זייד חביבאללה 322513433 למידת מכונה – מטלה 1

```
# Define parameter values
criterion = 'gini'
splitter = 'best'
max_depth = 10
min_samples_split = 5
min_samples_leaf = 2
```

AdaBoost

```
# Define parameter values
n_estimators = 100
learning_rate = 0.1
estimator = DecisionTreeClassifier(max_depth=3)
```

Try 1 – decision tree

זה הניסוי הראשון של המודל decision tree, עדכנו פרמטרים שונים לשני המודלים האחרים לשני המודלים לשני המודלים decision tree

```
# Define parameter values
n_estimators = 100
criterion = 'gini'
max_depth = 10
min_samples_split = 5
min_samples_leaf = 2
```

[8] 2	Decision Accuracy: 0.9 Classificatio	298	recall	f1-score	support
	0 1	0.91 0.94	0.91 0.94	0.91 0.94	43 71
	accuracy macro avg weighted avg	0.93 0.93	0.93 0.93	0.93 0.93 0.93	114 114 114
	Confusion Mat [[39 4] [4 67]]	rix:			
	Random Fo Accuracy: 0.9 Classificatio	649	recall	f1-score	support
	0	0.98 0.96	0.93 0.99	0.95 0.97	43 71
	accuracy macro avg weighted avg	0.97 0.97	0.99 0.96 0.96	0.96 0.96 0.96	114 114 114
	Confusion Mat [[40 3] [1 70]]	rix:			

AdaBoost Accuracy: 0. Classificati	9211			
	precision	recall	f1-score	support
0	0.87	0.93	0.90	43
1	0.96	0.92	0.94	71
accuracy			0.92	114
macro avg	0.91	0.92	0.92	114
weighted avg	0.92	0.92	0.92	114
Confusion Ma [[40 3] [6 65]]	trix:			
The best mod	el based on	accuracy :	is: Random	Forest

```
# Define parameter values
criterion = 'gini'
splitter = 'random'
max_depth = 20
min_samples_split = 5
min_samples_leaf = 4
```

AdaBoost

```
# Define parameter values
n_estimators = 100
learning_rate = 0.1
estimator = DecisionTreeClassifier(max_depth=3)
```

Try 2 – decision tree

splitter – max depth – min leaf נעשה שינוי

```
# Define parameter values
n_estimators = 100
criterion = 'gini'
max_depth = 10
min_samples_split = 5
min_samples_leaf = 2
```

Decision Tree Accuracy: 0.9649 Classification Report:					
	precision	recall	f1-score	support	
0 1	0.95 0.97	0.95 0.97	0.95 0.97	43 71	
accuracy macro avg weighted avg	0.96 0.96	0.96 0.96	0.96 0.96 0.96	114 114 114	
Confusion Matr [[41 2] [2 69]]	ix:				
Random For Accuracy: 0.96 Classification	49	recall	f1-score	support	
0 1	0.98 0.96	0.93 0.99	0.95 0.97	43 71	
accuracy macro avg weighted avg	0.97 0.97	0.96 0.96	0.96 0.96 0.96	114 114 114	
Confusion Matrix: [[40 3] [1 70]]					

AdaBoo Accuracy: Classifica	0.9211 ition Rep	ort: ision	recall	f1-score	support
	0 1	0.87 0.96	0.93 0.92	0.90 0.94	43 71
accura macro a weighted a	ıvg	0.91 0.92	0.92 0.92	0.92 0.92 0.92	114 114 114
Confusion Matrix: [[40 3] [6 65]]					
The best model based on accuracy is: Decision Tree					

Define parameter values criterion = 'entropy' splitter = 'random' max_depth = 20 min_samples_split = 10 min_samples_leaf = 4

Try 3 – decision tree



criterion – min split נעשה שינוי

AdaBoost

```
# Define parameter values
n_estimators = 100
learning_rate = 0.1
estimator = DecisionTreeClassifier(max_depth=3)
```

```
# Define parameter values
n_estimators = 100
criterion = 'gini'
max_depth = 10
min_samples_split = 5
min_samples_leaf = 2
```

Decision T Accuracy: 0.98 Classification	25	recall	f1-score	support
0 1	0.96 1.00	1.00 0.97	0.98 0.99	43 71
accuracy macro avg weighted avg	0.98 0.98	0.99 0.98	0.98 0.98 0.98	114 114 114
Confusion Matr [[43 0] [2 69]]	ix:			
Random Forest Accuracy: 0.9649 Classification Report: precision recall f1-score supp				
0 1	0.98 0.96	0.93 0.99	0.95 0.97	43 71
accuracy macro avg weighted avg	0.97 0.97	0.96 0.96	0.96 0.96 0.96	114 114 114
Confusion Matr [[40 3] [1 70]]	ix:			

AdaBoost Accuracy: 0.9211 Classification Report:					
	preci	ision	recall	f1-score	support
	0	0.87	0.93	0.90	43
	1	0.96	0.92	0.94	71
accurac	у			0.92	114
macro av	•	0.91	0.92	0.92	114
weighted av	g	0.92	0.92	0.92	114
Confusion Matrix: [[40 3] [6 65]]					
The best mo	del base	ed on ac	curacy is	s: Decision	Tree

```
# Define parameter values
criterion = 'entropy'
splitter = 'best'
max_depth = 10
min_samples_split = 5
min_samples_leaf = 4
```

AdaBoost

```
# Define parameter values
n_estimators = 100
learning_rate = 0.1
estimator = DecisionTreeClassifier(max_depth=3)
```

Try 4 – decision tree

splitter – max depth – min split נעשה שינוי

```
# Define parameter values
n_estimators = 100
criterion = 'gini'
max_depth = 10
min_samples_split = 5
min_samples_leaf = 2
```

Decision Tree Accuracy: 0.9561					
Classificat	ion Report:				
	precisio		f1-score	support	
	0.9 1 0.9				
		5 0.99	0.97	/1	
accuracy	/		0.96	114	
macro ave	g 0.9	6 0.95	0.95	114	
weighted av	g 0.9	0.96	0.96	114	
Confusion Ma [[39 4] [1 70]]	atrix:				
Random I Accuracy: 0: Classificat:	. 9649				
	precisio		f1-score	support	
	0.9		0.95	43	
:	1 0.9	0.99	0.97	71	
accuracy	,		0.96	114	
macro ave				114	
weighted ave	g 0.9	0.96	0.96	114	
Confusion Matrix: [[40 3] [1 70]]					

AdaBo Accuracy: Classific	0.9211 ation R		recall	f1-score	support
	0	0.87	0.93	0.90	43
	1	0.96	0.92	0.94	71
accur	асу			0.92	114
macro	avg	0.91	0.92	0.92	114
weighted	avg	0.92	0.92	0.92	114
Confusion [[40 3] [6 65]]		:			
The best	model b	ased on ac	curacy is	: Random	Forest

```
# Define parameter values
criterion = 'entropy'
splitter = 'random'
max_depth = 25
min_samples_split = 10
min_samples_leaf = 5
```

AdaBoost

```
# Define parameter values
n_estimators = 100
learning_rate = 0.1
estimator = DecisionTreeClassifier(max_depth=3)
```

Try 5 – decision tree

```
splitter – max depth – min leaf – min split נעשה שינוי
```

```
# Define parameter values
n_estimators = 100
criterion = 'gini'
max_depth = 10
min_samples_split = 5
min_samples_leaf = 2
```

Decision Tree					
Accuracy: 0.9737					
Classification R	ecision	recall	f1-score	support	
0	0.95	0.98	0.97	43	
1	0.99	0.97	0.98	71	
accuracy			0.97	114	
macro avg	0.97	0.97	0.97	114	
weighted avg	0.97	0.97	0.97	114	
Confusion Matrix [[42 1] [2 69]]	:				
Random Fores Accuracy: 0.9649 Classification R					
	ecision	recall	f1-score	support	
0	0.98	0.93	0.95	43	
1	0.96	0.99	0.97	71	
20011204			0.96	114	
accuracy macro avg	0.97	0.96	0.96	114	
weighted avg	0.97	0.96	0.96	114	
Confusion Matrix: [[40 3] [1 70]]					

AdaBoost Accuracy: 0.9211 Classification Report: precision recall f1-score support					
	pre	CT2TOII	recatt	11-20016	support
	0 1	0.87 0.96	0.93 0.92	0.90 0.94	43 71
	1	0.90	0.92	0.94	/1
accura macro a weighted a	vg	0.91 0.92	0.92 0.92	0.92 0.92 0.92	114 114 114
Confusion Matrix: [[40 3] [6 65]]					
The best model based on accuracy is: Decision Tree					

Try 1 – Random Forest

Random Forest

```
# Define parameter value
n_estimators = 200
criterion = 'entropy'
max_depth = 30
min_samples_split = 15
min_samples_leaf = 10
```

כרגע נתחיל עם הניסוי הראשון של המודל random forest אחרי שסיימנו לאמן את המודל decision tree ניקח את הפרמטרים שהראו את התוצאה הכי טובה,

random forest ונתחיל לעדכן בכל ניסוי את הפרמטרים של

AdaBoost

```
# Define parameter values
n_estimators = 100
learning_rate = 0.1
estimator = DecisionTreeClassifier(max_depth=3)
```

```
# Define parameter values
criterion = 'entropy'
splitter = 'random'
max_depth = 20
min_samples_split = 10
min_samples_leaf = 4
```

Decision Tree Accuracy: 0.9825					
Classification					
	precision	recall	f1-score	support	
0	0.96	1.00	0.98	43	
ĭ	1.00	0.97	0.99	71	
accuracy			0.98	114	
macro avg	0.98	0.99	0.98	114	
weighted avg	0.98	0.98	0.98	114	
Confusion Mate [[43 0] [2 69]]	rix:				
Random For Accuracy: 0.96	649 n Report:				
	precision	recall	f1-score	support	
0	0.98	0.93	0.95	43	
1	0.96	0.99	0.97	71	
accuracy			0.96	114	
macro avg	0.97	0.96	0.96	114	
weighted avg	0.97	0.96	0.96	114	
Confusion Matrix: [[40 3] [1 70]]					

AdaBoost Accuracy: 0. Classificat:	9211	recall	f1-score	support
:	0.87 L 0.96			43 71
accuracy macro avo weighted avo	0.91			114 114 114
Confusion Matrix: [[40 3] [6 65]]				
The best model based on accuracy is: Decision Tree				

Random Forest

```
# Define parameter values
n_estimators = 30
criterion = 'entropy'
max_depth = 3
min_samples_split = 50
min_samples_leaf = 25
```

AdaBoost

```
# Define parameter values
n_estimators = 100
learning_rate = 0.1
estimator = DecisionTreeClassifier(max_depth=3)
```

Try 2 – Random Forest

criterion נעשה שינוי בכל הערכים של הפרמטרים חוץ מה

```
# Define parameter values
criterion = 'entropy'
splitter = 'random'
max_depth = 20
min_samples_split = 10
min_samples_leaf = 4
```

Decision Tre Accuracy: 0.9825				
Classification R	eport: ecision	recall	f1-score	support
0 1	0.96 1.00	1.00 0.97	0.98 0.99	43 71
accuracy macro avg weighted avg	0.98 0.98	0.99 0.98	0.98 0.98 0.98	114 114 114
Confusion Matrix [[43 0] [2 69]]	:			
Random Fores Accuracy: 0.9561 Classification R		recall	f1-score	support
0	0.97	0.91	0.94	43
1	0.95	0.99	0.97	71
accuracy macro avg weighted avg	0.96 0.96	0.95 0.96	0.96 0.95 0.96	114 114 114
Confusion Matrix [[39 4] [1 70]]	:			

AdaBoost Accuracy: 0.9211 Classification Report:						
	precision	recall	f1-score	support		
0	0.87	0.93	0.90	43		
1	0.96	0.92	0.94	71		
accuracy			0.92	114		
macro avg	0.91	0.92	0.92	114		
weighted avg	0.92	0.92	0.92	114		
Confusion Mat [[40 3] [6 65]]	rix:					
The best mode	el based on	accuracy :	is: Decisio	n Tree		

Try 3 – Random Forest

Random Forest

```
# Define parameter values
n_estimators = 500
criterion = 'gini'
max_depth = 40
min_samples_split = 2
min_samples_leaf = 1
```

Decision tree

```
# Define parameter values
criterion = 'entropy'
splitter = 'random'
max_depth = 20
min_samples_split = 10
min_samples_leaf = 4
```

AdaBoost

```
# Define parameter values
n estimators = 100
learning_rate = 0.1
estimator = DecisionTreeClassifier(max_depth=3)
```

נעשה שינוי בכל הערכים של הפרמטרים למרות השינויים בכל הפרמטרים, הוא נתן אותה תשובה כמו בניסוי הראשון 0.9649

<pre> Decision T Accuracy: 0.98</pre>	325			
Classification				
	precision	recall	f1-score	support
0	0.96	1.00	0.98	43
ĭ	1.00	0.97	0.99	71
accuracy			0.98	114
macro avg	0.98	0.99	0.98	114
weighted avg	0.98	0.98	0.98	114
Confusion Mate [[43 0] [2 69]]	rix:			
Random For Accuracy: 0.96	649 n Report:			
	precision	recall	f1-score	support
0	0.98	0.93	0.95	43
1	0.96	0.99	0.97	71
accuracy			0.96	114
macro avg	0.97	0.96	0.96	114
weighted avg	0.97	0.96	0.96	114
Confusion Mate [[40 3] [1 70]]	rix:			

AdaBoost Accuracy: 0. Classificat:	9211	recall	f1-score	support
:	0.87 L 0.96			43 71
accuracy macro avo weighted avo	0.91			114 114 114
Confusion Ma [[40 3] [6 65]]	atrix:			
The best mod	del based on	accuracy :	is: Decisio	n Tree

Random Forest

```
# Define parameter values
n_estimators = 60
criterion = 'entropy'
max_depth = 12
min_samples_split = 50
min_samples_leaf = 20
```

AdaBoost

```
# Define parameter values
n_estimators = 100
learning_rate = 0.1
estimator = DecisionTreeClassifier(max_depth=3)
```

Try 4 – Random Forest

נעשה שינוי בכל הערכים של הפרמטרים

```
# Define parameter values
criterion = 'entropy'
splitter = 'random'
max_depth = 20
min_samples_split = 10
min_samples_leaf = 4
```

Decision Tre Accuracy: 0.9825 Classification R				
	ecision	recall	f1-score	support
0 1	0.96 1.00	1.00 0.97	0.98 0.99	43 71
accuracy macro avg weighted avg	0.98 0.98	0.99 0.98	0.98 0.98 0.98	114 114 114
Confusion Matrix [[43 0] [2 69]]	:			
Random Fores Accuracy: 0.9474 Classification R	eport:			
pr	ecision	recall	f1-score	support
0 1	0.95 0.95	0.91 0.97	0.93 0.96	43 71
accuracy macro avg weighted avg	0.95 0.95	0.94 0.95	0.95 0.94 0.95	114 114 114
Confusion Matrix [[39 4] [2 69]]	:			

AdaBoost Accuracy: 0: Classificat:	9211			
	precision	recall	f1-score	support
	0.87 1 0.96	0.93 0.92		43 71
accuracy macro avo weighted avo	0.91			114 114 114
Confusion Ma [[40 3] [6 65]]				
The best model based on accuracy is: Decision Tree				

Try 5 – Random Forest

Random Forest

```
# Define parameter values
n_estimators = 280
criterion = 'gini'
max_depth = 12
min_samples_split = 50
min_samples_leaf = 40
```



n estimators - criterion – min leaf - - נעשה שינוי ב

AdaBoost

```
# Define parameter values
n_estimators = 100
learning_rate = 0.1
estimator = DecisionTreeClassifier(max_depth=3)
```

```
# Define parameter values
criterion = 'entropy'
splitter = 'random'
max_depth = 20
min_samples_split = 10
min_samples_leaf = 4
```

Decision Tree Accuracy: 0.9825 Classification Re				
pre	cision	recall	f1-score	support
0 1	0.96 1.00	1.00 0.97	0.98 0.99	43 71
accuracy macro avg weighted avg	0.98 0.98	0.99 0.98	0.98 0.98 0.98	114 114 114
Confusion Matrix: [[43 0] [2 69]]				
Random Forest Accuracy: 0.9737 Classification Re	eport:	11	41	
pre	ecision	recall	f1-score	support
0 1	1.00 0.96	0.93 1.00	0.96 0.98	43 71
accuracy macro avg weighted avg	0.98 0.97	0.97 0.97	0.97 0.97 0.97	114 114 114
Confusion Matrix: [[40 3] [0 71]]				

AdaBoost Accuracy: 0. Classificati	9211	recall	f1–score	support
	•			
0	0.87	0.93	0.90	43
1		0.92		71
•	0.50	0.52	0154	′-
accuracy	,		0.92	114
macro avg	0.91	0.92	0.92	114
weighted avo	0.92	0.92	0.92	114
Confusion Ma [[40 3] [6 65]]	trix:			
The best mod	el based on	accuracy	is: Decisio	n Tree



```
# Define parameter values
n_estimators = 250
learning_rate = 0.1
estimator = DecisionTreeClassifier(max_depth=3)
```

Try 1 – AdaBoost

כרגע נתחיל עם הניסוי הראשון של המודל decision tree + random forest אחרי שסיימנו לאמן את המודל הפרמטרים שהראו את התוצאות הכי טובות עבור שני המודלים שאמנו, ונתחיל לעדכן בכל ניסוי את הפרמטרים של adaboost

Random Forest

```
# Define parameter values
n_estimators = 280
criterion = 'gini'
max_depth = 12
min_samples_split = 50
min_samples_leaf = 40
```

```
# Define parameter values
criterion = 'entropy'
splitter = 'random'
max_depth = 20
min_samples_split = 10
min_samples_leaf = 4
```

<pre>l Decision Tree Accuracy: 0.9825 Classification Re</pre>				
	cision	recall	f1-score	support
0 1	0.96 1.00	1.00 0.97	0.98 0.99	43 71
accuracy macro avg weighted avg	0.98 0.98	0.99 0.98	0.98 0.98 0.98	114 114 114
Confusion Matrix: [[43 0] [2 69]]				
Random Forest Accuracy: 0.9737 Classification Re	eport:			
pre	ecision	recall	f1-score	support
0 1	1.00 0.96	0.93 1.00	0.96 0.98	43 71
accuracy macro avg weighted avg	0.98 0.97	0.97 0.97	0.97 0.97 0.97	114 114 114
Confusion Matrix: [[40 3] [0 71]]				

Accura	aBoost cy: 0.9298 fication I	3			
	P	recision	recall	f1-score	support
	0	0.89	0.93	0.91	43
	1	0.96	0.93	0.94	71
ac	curacy			0.93	114
	ro avg	0.92	0.93	0.93	114
weight		0.93	0.93	0.93	114
Confus [[40 [5 6		K :			
The be	st model	based on ac	curacy is	s: Decision	Tree

```
# Define parameter values
n_estimators = 300
learning_rate = 0.2
estimator = DecisionTreeClassifier(max_depth=5)
```

Random Forest

```
# Define parameter values
n_estimators = 280
criterion = 'gini'
max_depth = 12
min_samples_split = 50
min_samples_leaf = 40
```

Try 2 – AdaBoost

נעשה שינוי בכל הערכים של הפרמטרים

```
# Define parameter values
criterion = 'entropy'
splitter = 'random'
max_depth = 20
min_samples_split = 10
min_samples_leaf = 4
```

Decision Tre				
Accuracy: 0.9825				
Classification R	•	recell	f1_cccro	cuppert
pr	ecision	recatt	f1-score	support
0	0.96	1.00	0.98	43
1	1.00	0.97	0.99	71
accuracy			0.98	114
macro avg	0.98	0.99	0.98	114
weighted avg	0.98	0.98	0.98	114
Confusion Matrix	C :			
[[43 0]				
[2 69]]				
Random Fores				
Accuracy: 0.9737	7			
Accuracy: 0.9737 Classification F	keport:	recall	f1–score	support
Accuracy: 0.9737 Classification F	7	recall	f1-score	support
Accuracy: 0.9737 Classification F	keport:	recall 0.93	f1-score 0.96	support 43
Accuracy: 0.9737 Classification F	Report: Tecision			
Accuracy: 0.9737 Classification F pr	Report: Tecision	0.93	0.96	43
Accuracy: 0.9737 Classification F pr	Report: Tecision 1.00 0.96	0.93	0.96 0.98 0.97	43 71 114
Accuracy: 0.9737 Classification F pr 0 1 accuracy macro avg	Report: Tecision 1.00 0.96	0.93 1.00 0.97	0.96 0.98 0.97 0.97	43 71 114 114
Accuracy: 0.9737 Classification F pr 0 1 accuracy	Report: Tecision 1.00 0.96	0.93 1.00	0.96 0.98 0.97	43 71 114
Accuracy: 0.9737 Classification F pr 0 1 accuracy macro avg weighted avg	Report: Tecision 1.00 0.96 0.98 0.97	0.93 1.00 0.97	0.96 0.98 0.97 0.97	43 71 114 114
Accuracy: 0.9737 Classification F pr 0 1 accuracy macro avg weighted avg Confusion Matrix	Report: Tecision 1.00 0.96 0.98 0.97	0.93 1.00 0.97	0.96 0.98 0.97 0.97	43 71 114 114
Accuracy: 0.9737 Classification F pr 0 1 accuracy macro avg weighted avg	Report: Tecision 1.00 0.96 0.98 0.97	0.93 1.00 0.97	0.96 0.98 0.97 0.97	43 71 114 114

AdaBoost - Accuracy: 0.96 Classification	49			
	precision	recall	f1-score	support
0	1.00	0.91	0.95	43
1	0.95	1.00	0.97	71
accuracy macro avg weighted avg	0.97 0.97	0.95 0.96	0.96 0.96 0.96	114 114 114
Confusion Matr [[39 4] [0 71]]	ix:			
The best model	based on a	ccuracy i	s: Decision	Tree

```
# Define parameter values
n_estimators = 380
learning_rate = 0.3
estimator = DecisionTreeClassifier(max_depth=5)
```

Random Forest

```
# Define parameter values
n_estimators = 280
criterion = 'gini'
max_depth = 12
min_samples_split = 50
min_samples_leaf = 40
```

Try 3 – AdaBoost

n estimators – learning rate -נעשה שינוי ב

```
# Define parameter values
criterion = 'entropy'
splitter = 'random'
max_depth = 20
min_samples_split = 10
min_samples_leaf = 4
```

l Decision Tre	e			
Accuracy: 0.9825				
Classification R	eport:			
pr	ecision	recall	f1-score	support
0	0.96	1.00	0.98	43
1	1.00	0.97	0.99	71
accuracy			0.98	114
macro avg	0.98	0.99	0.98	114
weighted avg	0.98	0.98	0.98	114
Confusion Matrix	:			
[[43 0]				
[2 69]]				
~				
Random Fores				
Accuracy: 0.9737				
Accuracy: 0.9737 Classification R	eport:			
Accuracy: 0.9737 Classification R		recall	f1-score	support
Accuracy: 0.9737 Classification R pr	eport: ecision			
Accuracy: 0.9737 Classification R pr	eport: ecision 1.00	0.93	0.96	43
Accuracy: 0.9737 Classification R pr	eport: ecision			
Accuracy: 0.9737 Classification R pr 0	eport: ecision 1.00	0.93	0.96 0.98	43 71
Accuracy: 0.9737 Classification R pr 0 1 accuracy	eport: ecision 1.00 0.96	0.93 1.00	0.96 0.98 0.97	43 71 114
Accuracy: 0.9737 Classification R pr 0 1 accuracy macro avg	eport: ecision 1.00 0.96	0.93 1.00 0.97	0.96 0.98 0.97 0.97	43 71 114 114
Accuracy: 0.9737 Classification R pr 0 1 accuracy macro avg	eport: ecision 1.00 0.96	0.93 1.00	0.96 0.98 0.97	43 71 114
Accuracy: 0.9737 Classification R pr 0 1 accuracy macro avg weighted avg	eport: ecision 1.00 0.96 0.98 0.97	0.93 1.00 0.97	0.96 0.98 0.97 0.97	43 71 114 114
Accuracy: 0.9737 Classification R pr 0 1 accuracy macro avg weighted avg Confusion Matrix	eport: ecision 1.00 0.96 0.98 0.97	0.93 1.00 0.97	0.96 0.98 0.97 0.97	43 71 114 114
Accuracy: 0.9737 Classification R pr 0 1 accuracy macro avg weighted avg	eport: ecision 1.00 0.96 0.98 0.97	0.93 1.00 0.97	0.96 0.98 0.97 0.97	43 71 114 114

AdaBoost Accuracy: 0.9386 Classification R				
pr	ecision	recall	f1-score	support
0	0.91	0.93	0.92	43
1	0.96	0.94	0.95	71
accuracy			0.94	114
macro avg	0.93	0.94	0.93	114
weighted avg	0.94	0.94	0.94	114
Confusion Matrix [[40 3] [4 67]]	:			
The best model b	ased on a	ccuracy is	s: Decision	Tree

```
# Define parameter values
n_estimators = 500
learning_rate = 0.7
estimator = DecisionTreeClassifier(max_depth=4)
```

Try 4 – AdaBoost

```
נעשה שינוי בכל הערכים של הפרמטרים

הניסוי

הטוב

ביותר
```

Random Forest

```
# Define parameter values
n_estimators = 280
criterion = 'gini'
max_depth = 12
min_samples_split = 50
min_samples_leaf = 40
```

```
# Define parameter values
criterion = 'entropy'
splitter = 'random'
max_depth = 20
min_samples_split = 10
min_samples_leaf = 4
```

l Decision				
Accuracy: 0.9 Classification				
	precision	recall	f1-score	support
0 1	0.96 1.00	1.00 0.97		43 71
accuracy macro avg weighted avg		0.99 0.98		
Confusion Mat [[43 0] [2 69]]	trix:			
Random Fo Accuracy: 0.9 Classification	9737	recall	f1–score	support
		2 02	2 00	
0 1	1.00 0.96			43 71
accuracy macro avg weighted avg	0.98	0.97 0.97	0.97 0.97 0.97	114 114 114
Confusion Mat [[40 3] [0 71]]	trix:			

AdaBo Accuracy: Classific	0.9737	,			
		ecision	recall	f1-score	support
	0	0.98	0.95	0.96	43
	1	0.97	0.99	0.98	71
accur macro weighted	avg	0.97 0.97	0.97 0.97	0.97 0.97 0.97	114 114 114
Confusion [[41 2] [1 70]]		:			
The best	model b	ased on a	ccuracy i	s: Decision	Tree

```
# Define parameter values
n_estimators = 130
learning_rate = 0.1
estimator = DecisionTreeClassifier(max_depth=3)
```

Random Forest

```
# Define parameter values
n_estimators = 280
criterion = 'gini'
max_depth = 12
min_samples_split = 50
min_samples_leaf = 40
```

Try 5 – AdaBoost

נעשה שינוי בכל הערכים של הפרמטרים

```
# Define parameter values
criterion = 'entropy'
splitter = 'random'
max_depth = 20
min_samples_split = 10
min_samples_leaf = 4
```

	ree					
Accuracy: 0.9825 Classification Report:						
	precision	recall	f1-score	support		
0	0.96	1.00	0.98	43		
1	1.00	0.97	0.99	71		
			2.00	114		
accuracy	0.98	0.99	0.98 0.98	114 114		
macro avg weighted avg	0.98	0.98	0.98	114		
weighted avg	0.30	0.50	0.50	114		
Confusion Matr [[43 0] [2 69]]	ix:					
Random Fore Accuracy: 0.973 Classification	37					
1	orecision	recall	f1-score	support		
				Suppor c		
a	1_00	0.93				
0 1	1.00 0.96	0.93 1.00	0.96	43		
	1.00 0.96	0.93 1.00				
	0.96	1.00	0.96 0.98 0.97	43 71 114		
accuracy macro avg	0.96 0.98	1.00 0.97	0.96 0.98 0.97 0.97	43 71 114 114		
1 accuracy	0.96	1.00	0.96 0.98 0.97	43 71 114		

AdaBoost Accuracy: 0.9211 Classification R					
pr	ecision	recall	f1-score	support	
0 1	0.87 0.96	0.93 0.92	0.90 0.94	43 71	
*	0.50	0.32	0.54	′-	
accuracy			0.92	114	
macro avg	0.91	0.92	0.92	114	
weighted avg	0.92	0.92	0.92	114	
Confusion Matrix [[40 3] [6 65]]	:				
The best model based on accuracy is: Decision Tree					

הערכים הכי טובים של כל אחד מהמודלים

AdaBoost

```
# Define parameter values
n_estimators = 500
learning_rate = 0.7
estimator = DecisionTreeClassifier(max_depth=4)
```

Random Forest

```
# Define parameter values
n_estimators = 280
criterion = 'gini'
max_depth = 12
min_samples_split = 50
min_samples_leaf = 40
```

```
# Define parameter values
criterion = 'entropy'
splitter = 'random'
max_depth = 20
min_samples_split = 10
min_samples_leaf = 4
```