

Candidate Elimination

2) Candidate elimination algorithm

```
import csv
dataset = list()
with open("tennis.csv", 'r') as f:
    data = csv.reader(f)
    for row in data:
        dataset.append(row)

print(dataset)
s = list()
GHyp = list()
g = dict()

for head in dataset[0][:-1]:
    s[head] = '?'
    s.append('0')

print("Specific Hypothesis", s)
print("General Hypothesis", g)
print("GHypothesis", GHyp)

for row in dataset[1:]:
    if row[-1] == 'Y':
        for i in range(0, len(row) - 1):
            if s[i] == row[i]:
                continue
            if s[i] == '0':
                s[i] = row[i]
            else:
                s[i] = '?'
            if len(GHyp) > 0:
                for dictionary in range(0, len(GHyp)):
                    if GHyp[dictionary][dataset[0][i]] != row[i]:
                        print("Extra hypothesis")
                        print(GHyp[dictionary])
                        del GHyp[dictionary]
            else:
                for i in range(0, len(row) - 1):
```

if $s[i] == '?'$ or $s[i] == row[i]$:

continue

temp = dict(g)

temp[dataset[0][i]] = s[i]

Ghyp.append(temp)

print(s)

print(g)

print(Ghyp)

Hypothesis = list()

Hypothesis.append(s[i])

for dictionary in Ghyp:

valid = True

position = -1

if (list(dictionary.values()) not in Hypotheses):

GHypothesis = list(dictionary.values())

print("GHypothesis", GHypothesis)

for value in GHypothesis:

position += 1

if value != '?':

break

for row in dataset:

if row[position] == GHypothesis[position]

and row[-1] == 'N':

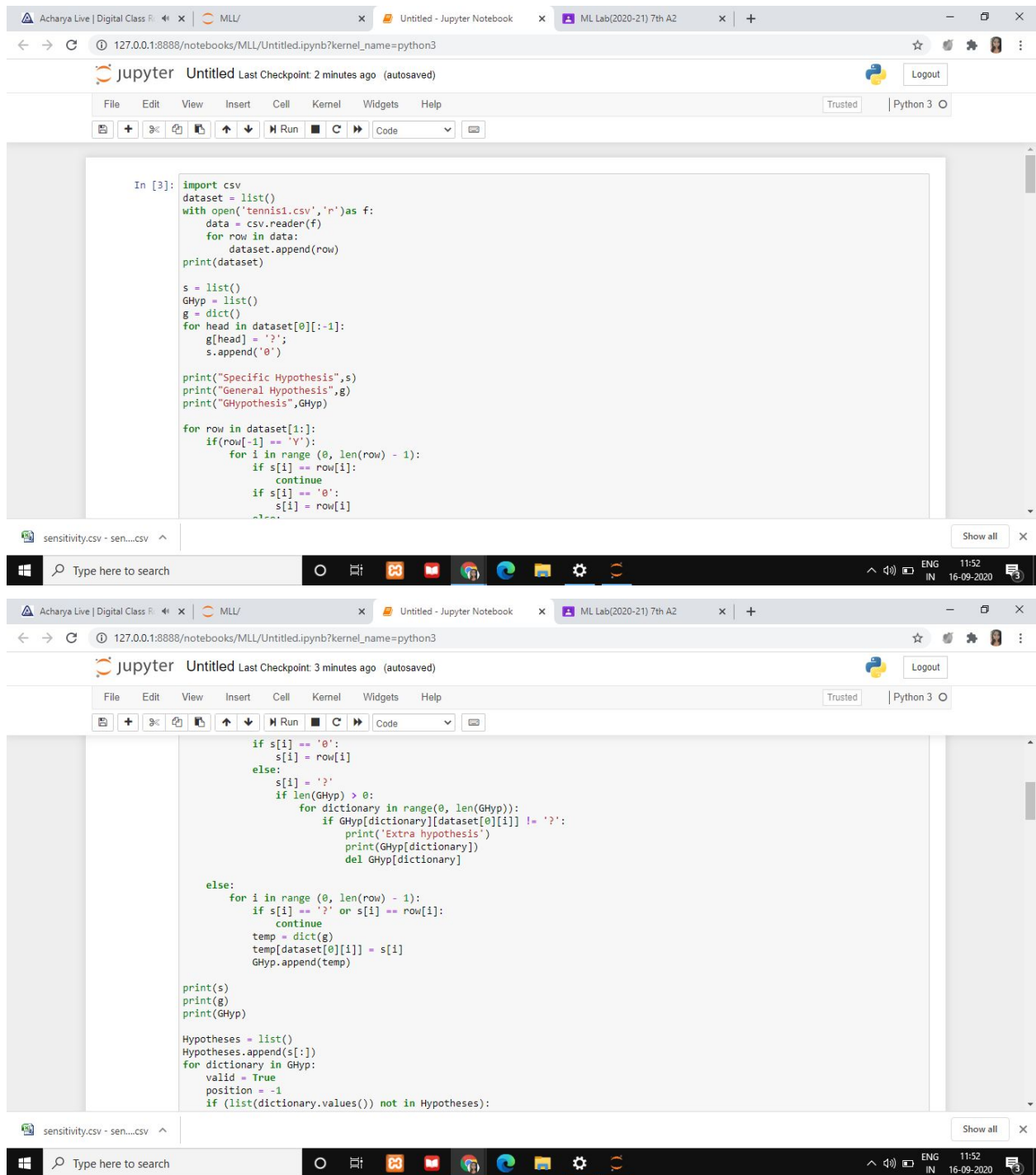
valid = False

if valid:

Hypotheses.append(GHypothesis[:])

print('Hypothesis in Version Space:', Hypotheses)

Output



The image displays two screenshots of a Jupyter Notebook interface, likely running on a remote server. The browser tabs at the top include 'Acharya Live | Digital Class R...', 'MLL/', 'Untitled - Jupyter Notebook', and 'ML Lab(2020-21) 7th A2'. The address bar shows the URL '127.0.0.1:8888/notebooks/MLL/Untitled.ipynb?kernel_name=python3'. The Jupyter interface includes a menu bar (File, Edit, View, Insert, Cell, Kernel, Widgets, Help), a toolbar with icons for file operations and execution, and a status bar indicating 'Trusted' and 'Python 3'. The notebook title is 'Untitled' with a 'Last Checkpoint: 2 minutes ago (autosaved)' timestamp. A 'Logout' button is visible in the top right.

The first screenshot shows the initial code cell (In [3]):

```
import csv
dataset = list()
with open('tennis1.csv','r') as f:
    data = csv.reader(f)
    for row in data:
        dataset.append(row)
print(dataset)

s = list()
GHyp = list()
g = dict()
for head in dataset[0][:-1]:
    g[head] = '?'
    s.append('0')

print("Specific Hypothesis",s)
print("General Hypothesis",g)
print("GHypothesis",GHyp)

for row in dataset[1:]:
    if row[-1] == 'V':
        for i in range(0, len(row) - 1):
            if s[i] == row[i]:
                continue
            if s[i] == '0':
                s[i] = row[i]
```

The second screenshot shows the continuation of the code cell:

```
if s[i] == '0':
    s[i] = row[i]
else:
    s[i] = '?'
    if len(GHyp) > 0:
        for dictionary in range(0, len(GHyp)):
            if GHyp[dictionary][dataset[0][i]] != '?':
                print('Extra hypothesis')
                print(GHyp[dictionary])
                del GHyp[dictionary]

    else:
        for i in range(0, len(row) - 1):
            if s[i] == '?' or s[i] == row[i]:
                continue
            temp = dict(g)
            temp[dataset[0][i]] = s[i]
            GHyp.append(temp)

print(s)
print(g)
print(GHyp)

Hypotheses = list()
Hypotheses.append(s[:])
for dictionary in GHyp:
    valid = True
    position = -1
    if (list(dictionary.values()) not in Hypotheses):
```

Both screenshots show a Windows taskbar at the bottom with the search bar 'Type here to search' and various application icons. The system clock indicates the time is 11:52 on 16-09-2020.

Acharya Live | Digital Class Room x MLL/ x Untitled - Jupyter Notebook x ML Lab(2020-21) 7th A2 x +

127.0.0.1:8888/notebooks/MLL/Untitled.ipynb?kernel_name=python3

jupyter Untitled Last Checkpoint: 3 minutes ago (autosaved) Logout

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

```
if (list(dictionary.values()) not in Hypotheses):
    GHypothesis = list(dictionary.values())
    print("GHypothesis", GHypothesis)
    for value in GHypothesis:
        position += 1
        if value != '?':
            break
    for row in dataset:
        if row[position] == GHypothesis[position] and row[-1] == 'N':
            valid = False
    if valid:
        Hypotheses.append(GHypothesis[:])

print('Hypothesis in Version Space: ', Hypotheses)

[['outlook', 'temp', 'humidity', 'wind', 'water', 'forecast', 'target'], ['Sunny', 'Warm', 'Normal', 'Strong', 'Warm', 'Same', 'Y'], ['Sunny', 'Warm', 'High', 'Strong', 'Warm', 'Same', 'Y'], ['Rainy', 'Cold', 'High', 'Strong', 'Warm', 'Change', 'N'], ['Sunny', 'Warm', 'High', 'Strong', 'Cool', 'Change', 'Y']]
Specific Hypothesis ['?', '?', '?', '?', '?', '?']
General Hypothesis {'outlook': '?', 'temp': '?', 'humidity': '?', 'wind': '?', 'water': '?', 'forecast': '?'}
GHypothesis []
Extra hypothesis
{'outlook': '?', 'temp': '?', 'humidity': '?', 'wind': '?', 'water': '?', 'forecast': 'Same'}
['Sunny', 'Warm', '?', 'Strong', '?', '?']
{'outlook': '?', 'temp': '?', 'humidity': '?', 'wind': '?', 'water': '?', 'forecast': '?'}
[{'outlook': 'Sunny', 'temp': '?', 'humidity': '?', 'wind': '?', 'water': '?', 'forecast': '?'}, {'outlook': '?', 'temp': 'Warm', 'humidity': '?', 'wind': '?', 'water': '?', 'forecast': '?'}]
GHypothesis ['Sunny', '?', '?', '?', '?', '?']
```

sensitivity.csv - sen....csv Show all X

Type here to search

Acharya Live | Digital Class Room x MLL/ x Untitled - Jupyter Notebook x ML Lab(2020-21) 7th A2 x +

127.0.0.1:8888/notebooks/MLL/Untitled.ipynb?kernel_name=python3

jupyter Untitled Last Checkpoint: 3 minutes ago (autosaved) Logout

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

```
position += 1
if value != '?':
    break
for row in dataset:
    if row[position] == GHypothesis[position] and row[-1] == 'N':
        valid = False
if valid:
    Hypotheses.append(GHypothesis[:])

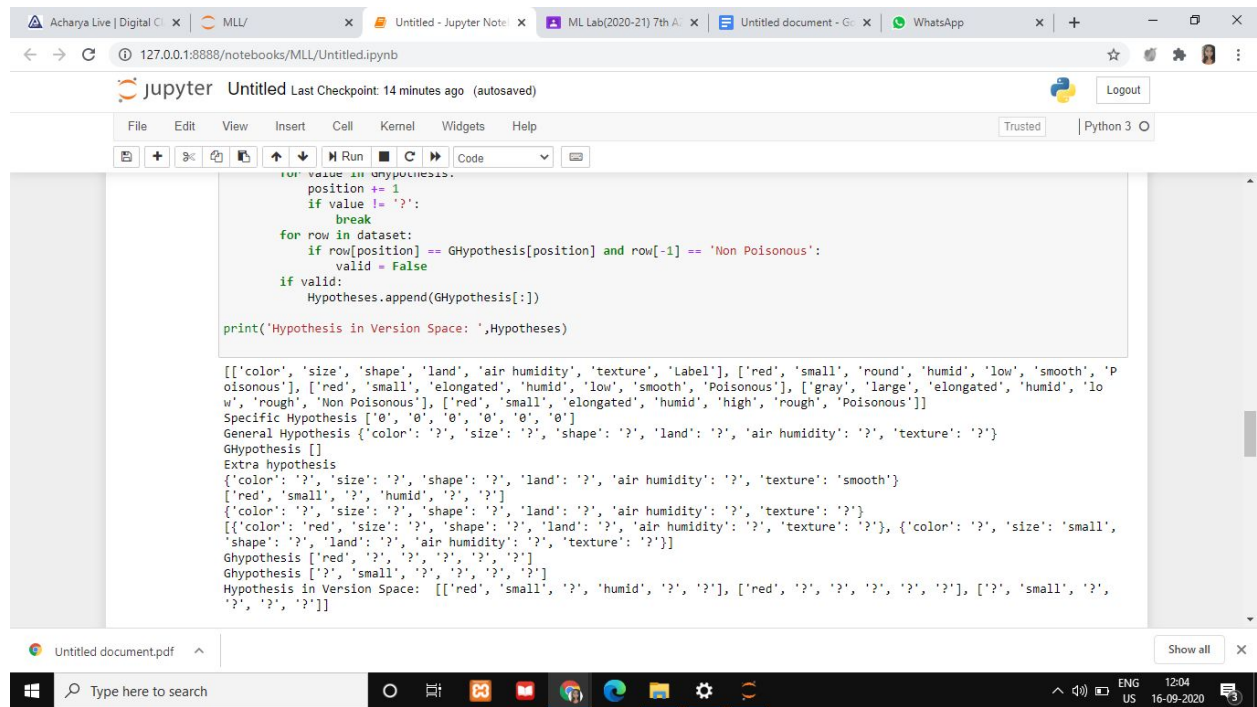
print('Hypothesis in Version Space: ', Hypotheses)

[['outlook', 'temp', 'humidity', 'wind', 'water', 'forecast', 'target'], ['Sunny', 'Warm', 'Normal', 'Strong', 'Warm', 'Same', 'Y'], ['Sunny', 'Warm', 'High', 'Strong', 'Warm', 'Same', 'Y'], ['Rainy', 'Cold', 'High', 'Strong', 'Warm', 'Change', 'N'], ['Sunny', 'Warm', 'High', 'Strong', 'Cool', 'Change', 'Y']]
Specific Hypothesis ['?', '?', '?', '?', '?', '?']
General Hypothesis {'outlook': '?', 'temp': '?', 'humidity': '?', 'wind': '?', 'water': '?', 'forecast': '?'}
GHypothesis []
Extra hypothesis
{'outlook': '?', 'temp': '?', 'humidity': '?', 'wind': '?', 'water': '?', 'forecast': 'Same'}
['Sunny', 'Warm', '?', 'Strong', '?', '?']
{'outlook': '?', 'temp': '?', 'humidity': '?', 'wind': '?', 'water': '?', 'forecast': '?'}
[{'outlook': 'Sunny', 'temp': '?', 'humidity': '?', 'wind': '?', 'water': '?', 'forecast': '?'}, {'outlook': '?', 'temp': 'Warm', 'humidity': '?', 'wind': '?', 'water': '?', 'forecast': '?'}]
GHypothesis ['Sunny', '?', '?', '?', '?', '?']
Hypothesis in Version Space: [['Sunny', 'Warm', '?', 'Strong', '?', '?'], ['Sunny', '?', '?', '?', '?', '?'], ['?', 'Warm', '?', '?', '?', '?']]
```

sensitivity.csv - sen....csv Show all X

Type here to search

Output for mushroom dataset



The screenshot displays a Jupyter Notebook environment with the following components:

- Browser Tabs:** Acharya Live | Digital C..., MLL/, Untitled - Jupyter Note..., ML Lab(2020-21) 7th AI..., Untitled document - G..., WhatsApp.
- Address Bar:** 127.0.0.1:8888/notebooks/MLL/Untitled.ipynb
- Jupyter Interface:**
 - Header: jupyter Untitled Last Checkpoint: 14 minutes ago (autosaved)
 - Menu: File, Edit, View, Insert, Cell, Kernel, Widgets, Help
 - Language: Python 3
 - Buttons: Run, Stop, Restart, Code
- Code Cell:**

```
for value in hypotheses:
    position += 1
    if value != '?':
        break
for row in dataset:
    if row[position] == GHypothesis[position] and row[-1] == 'Non Poisonous':
        valid = False
    if valid:
        Hypotheses.append(GHypothesis[:])

print('Hypothesis in Version Space: ',Hypotheses)
```
- Output:**

```
[[['color', 'size', 'shape', 'land', 'air humidity', 'texture', 'Label'], ['red', 'small', 'round', 'humid', 'low', 'smooth', 'Poisonous'], ['red', 'small', 'elongated', 'humid', 'low', 'smooth', 'Poisonous'], ['gray', 'large', 'elongated', 'humid', 'low', 'rough', 'Non Poisonous'], ['red', 'small', 'elongated', 'humid', 'high', 'rough', 'Poisonous']]
Specific Hypothesis ['?', '?', '?', '?', '?', '?', '?']
General Hypothesis {'color': '?', 'size': '?', 'shape': '?', 'land': '?', 'air humidity': '?', 'texture': '?'}
GHypothesis []
Extra hypothesis
{'color': '?', 'size': '?', 'shape': '?', 'land': '?', 'air humidity': '?', 'texture': 'smooth'}
['red', 'small', '?', 'humid', '?', '?']
{'color': '?', 'size': '?', 'shape': '?', 'land': '?', 'air humidity': '?', 'texture': '?'}
[{'color': 'red', 'size': '?', 'shape': '?', 'land': '?', 'air humidity': '?', 'texture': '?'}, {'color': '?', 'size': 'small', 'shape': '?', 'land': '?', 'air humidity': '?', 'texture': '?'}]
GHypothesis ['red', '?', '?', '?', '?', '?']
GHypothesis ['?', 'small', '?', '?', '?']
Hypothesis in Version Space: [['red', 'small', '?', 'humid', '?', '?'], ['red', '?', '?', '?', '?', '?'], ['?', 'small', '?', '?', '?', '?']]
```
- Taskbar:** Windows search bar, taskbar icons, system tray showing ENG US, 12:04, 16-09-2020.