Contents


```
close all;
clearvars;
clc;
```

Machine Learning Q1

```
for l=1:5
fprintf('Q%gV%g\n',1,l)
disp('Machine Learning Question-1')
idi=ceil(2*rand);
id=["Increase","Decrease","Increase","Decrease"];
di = ["Increase","Increase","Decrease","Decrease"];
fprintf('If we %s the k value in k nearest neighbour, the model will ____ the bias and ____ the variance .\n',id(idi))
ro = 4; %   Required options
ca = [];        %   Correct
ABC = Alpha_Gen(ro); %   Generates string of first n Alphabets
for i = 1:ro
    fprintf('%s. %s, %s\n',ABC(i),id(i),di(i))
end
if idi==2
    cai=2;
    expl=sprintf(['When K decreases to a low value, the model becomes complex. All test data point will belong to the different',...
    '\nclass: the minority class. This is over-fit, that is, low bias and high variance.\n']);
else
    cai=3;
    expl=sprintf(['When K increases to a large value, the model becomes simplest. All test data point will belong to the same',...
    '\nclass: the majority class. This is under-fit, that is, high bias and low variance.\n']);
end
fprintf('Answer: %s\n',ABC(cai))
disp('Solution-1')
disp(expl)
clearvars
end
```

```
Q1V1
Machine Learning Question-1
If we Decrease the k value in k nearest neighbour, the model will ____ the bias and ____ the variance .
A. Increase, Increase
B. Decrease, Increase
C. Increase, Decrease
D. Decrease, Decrease
Answer: B
Solution-1
When K decreases to a low value, the model becomes complex. All test data point will belong to the different
class: the minority class. This is over-fit, that is, low bias and high variance.

Q1V2
Machine Learning Question-1
If we Decrease the k value in k nearest neighbour, the model will ____ the bias and ____ the variance .
A. Increase, Increase
B. Decrease, Increase
C. Increase, Decrease
D. Decrease, Decrease
Answer: B
Solution-1
When K decreases to a low value, the model becomes complex. All test data point will belong to the different
class: the minority class. This is over-fit, that is, low bias and high variance.

Q1V3
Machine Learning Question-1
If we Increase the k value in k nearest neighbour, the model will ____ the bias and ____ the variance .
A. Increase, Increase
B. Decrease, Increase
C. Increase, Decrease
D. Decrease, Decrease
Answer: C
Solution-1
When K increases to a large value, the model becomes simplest. All test data point will belong to the same
class: the majority class. This is under-fit, that is, high bias and low variance.

Q1V4
Machine Learning Question-1
If we Increase the k value in k nearest neighbour, the model will ____ the bias and ____ the variance .
A. Increase, Increase
B. Decrease, Increase
C. Increase, Decrease
D. Decrease, Decrease
Answer: C
```

```
Solution-1
When K increases to a large value, the model becomes simplest. All test data point will belong to the same
class: the majority class. This is under-fit, that is, high bias and low variance.

Q1V5
Machine Learning Question-1
If we Increase the k value in k nearest neighbour, the model will ____ the bias and ____ the variance .
A. Increase, Increase
B. Decrease, Increase
C. Increase, Decrease
D. Decrease, Decrease
Answer: C
Solution-1
When K increases to a large value, the model becomes simplest. All test data point will belong to the same
class: the majority class. This is under-fit, that is, high bias and low variance.
```

Machine Learning Q2

```
for l=1:5
fprintf('Q%gV%g\n',2,l)
disp('Machine Learning Question-2')
idi=ceil(2*rand);
oui=ceil(2*rand);
id=["increased","decreased"];
ou=["over","under"];
fprintf('Which of the following hyper parameter(s), when %s may cause random forest to %s fit the data?\n',id(idi),ou(oui))
fprintf('1. Number of Trees\n2. Depth of Tree\n3. Learning Rate\n')
ro = 6; %   Required options
ca = [];        %   Correct
ABC = Alpha_Gen(ro); %   Generates string of first n Alphabets
for i = 1:3
    fprintf('%s. Only %g\n',ABC(i),i)
end
for i = 1:2
    fprintf('%s. %g and %g\n',ABC(i+3),i,i+1)
end
fprintf('%s. 1,2 and 3\n',ABC(end))
if (idi==1 && oui ==1)
    cai=2;
    expl=sprintf(['Increase in the depth of trees will cause over fitting while \nIncrease in the number of tree will cause under fitting and\nLearning rate is not
elseif (idi==2 && oui ==2)
    cai=2;
    expl=sprintf(['Decrease in the depth of trees will cause under fitting while\nDeccrease in the number of tree will cause over fitting and\nLearning rate is not
elseif (idi==1 && oui ==2)
    cai=1;
    expl=sprintf(['Increase in the number of tree will cause under fitting while\nIncrease in the depth of trees will cause over fitting and\nLearning rate is not a
elseif (idi==2 && oui ==1)
    cai=1;
    expl=sprintf(['Deccrease in the number of tree will cause over fitting while \nDecrease in the depth of trees will cause under fitting and\nLearning rate is not
end
fprintf('Answer: %s\n',ABC(cai))
disp('Solution-2')
disp(expl)
clearvars
end
```

```
Q2V1
Machine Learning Question-2
Which of the following hyper parameter(s), when increased may cause random forest to over fit the data?
1. Number of Trees
2. Depth of Tree
3. Learning Rate
A. Only 1
B. Only 2
C. Only 3
D. 1 and 2
E. 2 and 3
F. 1,2 and 3
Answer: B
Solution-2
Increase in the depth of trees will cause over fitting while
Increase in the number of tree will cause under fitting and
Learning rate is not an hyperparameter in random forest.
Q2V2
Machine Learning Question-2
Which of the following hyper parameter(s), when decreased may cause random forest to under fit the data?
1. Number of Trees
2. Depth of Tree
3. Learning Rate
A. Only 1
B. Only 2
C. Only 3
D. 1 and 2
E. 2 and 3
F. 1,2 and 3
Answer: B
Solution-2
```

```
Decrease in the depth of trees will cause under fitting while
Deccrease in the number of tree will cause over fitting and
Learning rate is not an hyperparameter in random forest.
Q2V3
Machine Learning Question-2
Which of the following hyper parameter(s), when decreased may cause random forest to under fit the data?
1. Number of Trees
2. Depth of Tree
3. Learning Rate
A. Only 1
B. Only 2
C. Only 3
D. 1 and 2
E. 2 and 3
F. 1,2 and 3
Answer: B
Solution-2
Decrease in the depth of trees will cause under fitting while
Deccrease in the number of tree will cause over fitting and
Learning rate is not an hyperparameter in random forest.
Q2V4
Machine Learning Question-2
Which of the following hyper parameter(s), when decreased may cause random forest to under fit the data?
1. Number of Trees
2. Depth of Tree
3. Learning Rate
A. Only 1
B. Only 2
C. Only 3
D. 1 and 2
E. 2 and 3
F. 1,2 and 3
Answer: B
Solution-2
Decrease in the depth of trees will cause under fitting while
Deccrease in the number of tree will cause over fitting and
Learning rate is not an hyperparameter in random forest.
Q2V5
Machine Learning Question-2
Which of the following hyper parameter(s), when decreased may cause random forest to under fit the data?
1. Number of Trees
2. Depth of Tree
3. Learning Rate
A. Only 1
B. Only 2
C. Only 3
D. 1 and 2
E. 2 and 3
F. 1,2 and 3
Answer: B
Solution-2
Decrease in the depth of trees will cause under fitting while
Deccrease in the number of tree will cause over fitting and
Learning rate is not an hyperparameter in random forest.
```

Machine Learning Q3

```
for l=1:5
fprintf('Q%gV%g\n',3,l)
format shortG
syms tp tn fp
m = ceil(3*rand)+1;  %   Matrix size
ro = 5; %   Required options
ca = [];        %   Correct
re=(0.25)*rand+0.2;
sp=(0.25)*rand+0.2;
pr=(0.25)*rand+0.2;
fn=ceil(10*rand)+30;
noa = "None of the Above";
disp('Question-3');
fprintf('Given the following parameters, find true positive, true negative and false positive:\n')
fprintf('Recall = %5.2f\nSpecificity = %5.2f\nPrecision = %5.2f\nFalse Negative = %g\n',re,sp,pr,fn)
ABC = Alpha_Gen(ro); %   Generates string of first n Alphabets
e1=re==tp/(tp+fn);
e2=pr==tp/(tp+fp);
e3=sp==tn/(tn+fp);
[tp,fp,tn]=solve(e1,e2,e3);
disp('Solution-3')
fprintf('True Positive = %5.2f\nFalse Positive = %5.2f\nTrue Negative = %5.2f\n',tp,fp,tn)
clearvars
end
```

```
Q3V1
Question-3
Given the following parameters, find true positive, true negative and false positive:
Recall =  0.35
Specificity =  0.26
Precision =  0.27
```

```
False Negative = 31
Solution-3
True Positive = 44.81
False Positive = 15.90
True Negative = 16.79
Q3V2
Question-3
Given the following parameters, find true positive, true negative and false positive:
Recall =  0.24
Specificity =  0.30
Precision =  0.24
False Negative = 39
Solution-3
True Positive = 38.40
False Positive = 16.68
True Negative = 12.01
Q3V3
Question-3
Given the following parameters, find true positive, true negative and false positive:
Recall =  0.22
Specificity =  0.41
Precision =  0.26
False Negative = 32
Solution-3
True Positive = 26.85
False Positive = 18.29
True Negative =  9.28
Q3V4
Question-3
Given the following parameters, find true positive, true negative and false positive:
Recall =  0.44
Specificity =  0.40
Precision =  0.36
False Negative = 34
Solution-3
True Positive = 48.10
False Positive = 32.56
True Negative = 26.57
Q3V5
Question-3
Given the following parameters, find true positive, true negative and false positive:
Recall =  0.31
Specificity =  0.29
Precision =  0.42
False Negative = 31
Solution-3
True Positive = 19.15
False Positive =  7.73
True Negative = 13.84
```

Machine Learning Q4

```
for l=1:5
fprintf('Q%gV%g\n',4,l)
Aw0=round(2*randn);Aw1=round(2*randn);Aw2=round(2*randn);
Bw0=round(2*randn);Bw1=round(2*randn);Bw2=round(2*randn);
ab=["A","B"];
tf=["True","False"];
abi=ceil(2*rand);
disp('Question-4');
fprintf(['Consider two perceptrons defined by the threshold expression\n',...
    'w0 + w1x1 + w2x2 > 0.\n Perceptron A has weight values\n',...
    'w0 = %g,w1 = %g, w2 = %g\nand Perceptron B has the weight values\n',...
    'w0 = %g,w1 = %g, w2 = %g\n'],Aw0,Aw1,Aw2,Bw0,Bw1,Bw2)
if (Aw0+Aw1+Aw2) >= (Bw0+Bw1+Bw2)
    fexp=sprintf(['Perceptron A is more general because every\n',...
'instance of x1 & x2 that satisfies perceptron B satisfies perceptron A.\n']);
    tfi=1;
elseif (Aw0+Aw1+Aw2) < (Bw0+Bw1+Bw2)
    fexp=sprintf(['Perceptron B is more general because every',...
'instance of x1 & x2 that \nsatisfies perceptron A satisfies perceptron B.\n']);
    tfi=2;
end
disp('Statement')
disp('Perceptron A is more general than Perceptron B.')
fprintf('Answer: %s\n',tf(tfi))
disp('Solution-4')
disp(fexp)
clearvars
end

function A = Alpha_Gen(n)
if n > 26
    n = 26;
elseif n <= 0
    n = 1;
end
A = string(num2cell(char(((1:n) + 64))));
end
```

```
Q4V1
Question-4
Consider two perceptrons defined by the threshold expression
w0 + w1x1 + w2x2 > 0.
 Perceptron A has weight values
w0 = 2,w1 = -1, w2 = -1
and Perceptron B has the weight values
w0 = 1,w1 = 3, w2 = 4
Statement
Perceptron A is more general than Perceptron B.
Answer: False
Solution-4
Perceptron B is more general because everyinstance of x1 & x2 that
satisfies perceptron A satisfies perceptron B.

Q4V2
Question-4
Consider two perceptrons defined by the threshold expression
w0 + w1x1 + w2x2 > 0.
 Perceptron A has weight values
w0 = -2,w1 = -1, w2 = 4
and Perceptron B has the weight values
w0 = 1,w1 = -1, w2 = 3
Statement
Perceptron A is more general than Perceptron B.
Answer: False
Solution-4
Perceptron B is more general because everyinstance of x1 & x2 that
satisfies perceptron A satisfies perceptron B.

Q4V3
Question-4
Consider two perceptrons defined by the threshold expression
w0 + w1x1 + w2x2 > 0.
 Perceptron A has weight values
w0 = -1,w1 = -2, w2 = 2
and Perceptron B has the weight values
w0 = 4,w1 = 1, w2 = 3
Statement
Perceptron A is more general than Perceptron B.
Answer: False
Solution-4
Perceptron B is more general because everyinstance of x1 & x2 that
satisfies perceptron A satisfies perceptron B.

Q4V4
Question-4
Consider two perceptrons defined by the threshold expression
w0 + w1x1 + w2x2 > 0.
 Perceptron A has weight values
w0 = 1,w1 = -1, w2 = 2
and Perceptron B has the weight values
w0 = 1,w1 = -2, w2 = -1
Statement
Perceptron A is more general than Perceptron B.
Answer: True
Solution-4
Perceptron A is more general because every
instance of x1 & x2 that satisfies perceptron B satisfies perceptron A.

Q4V5
Question-4
Consider two perceptrons defined by the threshold expression
w0 + w1x1 + w2x2 > 0.
 Perceptron A has weight values
w0 = -2,w1 = 1, w2 = -2
and Perceptron B has the weight values
w0 = 1,w1 = -2, w2 = -3
Statement
Perceptron A is more general than Perceptron B.
Answer: True
Solution-4
Perceptron A is more general because every
instance of x1 & x2 that satisfies perceptron B satisfies perceptron A.
```

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