STATISTICAL CONSULTING HW2

R26131086

Sheng-Yue Chang

2025-03-16

Table of contents

1. Data discription

Variable	Data Type	Definition	Note
family	character	Name of the family of mushroom species	Multinomial
name	character	Name of the mushroom species	Multinomial
class	binary	Edibility classification	p = poisonous, e = edible
cap-diameter	metrical	Cap diameter in cm	Min & Max values or Mean
cap-shape	nominal	Shape of the mushroom cap	b = bell, c = conical, x = convex, f = flat, s = sunken, p = spherical, o = others
cap-surface	nominal	Surface texture of the cap	i = fibrous, g = grooves, y = scaly, s = smooth, h = shiny, l = leathery, k = silky, t = sticky, w = wrinkled, e = fleshy
cap-color	nominal	Cap color	n = brown, b = buff, g = gray, r = green, p = pink, u = purple, e = red, w = white, y = yellow, l = blue, o = orange, k = black
does-bruise-bleed	nominal	Whether the mushroom bruises or bleeds	t = true, f = false

Variable	Data Type	Definition	Note
gill-attachment	nominal	How the gills attach to the stem	a = adnate, x = adnexed, d = decurrent, e = free, s = sinuate, p = pores, f = none, ? = unknown
gill-spacing	nominal	Distance between gills	c = close, d = distant, f = none
gill-color	nominal	Color of the gills	Same as cap-color + f = none
stem-height	metrical	Height of the mushroom stem in cm	Min & Max values or Mean
stem-width	metrical	Width of the mushroom stem in mm	Min & Max values or Mean
stem-root	nominal	Type of root structure	b = bulbous, s = swollen, c = club, u = cup, e = equal, z = rhizomorphs, r = rooted
stem-surface	nominal	Surface texture of the stem	Same as cap-surface + f = none
stem-color	nominal	Color of the stem	Same as cap-color + f = none
veil-type	nominal	Type of veil	p = partial, u = universal
veil-color	nominal	Color of the veil	Same as cap-color + f = none
has-ring	nominal	Whether the mushroom has a ring	t = true, f = none
ring-type	nominal	Type of ring	c = cobwebby, e = evanescent, r = flaring, g = grooved, l = large, p = pendant, s = sheathing, z = zone, y = scaly, m = movable, f = none, ? = unknown
spore-print-color	nominal	Color of the spore print	Same as cap-color
habitat	nominal	Where the mushroom is found	g = grasses, l = leaves, m = meadows, p = paths, h = heaths, u = urban, w = waste, d = woods
season	nominal	Season when the mushroom grows	s = spring, u = summer, a = autumn, w = winter

2. Data checking and fixing

```
mushdata <- read.csv("C:/Users/r2613/Rstudio/StatCons_hw/HW2/mushroom/primary_data.csv",
                     sep=";")

library(tidyr)
library(dplyr)

mushdata <- mushdata %>%
  mutate(
    cap.diameter_min = as.numeric(gsub("\\[|,.*|\\]", "", cap.diameter)),
    cap.diameter_max = as.numeric(gsub("\\[|.* |\\]", "", cap.diameter)),
    stem.height_min  = as.numeric(gsub("\\[|,.*|\\]", "", stem.height)),
    stem.height_max  = as.numeric(gsub("\\[|.* |\\]", "", stem.height)),
    stem.width_min   = as.numeric(gsub("\\[|,.*|\\]", "", stem.width)),
    stem.width_max   = as.numeric(gsub("\\[|.* |\\]", "", stem.width))
  )

variab_to_clean <- names(mushdata)[sapply(mushdata, function(x) any(grepl("\\[|\\]", x)))]

variab_to_clean <- c(variab_to_clean, "family", "class")

mushdata[variab_to_clean] <- lapply(mushdata[variab_to_clean], function(x) {
  as.factor(gsub("\\[|\\]", "", as.character(x)))})

mushdata <- mushdata[, !(names(mushdata) %in%
                           c("cap.diameter", "stem.height", "stem.width",
                             "stem.height", "stem.width"))]
```

```
str(mushdata)
```

```
'data.frame':   173 obs. of  26 variables:
 $ family              : Factor w/ 23 levels "Amanita Family",..: 1 1 1 1 1 1 1 1 13 13 ...
 $ name                : chr  "Fly Agaric" "Panther Cap" "False Panther Cap" "The Blusher" ...
 $ class               : Factor w/ 2 levels "e","p": 2 2 2 1 2 1 2 1 1 1 ...
 $ cap.shape           : Factor w/ 27 levels "b","b, f","b, f, s",..: 23 18 23 23 23 22 1 8 17 22 ...
 $ Cap.surface         : Factor w/ 41 levels "","d","d, e, y, i",..: 12 11 1 1 16 1 34 19 40 10 ...
 $ cap.color           : Factor w/ 67 levels "b","b, p, e, y",..: 8 26 14 26 49 61 56 26 58 26 ...
 $ does.bruise.or.bleed: Factor w/ 2 levels "f","t": 1 1 1 2 1 1 1 1 1 2 ...
 $ gill.attachment     : Factor w/ 9 levels "","a","a, d",..: 5 5 5 1 1 5 5 5 1 5 ...
 $ gill.spacing        : Factor w/ 4 levels "","c","d","f": 1 1 1 1 2 1 2 1 1 1 ...
 $ gill.color          : Factor w/ 59 levels "b","b, p, w",..: 38 38 38 38 38 38 38 38 38 38 ...
 $ stem.root           : Factor w/ 6 levels "","b","c","f",..: 6 1 1 2 1 2 1 1 6 1 ...
 $ stem.surface        : Factor w/ 15 levels "","f","g","h",..: 14 14 1 1 1 1 14 11 1 1 ...
 $ stem.color          : Factor w/ 41 levels "b, u","e","e, n",..: 32 32 32 32 32 37 32 34 16 32 ...
 $ veil.type           : Factor w/ 2 levels "","u": 2 2 2 2 2 2 2 2 1 1 ...
 $ veil.color          : Factor w/ 8 levels "","e, n","k",..: 6 6 6 6 6 8 6 6 1 1 ...
 $ has.ring            : Factor w/ 2 levels "f","t": 2 2 2 2 2 2 2 1 2 2 ...
 $ ring.type           : Factor w/ 14 levels "","e","e, g",..: 6 12 3 5 6 5 8 4 11 1 ...
 $ Spore.print.color   : Factor w/ 9 levels "","g","k","k, r",..: 1 1 1 1 1 1 1 1 1 1 ...
 $ habitat             : Factor w/ 21 levels "d","d, h","g",..: 1 1 1 1 1 1 1 1 18 4 ...
 $ season              : Factor w/ 10 levels "a","a, w","s",..: 10 9 9 9 9 9 9 9 9 9 ...
```

```
 $ cap.diameter_min    : num  10 5 10 5 5 4 5 4 10 12 ...
 $ cap.diameter_max    : num  20 10 15 15 12 9 10 8 25 18 ...
 $ stem.height_min     : num  15 6 10 7 10 5 10 10 15 8 ...
 $ stem.height_max     : num  20 10 12 15 12 7 15 15 35 12 ...
 $ stem.width_min      : num  15 10 10 10 10 10 10 10 15 15 ...
 $ stem.width_max      : num  20 20 20 25 20 15 15 15 25 20 ...
```

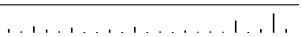
```
library(Hmisc)

latex(describe(mushdata),file="")
```

mushdata
26 Variables 173 Observations

---

family



```
   n   missing   distinct
 173         0         23

lowest : Amanita Family     Bolbitius Family   Bolete Family      Bracket Fungi      Chanterelle Family
highest: Russula Family     Saddle-Cup Family  Stropharia Family  Tricholoma Family  Wax Gill Family
```

---

name

```
   n   missing   distinct
 173         0       173

lowest : Amethyst Deceiver        Aniseed Funnel Cap       Apricot Fungus           Bare-toothed Russula     Bay Bolete
highest: Yellow-gilled Russula    Yellow-staining Mushroom Yellow-stemmed Bell Cap   Yellow Swamp Russula     Yellow Wax cap
```

---

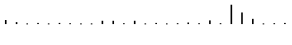
class

```
   n   missing   distinct
 173         0         2

Value          e     p
Frequency     77    96
Proportion 0.445 0.555
```

---

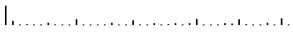
cap.shape



```
   n   missing   distinct
 173         0        27

lowest : b       b, f    b, f, s b, x    b, x, f, highest: x, f    x, f, s x, o    x, p    x, s
```

Cap.surface

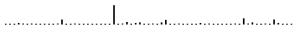


```
   n   missing   distinct
 173         0        41

lowest :           d          d, e, y, i d, k       d, k, s
highest: t, w, d   w          w, t       y          y, s
```

---

cap.color



```
   n   missing   distinct
 173         0        67

lowest : b            b, p, e, y    b, u          e            e, n
highest: y            y, n          y, o          y, o, g, n, r y, o, r, n
```

---

does.bruise.or.bleed

n	missing	distinct
173	0	2

Value	f	t
Frequency	143	30
Proportion	0.827	0.173

---

gill.attachment

n	missing	distinct
173	0	9

Value	a	a, d	d	e	f	p	s	x
Frequency	28	32	8	25	16	10	17	16	21
Proportion	0.162	0.185	0.046	0.145	0.092	0.058	0.098	0.092	0.121

---

gill.spacing

n	missing	distinct
173	0	4

Value	c	d	f
Frequency	71	70	22	10
Proportion	0.410	0.405	0.127	0.058

---

gill.color

n	missing	distinct
173	0	59

lowest : b b, p, w b, u e f , highest: y, n y, o, e y, r y, r, k y, w

---

stem.root

n	missing	distinct
173	0	6

Value	b	c	f	r	s
Frequency	146	9	2	3	4	9
Proportion	0.844	0.052	0.012	0.017	0.023	0.052

---

stem.surface

n	missing	distinct
173	0	15

Value	f	g	h	i	i, s	i, t	i, y	k	k, s	s	s, h	t	y
Frequency	108	3	5	1	11	1	1	1	4	1	15	1	7	13
Proportion	0.624	0.017	0.029	0.006	0.064	0.006	0.006	0.006	0.023	0.006	0.087	0.006	0.040	0.075

Value	y, s
Frequency	1
Proportion	0.006

---

stem.color

n	missing	distinct
173	0	41

lowest : b, u e e, n e, u, y e, y , highest: w, y y y, e, n y, n y, o, k

---

veil.type

n	missing	distinct
173	0	2

Value		u
Frequency	164	9
Proportion	0.948	0.052

---

veil.color

n	missing	distinct
173	0	8

Value		e, n	k	n	u	w	y	y, w
Frequency	152	1	1	1	1	15	1	1
Proportion	0.879	0.006	0.006	0.006	0.006	0.087	0.006	0.006

---

has.ring

n	missing	distinct
173	0	2

Value		f	t
Frequency	130	43	
Proportion	0.751	0.249	

---

ring.type

n	missing	distinct
173	0	14

Value		e	e, g	f	g	g, p	l	l, e	l, p	l, r	m	p	r	z
Frequency	7	6	1	137	2	2	2	1	1	2	1	2	3	6
Proportion	0.040	0.035	0.006	0.792	0.012	0.012	0.012	0.006	0.006	0.012	0.006	0.012	0.017	0.035

Spore.print.color

n	missing	distinct
173	0	9

Value		g	k	k, r	k, u	n	p	p, w	w
Frequency	155	1	5	1	1	3	3	1	3
Proportion	0.896	0.006	0.029	0.006	0.006	0.017	0.017	0.006	0.017

---

habitat

n	missing	distinct
173	0	21

lowest : d d, h g g, d g, d, h, highest: m m, d m, h p, d w

---

season

n	missing	distinct
173	0	10

Value		a	a, w	s	s, a, w	s, u	s, u, a	s, u, a, w
Frequency		16	15	1	1	3	5	13
Proportion		0.092	0.087	0.006	0.006	0.017	0.029	0.075

Value		u	u, a	u, a, w
Frequency		1	106	12
Proportion		0.006	0.613	0.069

---

cap.diameter_min

n	missing	distinct	Info	Mean	pMedian	Gmd	.05	.10	.25	.50	.75	.90	.95
173	0	14	0.976	4.043	3.5	3.038	1	1	2	3	5	7	8

Value	0.4	0.5	0.7	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	10.0	12.0	50.0
Frequency	2	4	1	17	39	24	26	29	11	4	9	4	2	1
Proportion	0.012	0.023	0.006	0.098	0.225	0.139	0.150	0.168	0.064	0.023	0.052	0.023	0.012	0.006

For the frequency table, variable is rounded to the nearest 0

---

cap.diameter_max

n	missing	distinct	Info	Mean	pMedian	Gmd	.05	.10	.25	.50	.75	.90	.95
173	0	20	0.991	9.435	8.5	6.548	2	3	5	8	12	15	20

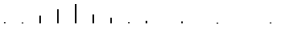
Value	1.0	1.3	1.5	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	12.0	14.0
Frequency	3	1	4	7	6	12	18	16	7	16	3	28	18	3
Proportion	0.017	0.006	0.023	0.040	0.035	0.069	0.104	0.092	0.040	0.092	0.017	0.162	0.104	0.017

Value	15.0	18.0	20.0	25.0	30.0	50.0
Frequency	15	3	5	5	2	1
Proportion	0.087	0.017	0.029	0.029	0.012	0.006

For the frequency table, variable is rounded to the nearest 0

---

stem.height_min



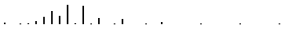
n	missing	distinct	Info	Mean	pMedian	Gmd	.05	.10	.25	.50	.75	.90	.95
173	0	12	0.957	4.306	4	2.233	2.0	2.0	3.0	4.0	5.0	6.8	8.0

Value	0	1	2	3	4	5	6	7	8	10	12	15
Frequency	3	2	21	38	52	24	15	3	7	5	1	2
Proportion	0.017	0.012	0.121	0.220	0.301	0.139	0.087	0.017	0.040	0.029	0.006	0.012

For the frequency table, variable is rounded to the nearest 0

---

stem.height_max



n	missing	distinct	Info	Mean	pMedian	Gmd	.05	.10	.25	.50	.75	.90	.95
173	0	19	0.977	8.873	8	4.37	4.0	5.0	6.0	8.0	10.0	14.8	15.0

Value	0	2	3	4	5	6	7	8	9	10	11	12	14	15
Frequency	3	1	2	6	14	25	16	37	2	35	1	12	1	10
Proportion	0.017	0.006	0.012	0.035	0.081	0.145	0.092	0.214	0.012	0.202	0.006	0.069	0.006	0.058

Value	18	20	25	30	35
Frequency	1	4	1	1	1
Proportion	0.006	0.023	0.006	0.006	0.006

For the frequency table, variable is rounded to the nearest 0

---

stem.width_min

n	missing	distinct	Info	Mean	pMedian	Gmd	.05	.10	.25	.50	.75	.90	.95
173	0	16	0.98	8.529	8	6.804	1	2	4	8	10	19	20

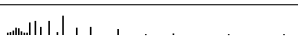
Value	0.0	0.5	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	10.0	12.0	15.0	20.0
Frequency	3	1	9	18	12	12	19	7	1	10	42	1	20	16
Proportion	0.017	0.006	0.052	0.104	0.069	0.069	0.110	0.040	0.006	0.058	0.243	0.006	0.116	0.092

Value	30.0	40.0
Frequency	1	1
Proportion	0.006	0.006

For the frequency table, variable is rounded to the nearest 0

---

stem.width_max



n	missing	distinct	Info	Mean	pMedian	Gmd	.05	.10	.25	.50	.75	.90	.95
173	0	21	0.992	15.79	14	13.49	2	3	8	12	20	30	40

lowest : 0 1 2 3 4, highest: 40 50 60 80 100

---

3. Table1

```
mushdata$name <- NULL

library(table1)

table1(~.|class, mushdata)
```

	e	p	Overall
	(N=77)	(N=96)	(N=173)
family			
Amanita Family	3 (3.9%)	5 (5.2%)	8 (4.6%)
Bolbitius Family	1 (1.3%)	2 (2.1%)	3 (1.7%)
Bolete Family	11 (14.3%)	3 (3.1%)	14 (8.1%)
Bracket Fungi	1 (1.3%)	6 (6.3%)	7 (4.0%)
Chanterelle Family	3 (3.9%)	0 (0%)	3 (1.7%)
Cortinarius Family	0 (0%)	11 (11.5%)	11 (6.4%)
Crepidotus Family	0 (0%)	1 (1.0%)	1 (0.6%)
Ear-Pick Family	0 (0%)	1 (1.0%)	1 (0.6%)
Entoloma Family	1 (1.3%)	6 (6.3%)	7 (4.0%)
Hydnum Family	1 (1.3%)	0 (0%)	1 (0.6%)
Ink Cap Family	6 (7.8%)	7 (7.3%)	13 (7.5%)
Jelly Discs Family	0 (0%)	1 (1.0%)	1 (0.6%)
Lepiota Family	2 (2.6%)	1 (1.0%)	3 (1.7%)
Morel Family	1 (1.3%)	0 (0%)	1 (0.6%)
Mushroom Family	4 (5.2%)	1 (1.0%)	5 (2.9%)
Oyster Mushroom Family	2 (2.6%)	0 (0%)	2 (1.2%)
Paxillus Family	0 (0%)	3 (3.1%)	3 (1.7%)
Pluteus Family	2 (2.6%)	0 (0%)	2 (1.2%)
Russula Family	11 (14.3%)	16 (16.7%)	27 (15.6%)
Saddle-Cup Family	0 (0%)	1 (1.0%)	1 (0.6%)
Stropharia Family	1 (1.3%)	7 (7.3%)	8 (4.6%)
Tricholoma Family	23 (29.9%)	20 (20.8%)	43 (24.9%)
Wax Gill Family	4 (5.2%)	4 (4.2%)	8 (4.6%)
cap.shape			
b	2 (2.6%)	8 (8.3%)	10 (5.8%)
b, f	2 (2.6%)	3 (3.1%)	5 (2.9%)
b, f, s	0 (0%)	1 (1.0%)	1 (0.6%)
b, x	0 (0%)	3 (3.1%)	3 (1.7%)
b, x, f	0 (0%)	1 (1.0%)	1 (0.6%)
c	1 (1.3%)	2 (2.1%)	3 (1.7%)
c, f	0 (0%)	2 (2.1%)	2 (1.2%)
c, x	1 (1.3%)	0 (0%)	1 (0.6%)
c, x, f	1 (1.3%)	0 (0%)	1 (0.6%)
f	4 (5.2%)	4 (4.2%)	8 (4.6%)
f, s	3 (3.9%)	5 (5.2%)	8 (4.6%)
f, x	1 (1.3%)	1 (1.0%)	2 (1.2%)
o	1 (1.3%)	7 (7.3%)	8 (4.6%)
p	0 (0%)	1 (1.0%)	1 (0.6%)
p, b	1 (1.3%)	2 (2.1%)	3 (1.7%)
p, c, o	1 (1.3%)	0 (0%)	1 (0.6%)

	e	p	Overall
p, f	2 (2.6%)	0 (0%)	2 (1.2%)
p, x	3 (3.9%)	1 (1.0%)	4 (2.3%)
p, x, f	2 (2.6%)	0 (0%)	2 (1.2%)
s	4 (5.2%)	5 (5.2%)	9 (5.2%)
s, o	2 (2.6%)	0 (0%)	2 (1.2%)
x	23 (29.9%)	25 (26.0%)	48 (27.7%)
x, f	14 (18.2%)	15 (15.6%)	29 (16.8%)
x, f, s	7 (9.1%)	6 (6.3%)	13 (7.5%)
x, o	0 (0%)	1 (1.0%)	1 (0.6%)
x, p	1 (1.3%)	1 (1.0%)	2 (1.2%)
x, s	1 (1.3%)	2 (2.1%)	3 (1.7%)
Cap.surface			
	19 (24.7%)	21 (21.9%)	40 (23.1%)
d	4 (5.2%)	5 (5.2%)	9 (5.2%)
d, e, y, i	0 (0%)	1 (1.0%)	1 (0.6%)
d, k	1 (1.3%)	1 (1.0%)	2 (1.2%)
d, k, s	0 (0%)	1 (1.0%)	1 (0.6%)
d, s	1 (1.3%)	0 (0%)	1 (0.6%)
e	3 (3.9%)	2 (2.1%)	5 (2.9%)
e, k, s, h	0 (0%)	1 (1.0%)	1 (0.6%)
e, t, k	0 (0%)	1 (1.0%)	1 (0.6%)
e, y	1 (1.3%)	0 (0%)	1 (0.6%)
g	5 (6.5%)	7 (7.3%)	12 (6.9%)
g, h	0 (0%)	1 (1.0%)	1 (0.6%)
g, s, d	0 (0%)	1 (1.0%)	1 (0.6%)
g, s, h, t	1 (1.3%)	0 (0%)	1 (0.6%)
g, s, t	1 (1.3%)	0 (0%)	1 (0.6%)
h	3 (3.9%)	2 (2.1%)	5 (2.9%)
h, s, d	1 (1.3%)	0 (0%)	1 (0.6%)
h, s, t	0 (0%)	1 (1.0%)	1 (0.6%)
h, t	6 (7.8%)	4 (4.2%)	10 (5.8%)
h, t, w	0 (0%)	1 (1.0%)	1 (0.6%)
h, t, y	0 (0%)	1 (1.0%)	1 (0.6%)
i	0 (0%)	4 (4.2%)	4 (2.3%)
i, e	0 (0%)	1 (1.0%)	1 (0.6%)
i, y	2 (2.6%)	0 (0%)	2 (1.2%)
k	0 (0%)	4 (4.2%)	4 (2.3%)
k, e	0 (0%)	1 (1.0%)	1 (0.6%)
l	2 (2.6%)	2 (2.1%)	4 (2.3%)
s	8 (10.4%)	5 (5.2%)	13 (7.5%)
s, d	1 (1.3%)	0 (0%)	1 (0.6%)
s, h	0 (0%)	1 (1.0%)	1 (0.6%)
s, i	0 (0%)	1 (1.0%)	1 (0.6%)
s, t	2 (2.6%)	2 (2.1%)	4 (2.3%)
s, y	1 (1.3%)	2 (2.1%)	3 (1.7%)
t	2 (2.6%)	10 (10.4%)	12 (6.9%)
t, h	1 (1.3%)	1 (1.0%)	2 (1.2%)
t, h, s	1 (1.3%)	0 (0%)	1 (0.6%)
t, w, d	0 (0%)	1 (1.0%)	1 (0.6%)
w	2 (2.6%)	3 (3.1%)	5 (2.9%)
w, t	1 (1.3%)	0 (0%)	1 (0.6%)
y	7 (9.1%)	7 (7.3%)	14 (8.1%)

	e	p	Overall
y, s	1 (1.3%)	0 (0%)	1 (0.6%)
cap.color			
b	1 (1.3%)	0 (0%)	1 (0.6%)
b, p, e, y	0 (0%)	1 (1.0%)	1 (0.6%)
b, u	1 (1.3%)	0 (0%)	1 (0.6%)
e	0 (0%)	3 (3.1%)	3 (1.7%)
e, n	0 (0%)	2 (2.1%)	2 (1.2%)
e, n, p, w	0 (0%)	1 (1.0%)	1 (0.6%)
e, n, y	2 (2.6%)	0 (0%)	2 (1.2%)
e, o	0 (0%)	1 (1.0%)	1 (0.6%)
e, o, k	0 (0%)	1 (1.0%)	1 (0.6%)
e, p, w	0 (0%)	1 (1.0%)	1 (0.6%)
e, u, y	0 (0%)	1 (1.0%)	1 (0.6%)
g	0 (0%)	1 (1.0%)	1 (0.6%)
g, k	1 (1.3%)	1 (1.0%)	2 (1.2%)
g, n	6 (7.8%)	4 (4.2%)	10 (5.8%)
g, n, k	0 (0%)	1 (1.0%)	1 (0.6%)
g, r, k, n	0 (0%)	1 (1.0%)	1 (0.6%)
g, r, n	0 (0%)	2 (2.1%)	2 (1.2%)
g, u, n	0 (0%)	1 (1.0%)	1 (0.6%)
g, u, n, p	1 (1.3%)	0 (0%)	1 (0.6%)
k, n, w	1 (1.3%)	0 (0%)	1 (0.6%)
l, g, b, w	1 (1.3%)	0 (0%)	1 (0.6%)
l, k	0 (0%)	1 (1.0%)	1 (0.6%)
l, r, w	1 (1.3%)	0 (0%)	1 (0.6%)
l, u, g, n	1 (1.3%)	0 (0%)	1 (0.6%)
l, y	1 (1.3%)	0 (0%)	1 (0.6%)
n	22 (28.6%)	16 (16.7%)	38 (22.0%)
n ,w	1 (1.3%)	0 (0%)	1 (0.6%)
n, b	1 (1.3%)	1 (1.0%)	2 (1.2%)
n, e	1 (1.3%)	4 (4.2%)	5 (2.9%)
n, e, y	0 (0%)	1 (1.0%)	1 (0.6%)
n, g	3 (3.9%)	0 (0%)	3 (1.7%)
n, o	2 (2.6%)	2 (2.1%)	4 (2.3%)
n, o, e	1 (1.3%)	0 (0%)	1 (0.6%)
n, o, y, w	0 (0%)	1 (1.0%)	1 (0.6%)
n, p, e	1 (1.3%)	1 (1.0%)	2 (1.2%)
n, r, u, y	1 (1.3%)	0 (0%)	1 (0.6%)
n, w	1 (1.3%)	3 (3.1%)	4 (2.3%)
n, y	3 (3.9%)	6 (6.3%)	9 (5.2%)
n, y, e	1 (1.3%)	0 (0%)	1 (0.6%)
n, y, w	1 (1.3%)	0 (0%)	1 (0.6%)
o	0 (0%)	2 (2.1%)	2 (1.2%)
o, b	1 (1.3%)	0 (0%)	1 (0.6%)
o, e, n, k	0 (0%)	1 (1.0%)	1 (0.6%)
o, n	1 (1.3%)	0 (0%)	1 (0.6%)
o, p, e	1 (1.3%)	0 (0%)	1 (0.6%)
o, y	0 (0%)	3 (3.1%)	3 (1.7%)
o, y, r	0 (0%)	1 (1.0%)	1 (0.6%)
p	0 (0%)	2 (2.1%)	2 (1.2%)
r	0 (0%)	1 (1.0%)	1 (0.6%)
r, l	0 (0%)	1 (1.0%)	1 (0.6%)

	e	p	Overall
r, n	0 (0%)	1 (1.0%)	1 (0.6%)
r, p, y	0 (0%)	1 (1.0%)	1 (0.6%)
r, y	0 (0%)	1 (1.0%)	1 (0.6%)
u	0 (0%)	2 (2.1%)	2 (1.2%)
u, k	1 (1.3%)	0 (0%)	1 (0.6%)
w	6 (7.8%)	6 (6.3%)	12 (6.9%)
w, g	1 (1.3%)	1 (1.0%)	2 (1.2%)
w, n	2 (2.6%)	2 (2.1%)	4 (2.3%)
w, p, o	1 (1.3%)	0 (0%)	1 (0.6%)
w, u	0 (0%)	1 (1.0%)	1 (0.6%)
w, y	1 (1.3%)	1 (1.0%)	2 (1.2%)
w, y, g, n	0 (0%)	1 (1.0%)	1 (0.6%)
y	6 (7.8%)	4 (4.2%)	10 (5.8%)
y, n	0 (0%)	3 (3.1%)	3 (1.7%)
y, o	0 (0%)	1 (1.0%)	1 (0.6%)
y, o, g, n, r	0 (0%)	1 (1.0%)	1 (0.6%)
y, o, r, n	0 (0%)	1 (1.0%)	1 (0.6%)
does.bruise.or.bleed			
f	63 (81.8%)	80 (83.3%)	143 (82.7%)
t	14 (18.2%)	16 (16.7%)	30 (17.3%)
gill.attachment			
	10 (13.0%)	18 (18.8%)	28 (16.2%)
a	11 (14.3%)	21 (21.9%)	32 (18.5%)
a, d	5 (6.5%)	3 (3.1%)	8 (4.6%)
d	9 (11.7%)	16 (16.7%)	25 (14.5%)
e	10 (13.0%)	6 (6.3%)	16 (9.2%)
f	4 (5.2%)	6 (6.3%)	10 (5.8%)
p	12 (15.6%)	5 (5.2%)	17 (9.8%)
s	7 (9.1%)	9 (9.4%)	16 (9.2%)
x	9 (11.7%)	12 (12.5%)	21 (12.1%)
gill.spacing			
	31 (40.3%)	40 (41.7%)	71 (41.0%)
c	29 (37.7%)	41 (42.7%)	70 (40.5%)
d	13 (16.9%)	9 (9.4%)	22 (12.7%)
f	4 (5.2%)	6 (6.3%)	10 (5.8%)
gill.color			
b	1 (1.3%)	0 (0%)	1 (0.6%)
b, p, w	0 (0%)	1 (1.0%)	1 (0.6%)
b, u	1 (1.3%)	0 (0%)	1 (0.6%)
e	0 (0%)	1 (1.0%)	1 (0.6%)
f	4 (5.2%)	6 (6.3%)	10 (5.8%)
g	3 (3.9%)	1 (1.0%)	4 (2.3%)
g, k	1 (1.3%)	1 (1.0%)	2 (1.2%)
g, n	1 (1.3%)	2 (2.1%)	3 (1.7%)
g, n, u	0 (0%)	1 (1.0%)	1 (0.6%)
g, p	1 (1.3%)	0 (0%)	1 (0.6%)
g, r, w	0 (0%)	1 (1.0%)	1 (0.6%)
g, u	0 (0%)	1 (1.0%)	1 (0.6%)
g, w	2 (2.6%)	0 (0%)	2 (1.2%)
g, w, y	1 (1.3%)	0 (0%)	1 (0.6%)
k, n	2 (2.6%)	4 (4.2%)	6 (3.5%)
k, p	0 (0%)	1 (1.0%)	1 (0.6%)

	e	p	Overall
k, p, w	1 (1.3%)	0 (0%)	1 (0.6%)
n	3 (3.9%)	8 (8.3%)	11 (6.4%)
n, e, y	0 (0%)	1 (1.0%)	1 (0.6%)
n, p	0 (0%)	2 (2.1%)	2 (1.2%)
n, r	0 (0%)	1 (1.0%)	1 (0.6%)
n, u	0 (0%)	1 (1.0%)	1 (0.6%)
n, w	0 (0%)	2 (2.1%)	2 (1.2%)
n, y	1 (1.3%)	1 (1.0%)	2 (1.2%)
o	2 (2.6%)	2 (2.1%)	4 (2.3%)
o, b	1 (1.3%)	0 (0%)	1 (0.6%)
o, e	1 (1.3%)	1 (1.0%)	2 (1.2%)
o, y	1 (1.3%)	4 (4.2%)	5 (2.9%)
p	3 (3.9%)	5 (5.2%)	8 (4.6%)
p, n	1 (1.3%)	0 (0%)	1 (0.6%)
p, n, k	1 (1.3%)	0 (0%)	1 (0.6%)
p, w	3 (3.9%)	2 (2.1%)	5 (2.9%)
p, y	0 (0%)	1 (1.0%)	1 (0.6%)
p, y, r	0 (0%)	1 (1.0%)	1 (0.6%)
r	1 (1.3%)	0 (0%)	1 (0.6%)
r, y	0 (0%)	1 (1.0%)	1 (0.6%)
u, w	1 (1.3%)	0 (0%)	1 (0.6%)
w	21 (27.3%)	15 (15.6%)	36 (20.8%)
w, b, n	0 (0%)	1 (1.0%)	1 (0.6%)
w, g	0 (0%)	1 (1.0%)	1 (0.6%)
w, g, k	0 (0%)	1 (1.0%)	1 (0.6%)
w, g, p, n	0 (0%)	1 (1.0%)	1 (0.6%)
w, g, u	0 (0%)	1 (1.0%)	1 (0.6%)
w, n	3 (3.9%)	2 (2.1%)	5 (2.9%)
w, p	1 (1.3%)	2 (2.1%)	3 (1.7%)
w, p, y	1 (1.3%)	0 (0%)	1 (0.6%)
w, r	0 (0%)	1 (1.0%)	1 (0.6%)
w, u, g, n	1 (1.3%)	0 (0%)	1 (0.6%)
w, y	3 (3.9%)	2 (2.1%)	5 (2.9%)
w, y, g, n	0 (0%)	1 (1.0%)	1 (0.6%)
y	6 (7.8%)	7 (7.3%)	13 (7.5%)
y, e, n	1 (1.3%)	0 (0%)	1 (0.6%)
y, g, k	0 (0%)	1 (1.0%)	1 (0.6%)
y, k	1 (1.3%)	0 (0%)	1 (0.6%)
y, n	1 (1.3%)	4 (4.2%)	5 (2.9%)
y, o, e	0 (0%)	1 (1.0%)	1 (0.6%)
y, r	1 (1.3%)	0 (0%)	1 (0.6%)
y, r, k	0 (0%)	1 (1.0%)	1 (0.6%)
y, w	0 (0%)	1 (1.0%)	1 (0.6%)
stem.root			
	67 (87.0%)	79 (82.3%)	146 (84.4%)
b	6 (7.8%)	3 (3.1%)	9 (5.2%)
c	0 (0%)	2 (2.1%)	2 (1.2%)
f	0 (0%)	3 (3.1%)	3 (1.7%)
r	0 (0%)	4 (4.2%)	4 (2.3%)
s	4 (5.2%)	5 (5.2%)	9 (5.2%)
stem.surface			
	53 (68.8%)	55 (57.3%)	108 (62.4%)

	e	p	Overall
f	0 (0%)	3 (3.1%)	3 (1.7%)
g	0 (0%)	5 (5.2%)	5 (2.9%)
h	0 (0%)	1 (1.0%)	1 (0.6%)
i	4 (5.2%)	7 (7.3%)	11 (6.4%)
i, s	0 (0%)	1 (1.0%)	1 (0.6%)
i, t	1 (1.3%)	0 (0%)	1 (0.6%)
i, y	0 (0%)	1 (1.0%)	1 (0.6%)
k	1 (1.3%)	3 (3.1%)	4 (2.3%)
k, s	1 (1.3%)	0 (0%)	1 (0.6%)
s	9 (11.7%)	6 (6.3%)	15 (8.7%)
s, h	0 (0%)	1 (1.0%)	1 (0.6%)
t	3 (3.9%)	4 (4.2%)	7 (4.0%)
y	4 (5.2%)	9 (9.4%)	13 (7.5%)
y, s	1 (1.3%)	0 (0%)	1 (0.6%)
stem.color			
b, u	1 (1.3%)	0 (0%)	1 (0.6%)
e	0 (0%)	1 (1.0%)	1 (0.6%)
e, n	1 (1.3%)	2 (2.1%)	3 (1.7%)
e, u, y	0 (0%)	1 (1.0%)	1 (0.6%)
e, y	1 (1.3%)	0 (0%)	1 (0.6%)
f	0 (0%)	3 (3.1%)	3 (1.7%)
g	2 (2.6%)	0 (0%)	2 (1.2%)
g, w	1 (1.3%)	0 (0%)	1 (0.6%)
g, n	1 (1.3%)	3 (3.1%)	4 (2.3%)
g, r, n	0 (0%)	2 (2.1%)	2 (1.2%)
g, u, n	0 (0%)	1 (1.0%)	1 (0.6%)
g, w	2 (2.6%)	0 (0%)	2 (1.2%)
k	0 (0%)	1 (1.0%)	1 (0.6%)
k, n	1 (1.3%)	1 (1.0%)	2 (1.2%)
l, r, w	1 (1.3%)	0 (0%)	1 (0.6%)
n	15 (19.5%)	20 (20.8%)	35 (20.2%)
n, e	0 (0%)	2 (2.1%)	2 (1.2%)
n, g	1 (1.3%)	1 (1.0%)	2 (1.2%)
n, o	1 (1.3%)	1 (1.0%)	2 (1.2%)
n, p	0 (0%)	1 (1.0%)	1 (0.6%)
n, p, w	1 (1.3%)	0 (0%)	1 (0.6%)
n, w	2 (2.6%)	1 (1.0%)	3 (1.7%)
n, y	1 (1.3%)	1 (1.0%)	2 (1.2%)
o	0 (0%)	1 (1.0%)	1 (0.6%)
o, e	1 (1.3%)	0 (0%)	1 (0.6%)
o, n	1 (1.3%)	0 (0%)	1 (0.6%)
o, y	1 (1.3%)	4 (4.2%)	5 (2.9%)
p	0 (0%)	2 (2.1%)	2 (1.2%)
r, y	0 (0%)	1 (1.0%)	1 (0.6%)
u	1 (1.3%)	1 (1.0%)	2 (1.2%)
u, e	0 (0%)	1 (1.0%)	1 (0.6%)
w	32 (41.6%)	25 (26.0%)	57 (32.9%)
w, l, n	0 (0%)	1 (1.0%)	1 (0.6%)
w, n	2 (2.6%)	1 (1.0%)	3 (1.7%)
w, o	1 (1.3%)	0 (0%)	1 (0.6%)
w, u	0 (0%)	1 (1.0%)	1 (0.6%)
w, y	1 (1.3%)	2 (2.1%)	3 (1.7%)

	e	p	Overall
y	5 (6.5%)	8 (8.3%)	13 (7.5%)
y, e, n	0 (0%)	1 (1.0%)	1 (0.6%)
y, n	0 (0%)	4 (4.2%)	4 (2.3%)
y, o, k	0 (0%)	1 (1.0%)	1 (0.6%)
veil.type			
	74 (96.1%)	90 (93.8%)	164 (94.8%)
u	3 (3.9%)	6 (6.3%)	9 (5.2%)
veil.color			
	68 (88.3%)	84 (87.5%)	152 (87.9%)
e, n	0 (0%)	1 (1.0%)	1 (0.6%)
k	0 (0%)	1 (1.0%)	1 (0.6%)
n	0 (0%)	1 (1.0%)	1 (0.6%)
u	0 (0%)	1 (1.0%)	1 (0.6%)
w	7 (9.1%)	8 (8.3%)	15 (8.7%)
y	1 (1.3%)	0 (0%)	1 (0.6%)
y, w	1 (1.3%)	0 (0%)	1 (0.6%)
has.ring			
f	60 (77.9%)	70 (72.9%)	130 (75.1%)
t	17 (22.1%)	26 (27.1%)	43 (24.9%)
ring.type			
	4 (5.2%)	3 (3.1%)	7 (4.0%)
e	3 (3.9%)	3 (3.1%)	6 (3.5%)
e, g	0 (0%)	1 (1.0%)	1 (0.6%)
f	61 (79.2%)	76 (79.2%)	137 (79.2%)
g	2 (2.6%)	0 (0%)	2 (1.2%)
g, p	0 (0%)	2 (2.1%)	2 (1.2%)
l	1 (1.3%)	1 (1.0%)	2 (1.2%)
l, e	0 (0%)	1 (1.0%)	1 (0.6%)
l, p	1 (1.3%)	0 (0%)	1 (0.6%)
l, r	2 (2.6%)	0 (0%)	2 (1.2%)
m	1 (1.3%)	0 (0%)	1 (0.6%)
p	1 (1.3%)	1 (1.0%)	2 (1.2%)
r	1 (1.3%)	2 (2.1%)	3 (1.7%)
z	0 (0%)	6 (6.3%)	6 (3.5%)
Spore.print.color			
	72 (93.5%)	83 (86.5%)	155 (89.6%)
g	1 (1.3%)	0 (0%)	1 (0.6%)
k	1 (1.3%)	4 (4.2%)	5 (2.9%)
k, r	0 (0%)	1 (1.0%)	1 (0.6%)
k, u	0 (0%)	1 (1.0%)	1 (0.6%)
n	0 (0%)	3 (3.1%)	3 (1.7%)
p	1 (1.3%)	2 (2.1%)	3 (1.7%)
p, w	0 (0%)	1 (1.0%)	1 (0.6%)
w	2 (2.6%)	1 (1.0%)	3 (1.7%)
habitat			
d	47 (61.0%)	57 (59.4%)	104 (60.1%)
d, h	1 (1.3%)	3 (3.1%)	4 (2.3%)
g	1 (1.3%)	10 (10.4%)	11 (6.4%)
g, d	6 (7.8%)	4 (4.2%)	10 (5.8%)
g, d, h	1 (1.3%)	0 (0%)	1 (0.6%)
g, h, d	1 (1.3%)	2 (2.1%)	3 (1.7%)
g, l, d	0 (0%)	1 (1.0%)	1 (0.6%)

	e	p	Overall
g, l, m, d	1 (1.3%)	0 (0%)	1 (0.6%)
g, m	3 (3.9%)	2 (2.1%)	5 (2.9%)
g, m, d	1 (1.3%)	4 (4.2%)	5 (2.9%)
g, u, d	1 (1.3%)	0 (0%)	1 (0.6%)
h, d	0 (0%)	2 (2.1%)	2 (1.2%)
l	1 (1.3%)	0 (0%)	1 (0.6%)
l, d	7 (9.1%)	6 (6.3%)	13 (7.5%)
l, d, h	1 (1.3%)	0 (0%)	1 (0.6%)
l, h	1 (1.3%)	0 (0%)	1 (0.6%)
m	1 (1.3%)	1 (1.0%)	2 (1.2%)
m, d	2 (2.6%)	1 (1.0%)	3 (1.7%)
m, h	0 (0%)	1 (1.0%)	1 (0.6%)
p, d	0 (0%)	2 (2.1%)	2 (1.2%)
w	1 (1.3%)	0 (0%)	1 (0.6%)
season			
a	5 (6.5%)	11 (11.5%)	16 (9.2%)
a, w	9 (11.7%)	6 (6.3%)	15 (8.7%)
s	1 (1.3%)	0 (0%)	1 (0.6%)
s, a, w	1 (1.3%)	0 (0%)	1 (0.6%)
s, u	2 (2.6%)	1 (1.0%)	3 (1.7%)
s, u, a	1 (1.3%)	4 (4.2%)	5 (2.9%)
s, u, a, w	7 (9.1%)	6 (6.3%)	13 (7.5%)
u	0 (0%)	1 (1.0%)	1 (0.6%)
u, a	43 (55.8%)	63 (65.6%)	106 (61.3%)
u, a, w	8 (10.4%)	4 (4.2%)	12 (6.9%)
cap.diameter_min			
Mean (SD)	4.75 (5.74)	3.47 (2.27)	4.04 (4.22)
Median [Min, Max]	4.00 [0.500, 50.0]	3.00 [0.400, 10.0]	3.00 [0.400, 50.0]
cap.diameter_max			
Mean (SD)	10.9 (7.29)	8.29 (5.58)	9.44 (6.50)
Median [Min, Max]	10.0 [1.50, 50.0]	7.00 [1.00, 30.0]	8.00 [1.00, 50.0]
stem.height_min			
Mean (SD)	4.52 (2.20)	4.14 (2.31)	4.31 (2.26)
Median [Min, Max]	4.00 [2.00, 15.0]	4.00 [0, 15.0]	4.00 [0, 15.0]
stem.height_max			
Mean (SD)	9.58 (5.03)	8.30 (4.03)	8.87 (4.53)
Median [Min, Max]	8.00 [3.00, 35.0]	8.00 [0, 20.0]	8.00 [0, 35.0]
stem.width_min			
Mean (SD)	10.1 (6.80)	7.26 (5.71)	8.53 (6.36)
Median [Min, Max]	10.0 [1.00, 40.0]	5.00 [0, 20.0]	8.00 [0, 40.0]
stem.width_max			
Mean (SD)	18.6 (15.7)	13.5 (11.8)	15.8 (13.9)
Median [Min, Max]	15.0 [1.00, 100]	10.0 [0, 60.0]	12.0 [0, 100]