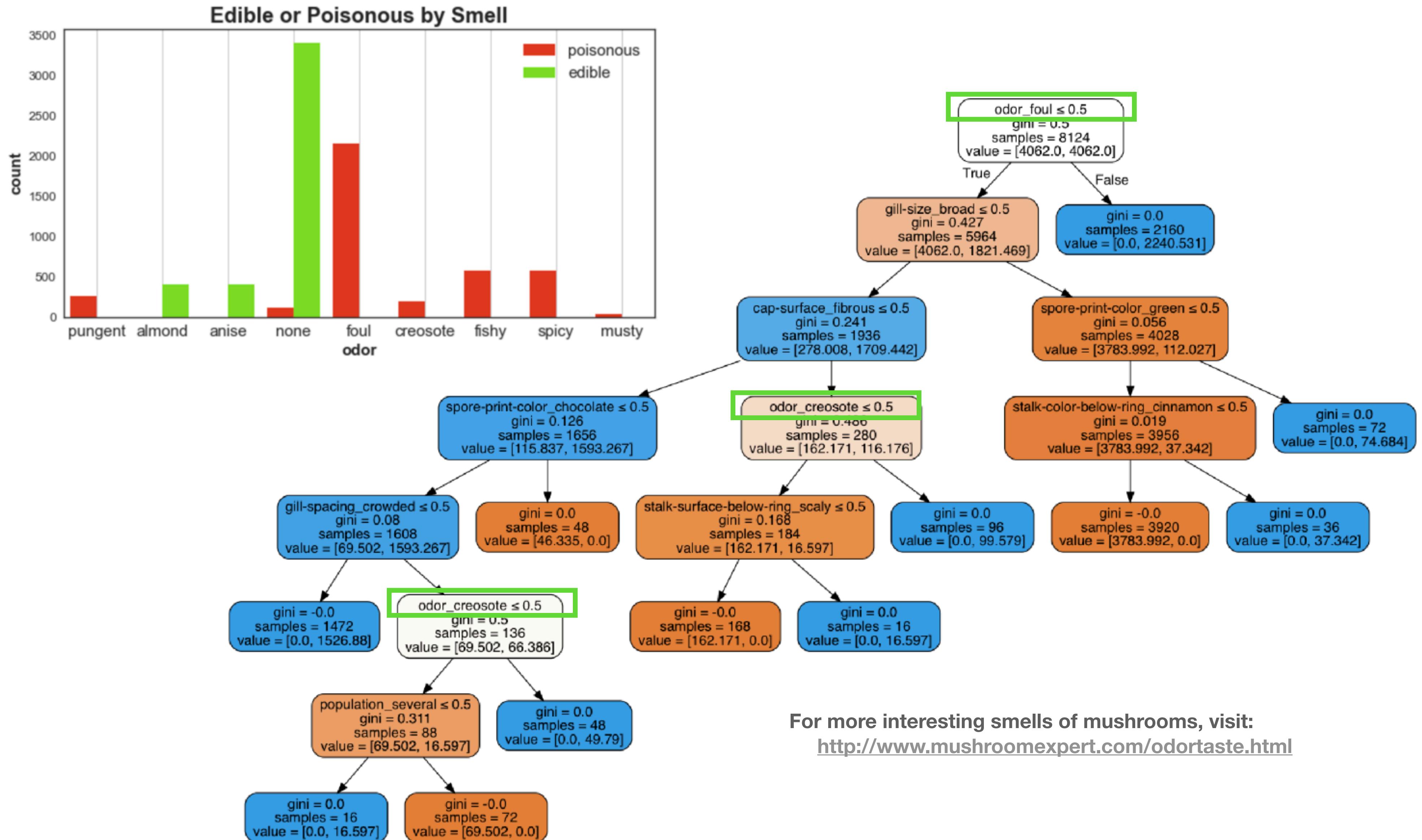
Test set (30% data)

Poisonous (True)	1175	0
Edible (True)	0	1263
Poisonous (Predicted)		Edible (Predicted)

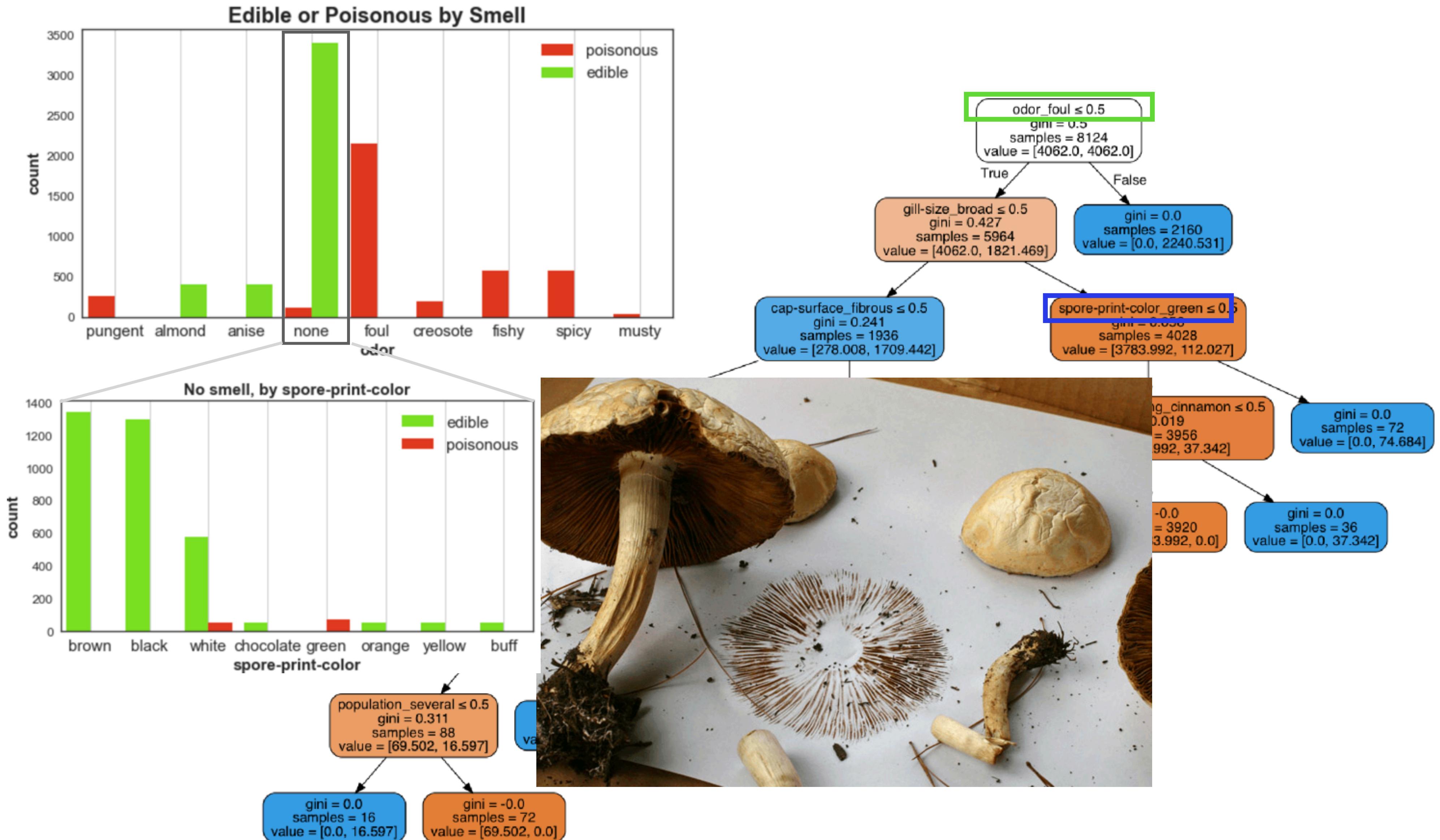


7 Questions got them all.

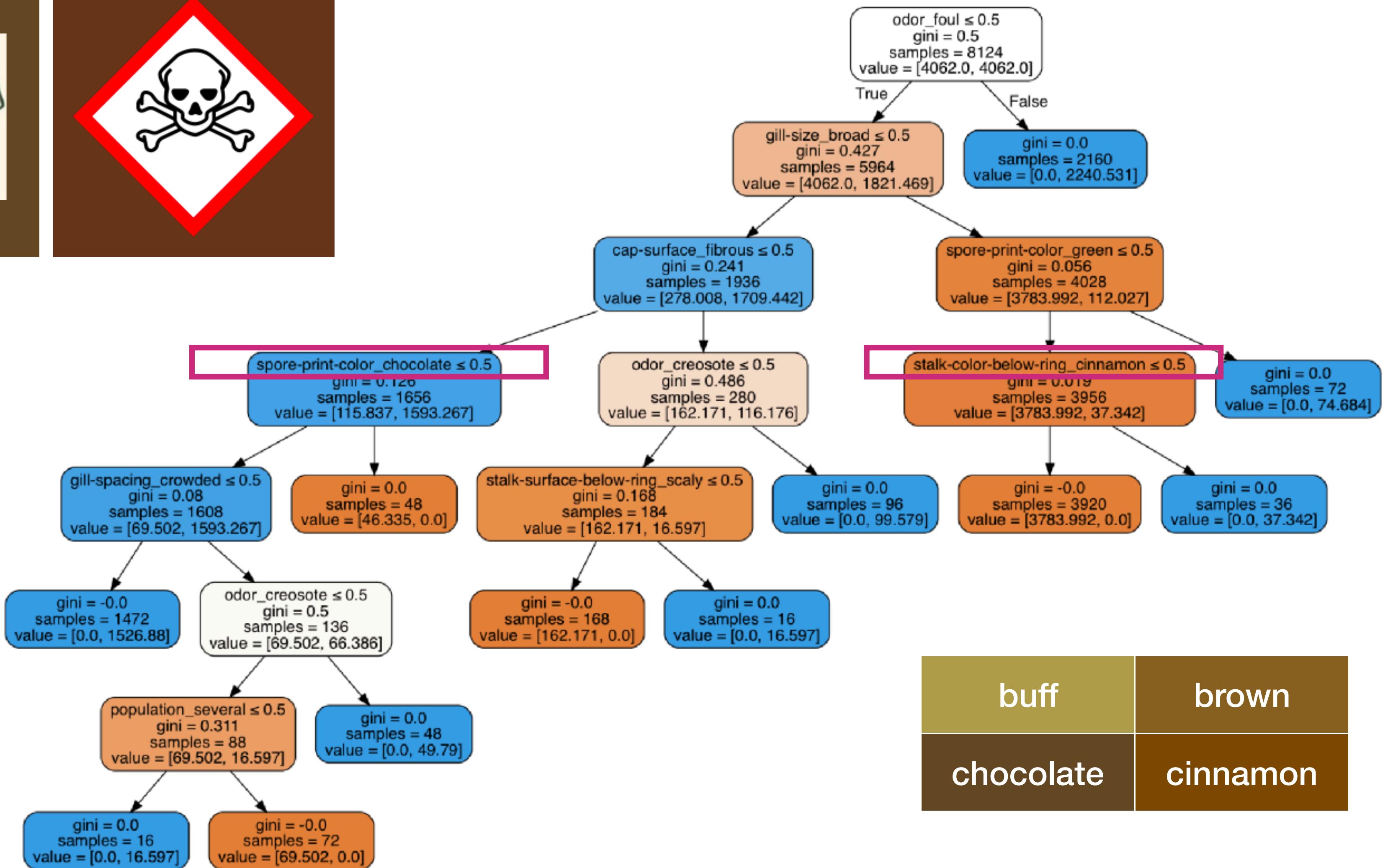
Why you should be concerned



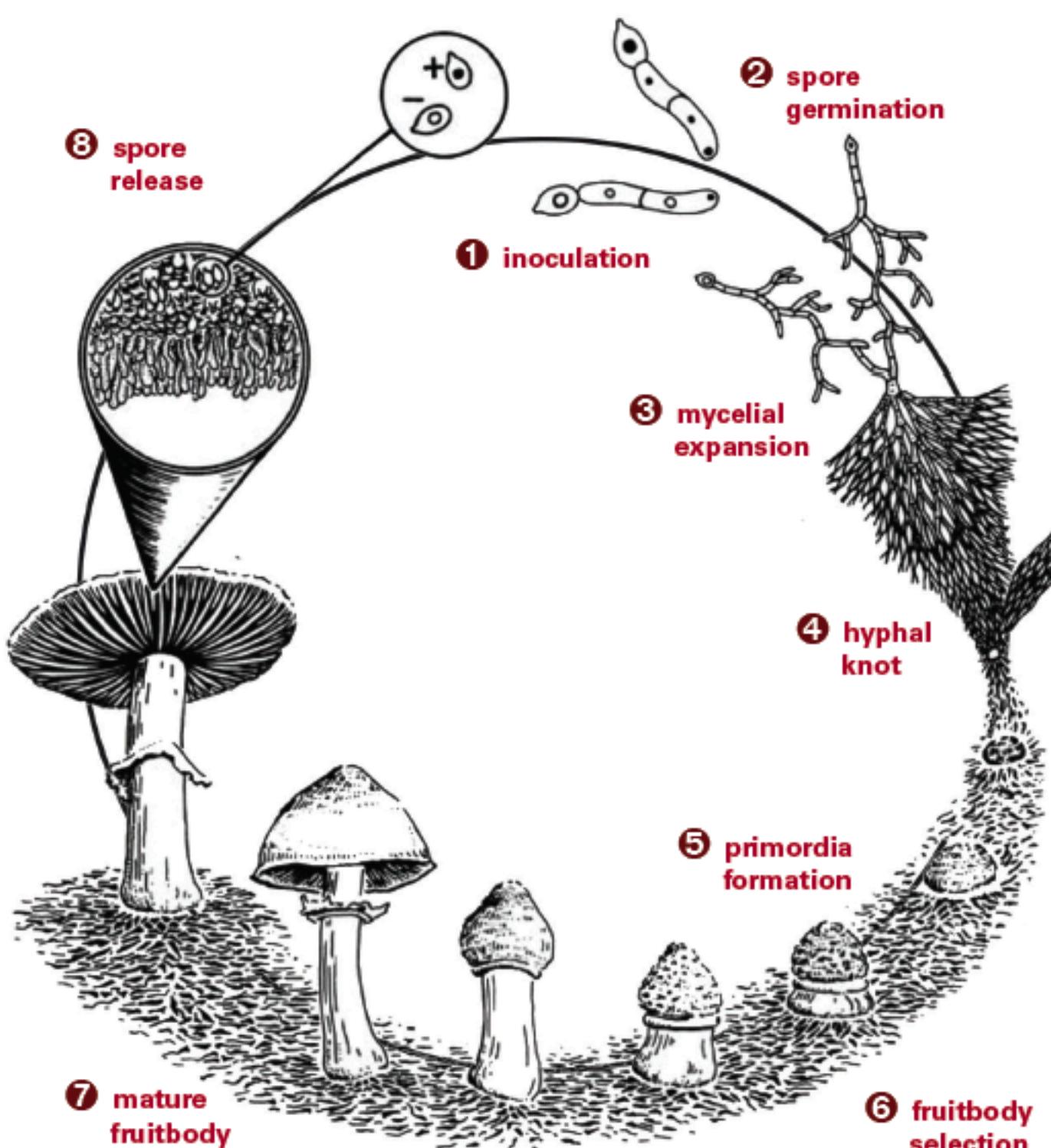
Why you should be concerned



Why you should be concerned



Why you should be concerned



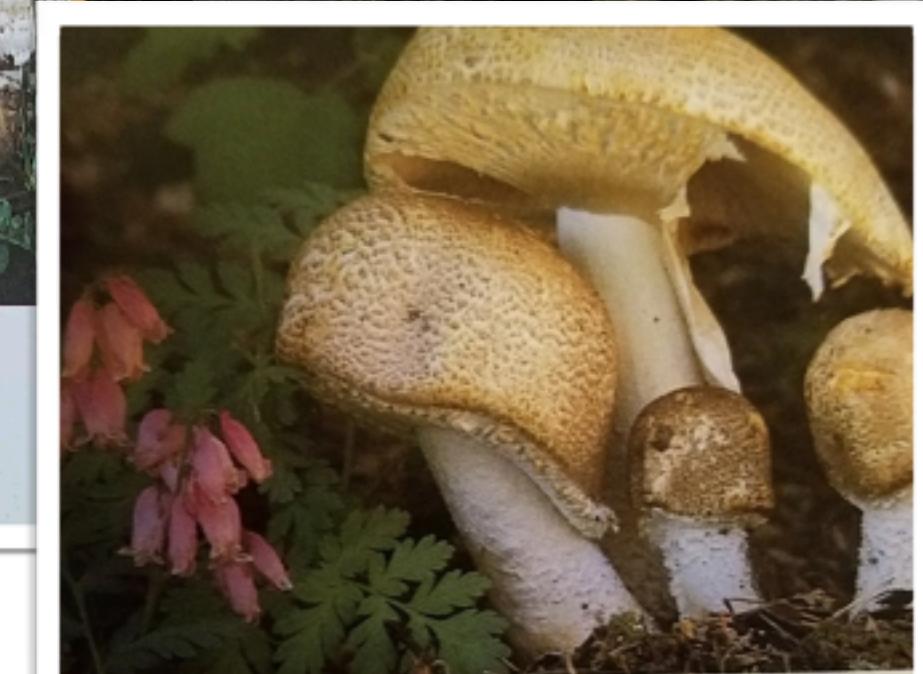
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Environmental/biological conditions

- Weather
- Ambient light
- Life cycle of mushrooms



Shaggy Parasol (*Lepiota rachodes*)
Other Names: Leppie, *Lepiota rhacodes*, *Macrolepiota rachodes*.



Prince (*Agaricus augustus*)

Characteristics:
• with brown to golden-brown fibers or scales, at least broad when mature.
• marshmallow-shaped when young (before ve
aks)
• when surface

Let's get practical.

Drop/Merge ambiguous features

- **Stalk surface:**

silky → smooth

- **Colors:**



→ brown

- **Population:**

abundant, clustered, numerous, scattered, several, solitary



Features: 117 → 61

Let's get practical.

Drop/Merge ambiguous features

- **Stalk surface:**

silky → smooth

- **Colors:**



→ brown

- **Population:**

abundant, clustered, numerous, scattered, several, solitary



Features: 117 → 61

Account for human errors

- **Goal:** capture uncertainty in feature values
- **Source:** survey data
- **Method:** adding noise to model data

Let's get practical.

Drop/Merge ambiguous features

- Stalk surface:

silky → smooth

- Colors:



→ brown

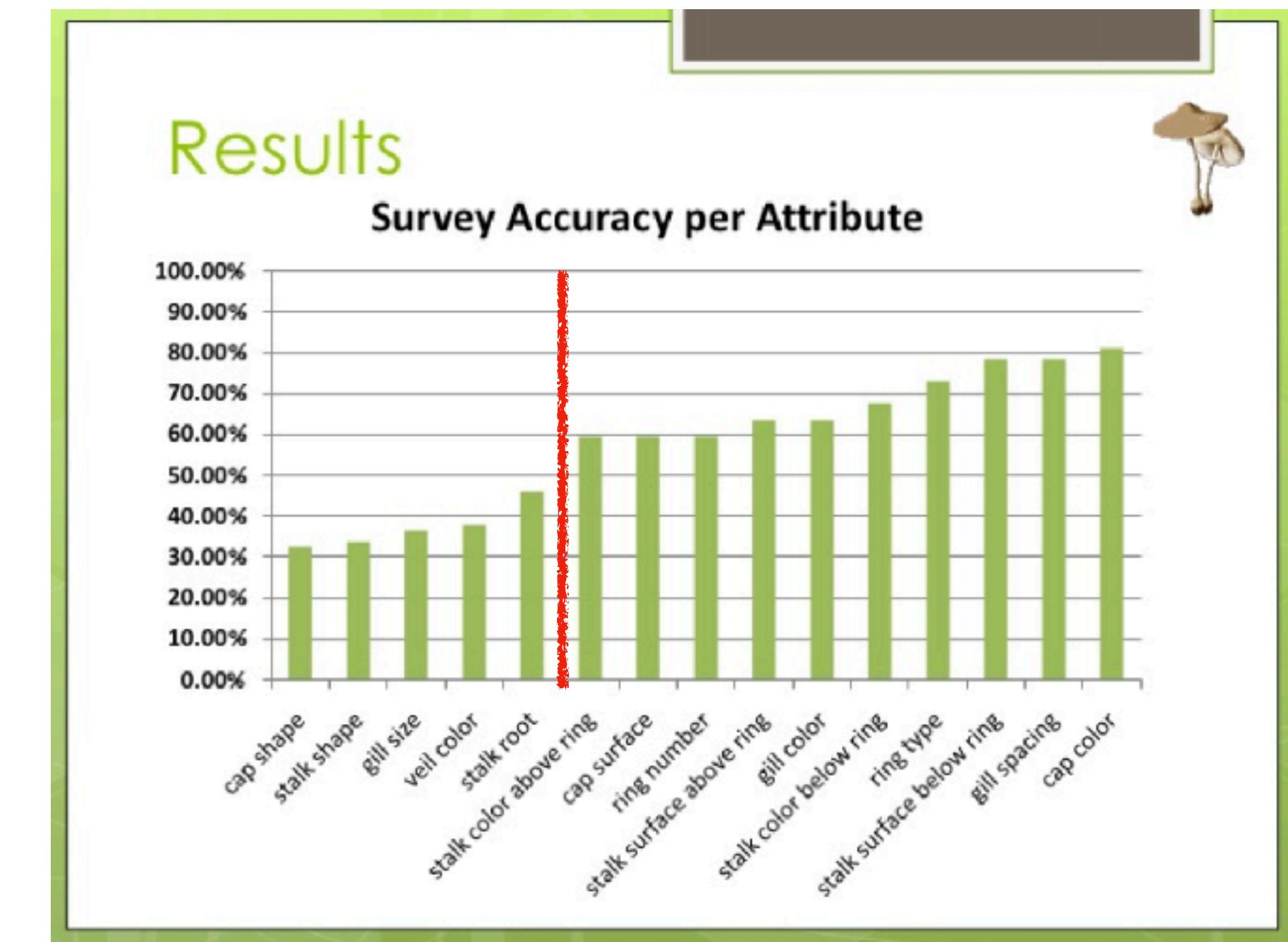
- Population:

abundant, clustered, numerous, scattered, several, solitary



Features: 117 → 61

<https://www.slideshare.net/timmenzies/project-3-mushrooms>



Account for human errors

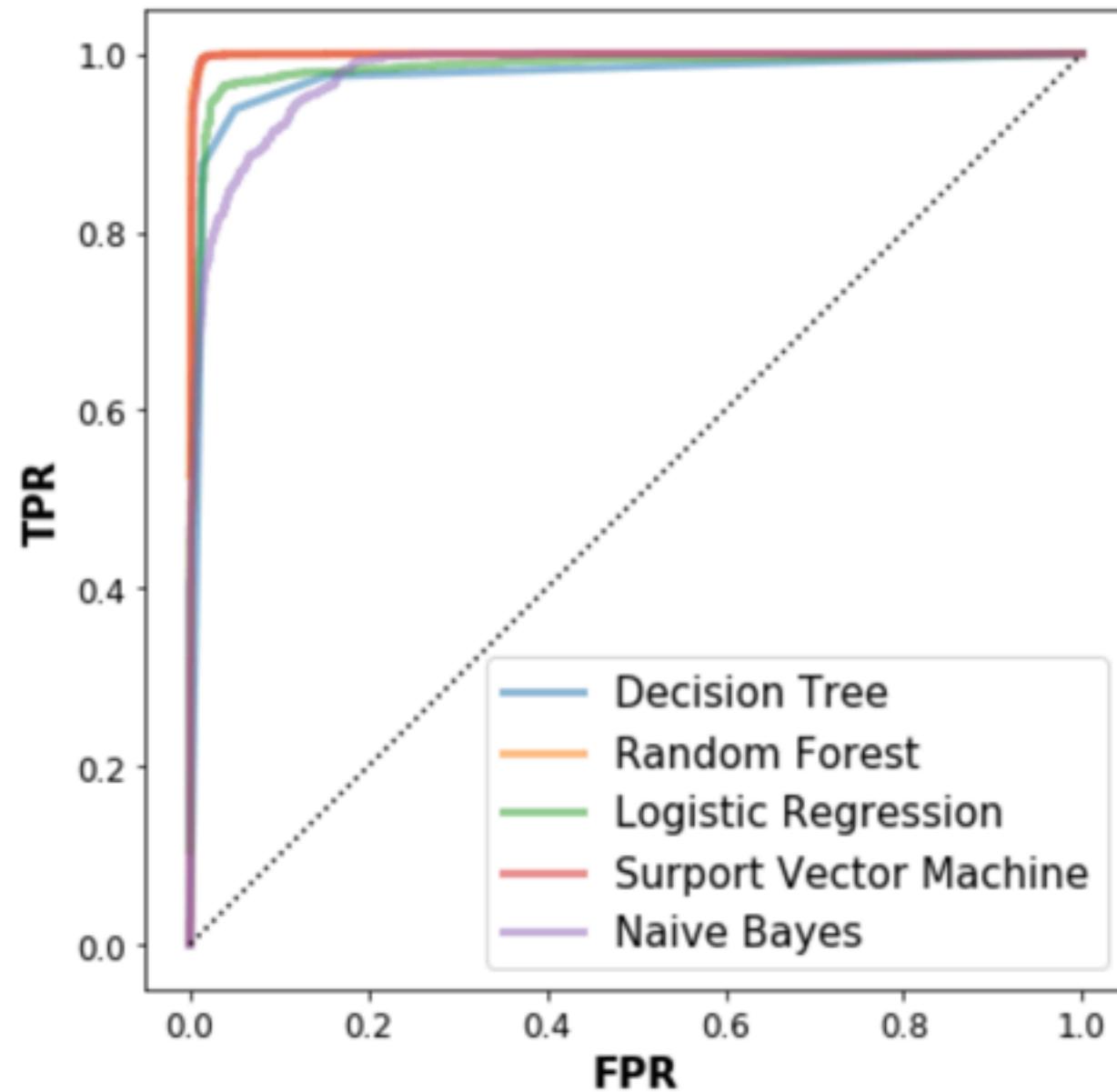
- Goal: capture uncertainty in feature values
- Source: survey data
- Method: adding noise to test data

0 <→ 1

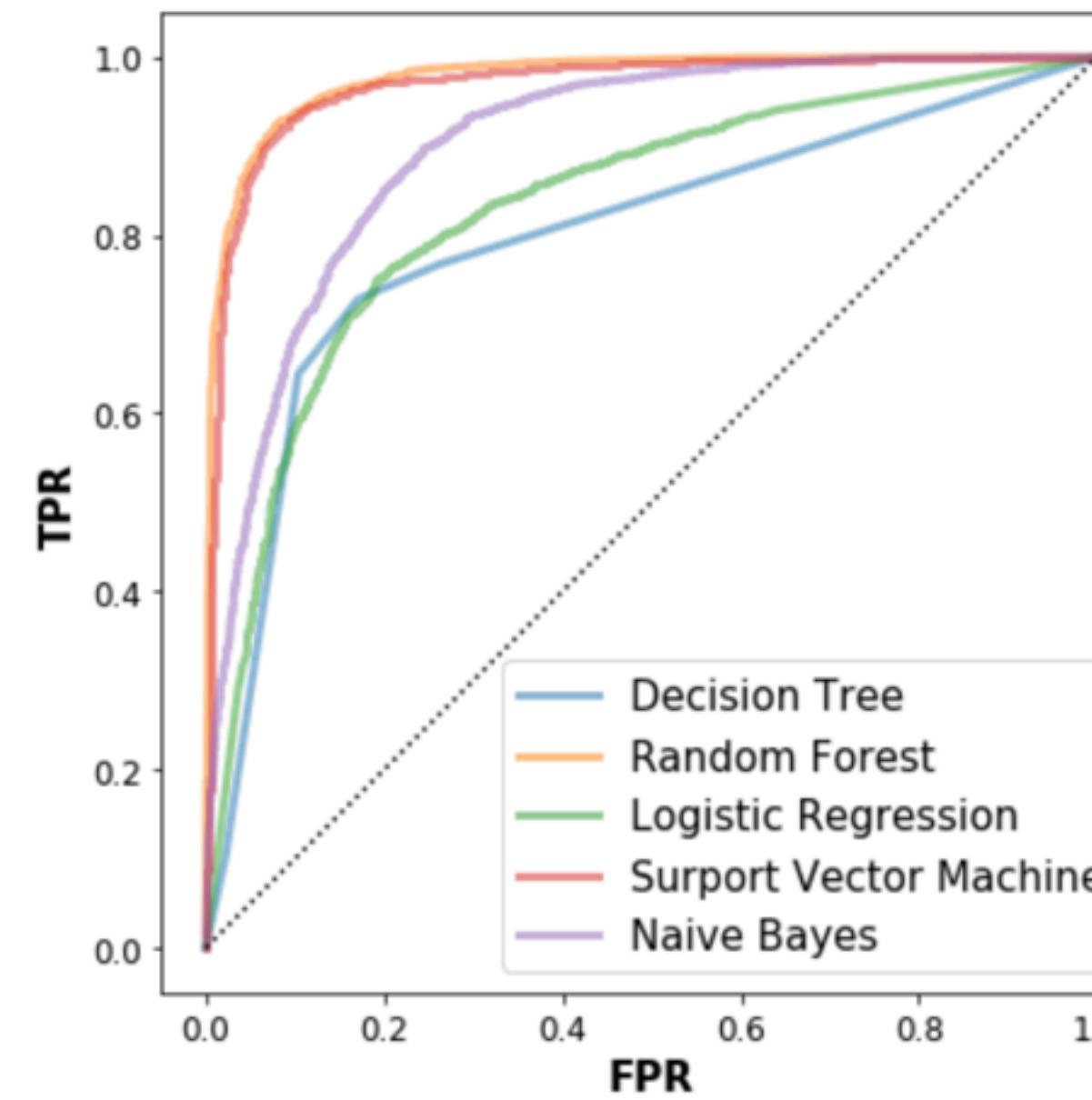
1%-20% chance of switching to opposite value

Classifier comparison

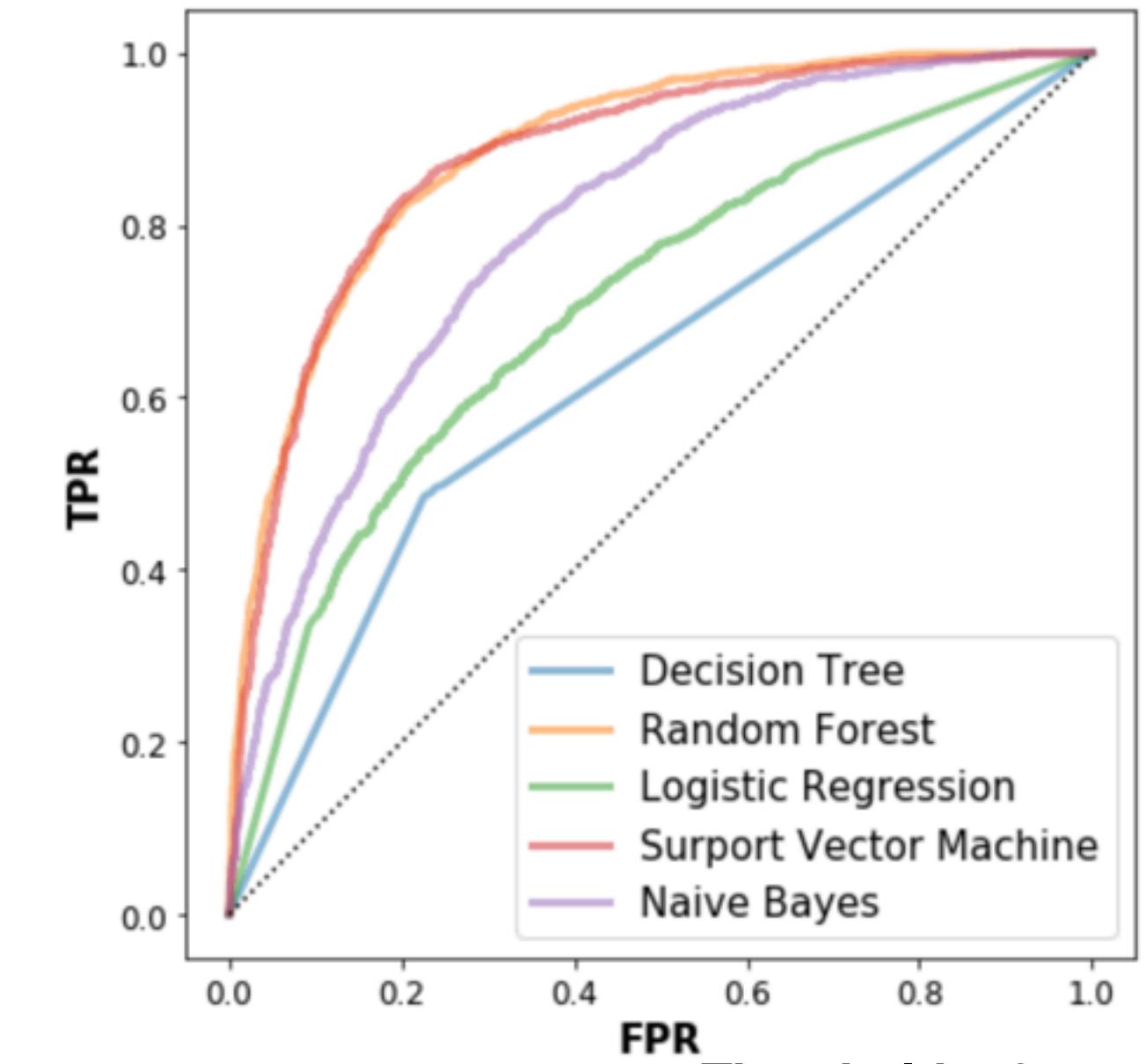
human error rate: 1%



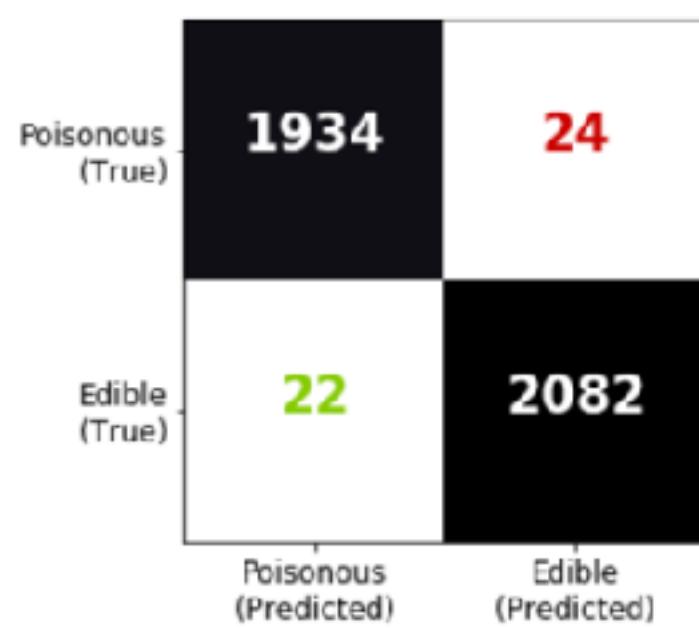
human error rate: 10%



human error rate: 20%

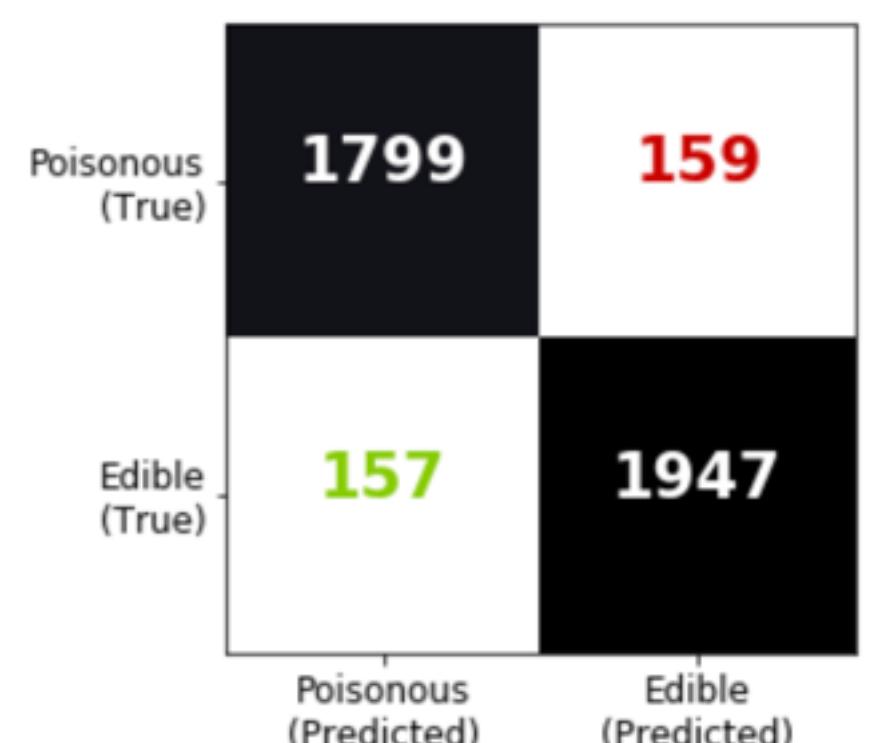


Threshold = 0.5



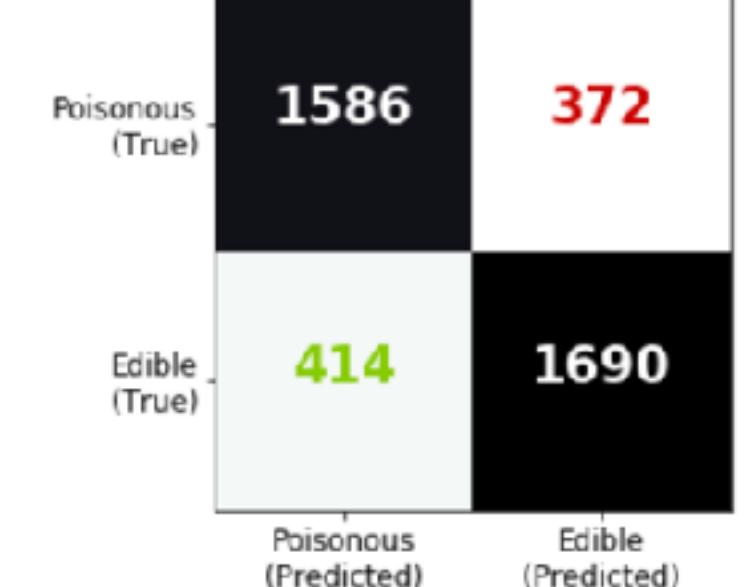
Decision Tree Logistic Regression Naive Bayes Random Forest Support Vector Machine

0.797884 0.832082 0.902550 0.975613 0.967399



Threshold = 0.5

Threshold = 0.5



Threshold = 0.2

New Mushroom App

Design Philosophy

- Decision tree/random forest for fun
- Low threshold for safety
- Provide risk level (low - high)

Visualization Tools

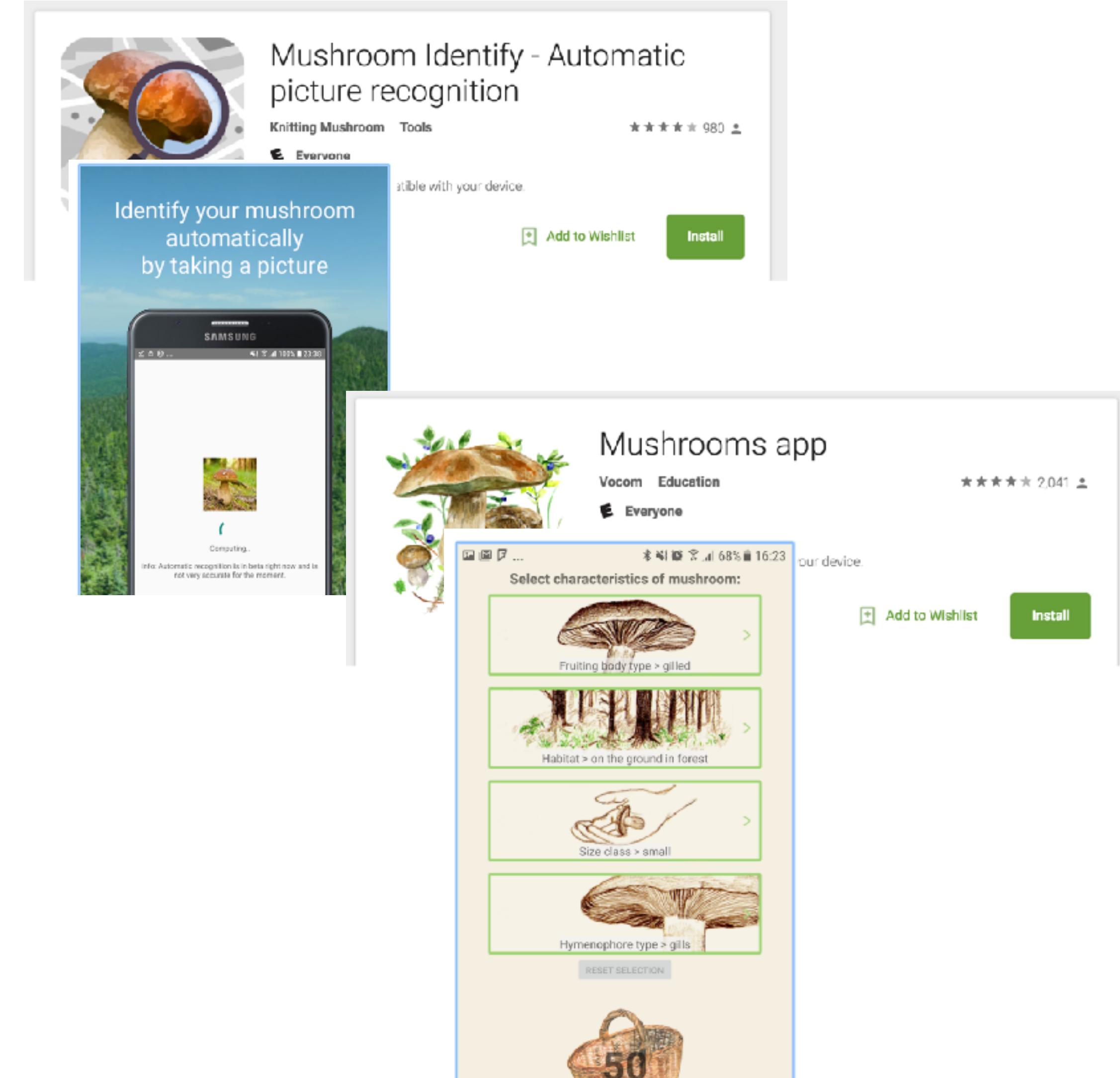
- D3.js
- Flask
- AWS

To make a full app:

- Combine GPS location and season info
- Validate with image recognition
- Include encyclopedia information on mushroom species
- Provide recommendations for further identification criteria
- User feedback

Prototype

Competitors:



Interested in mushrooms?



PUGET SOUND
MYCOLOGICAL SOCIETY

Search psms.org www.

Members' Page



HOME

ABOUT PSMS

History, Mission & Bylaws
Presidents
The Patrice Benson
Golden Mushroom Award

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Benefits of Joining
Join Online
Renew Online
Join/Renew by Mail
Members' Page

EVENTS

Wild Mushroom Show
Research Projects
Membership Meetings
Field Trips
Mushroom Maynia
Survivors' Banquet
Event Registration

EDUCATION

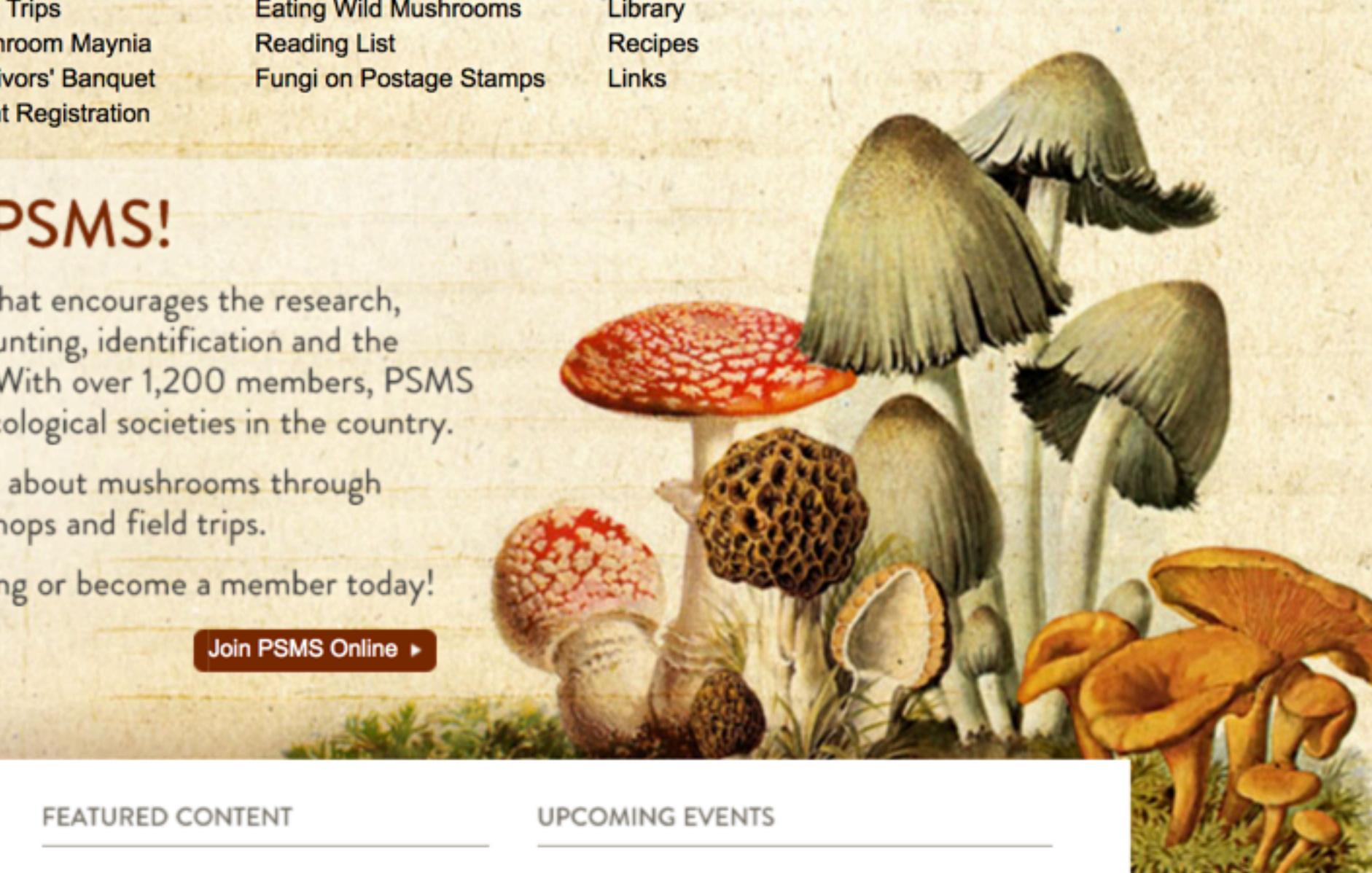
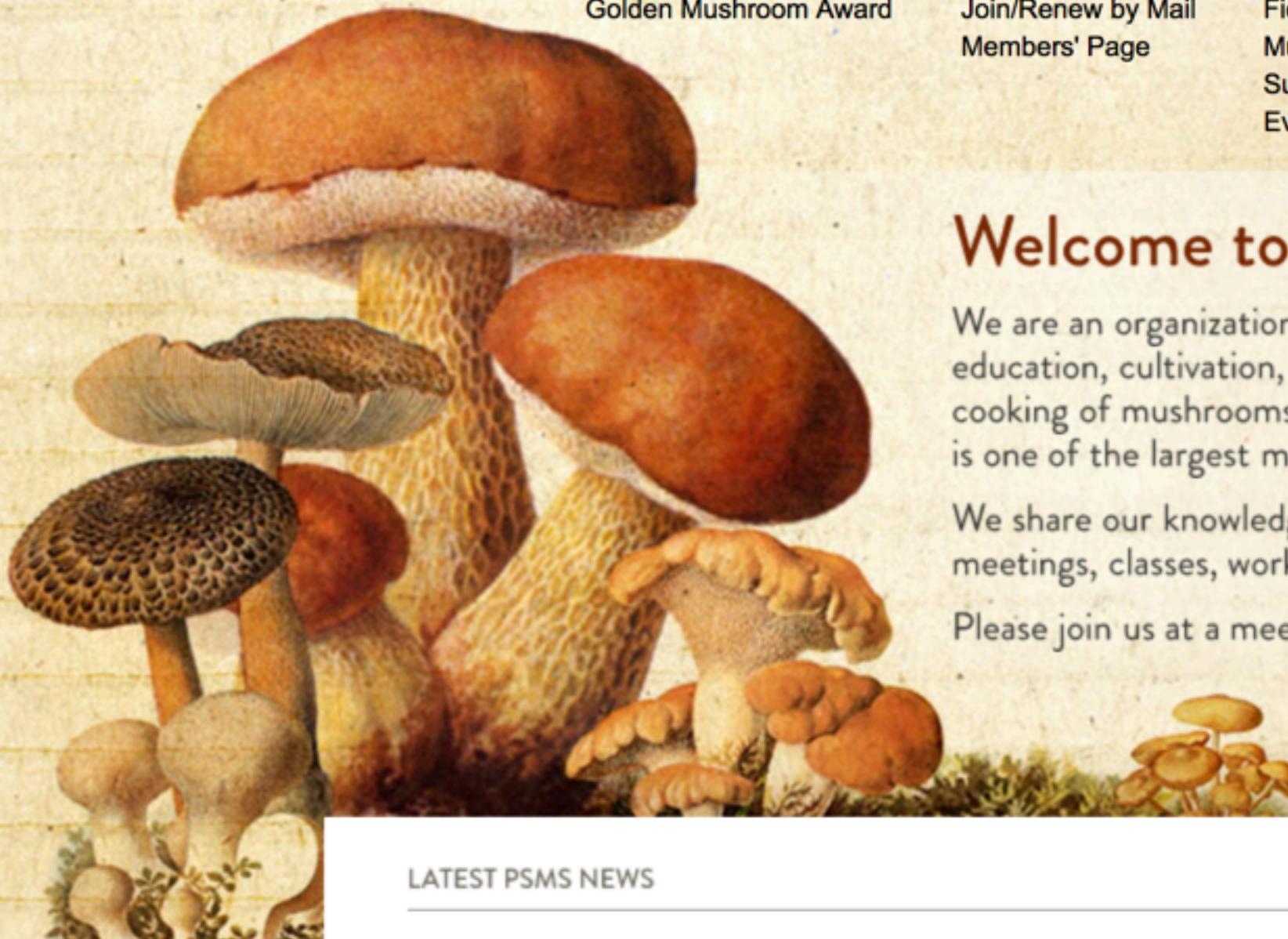
Poisoning
Classes & Workshops
ID Clinics
Eating Wild Mushrooms
Reading List
Fungi on Postage Stamps

RESOURCES

Spore Prints Newsletter
Foundation & Grants
Harvesting Rules
Library
Recipes
Links

CONTACT

Contact Info
Directions



LATEST PSMS NEWS

Fall "Hildegard Hendrickson ID Clinics" are done for the season.

Thank you to all who participated!

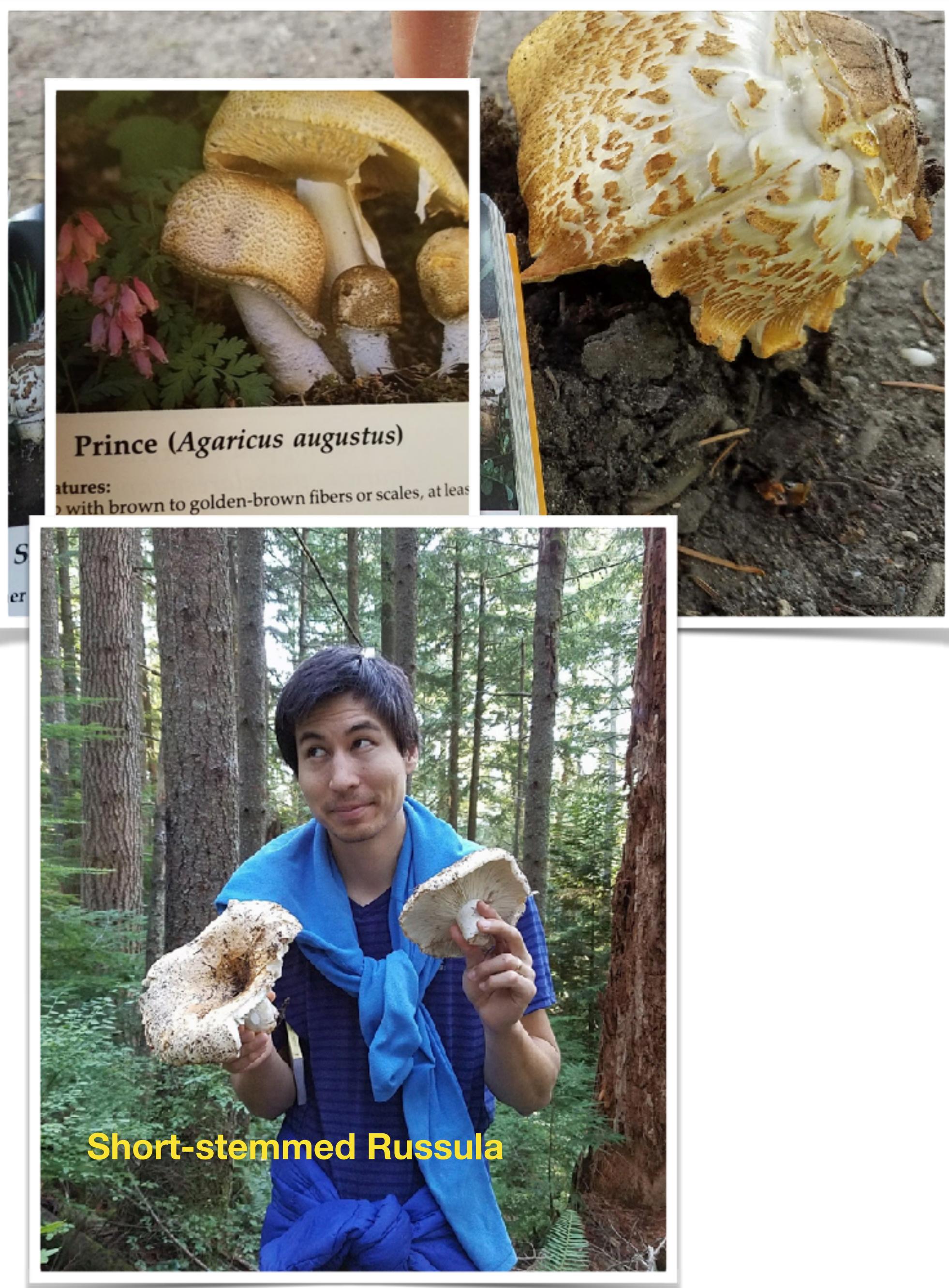
FEATURED CONTENT

If You Suspect
a Poisoning

UPCOMING EVENTS

Tuesday, February 13, 2018 -
7:30pm
PSMS Monthly Meeting

<http://www.psms.org/>



All Agaricus species start out with white or pink gills when they are young. They all turn brown when mature. That color is due to the color of the mature spores sitting on the gills.
(All Agaricus species have brown spores.)

None of the Agaricus species are deadly, though many will make you sick to your stomach. The general rules for Agaricus on the U.S. west coast are:

All "phenolic"-smelling (i.e., they smell like Chloraseptic, the throat spray) Agaricus will make you sick.

All yellow-staining Agaricus will make you sick, *unless* they smell like almonds, in which case they are delicious. (All the other yellow-staining Agaricus smell phenolic.)

All red-staining Agaricus are edible and delicious.

All other Agaricus need to be ID'ed using other criteria, but if they are not phenolic-smelling (which *really* becomes apparent if you make a mistake and start to cook even one "bad actor" in a pan of other mushrooms -- the smell is quite distinctive, and definitely off-putting...not something you'd want to eat.