

-----PART 1-----

The accuracy score for Decision Tree is 0.9533333333333334

[[50 0 0]

[ 0 48 2]

[ 0 5 45]]

Features used: ['sepal-length', 'sepal-width', 'petal-length', 'petal-width']

-----PART 2-----

eigen values:

[4.22484077 0.24224357 0.07852391 0.02368303]

eigen vectors:

[[ 0.36158968 -0.65653988 -0.58099728 0.31725455]

[-0.08226889 -0.72971237 0.59641809 -0.32409435]

[ 0.85657211 0.1757674 0.07252408 -0.47971899]

[ 0.35884393 0.07470647 0.54906091 0.75112056]]

PoV: 0.9246162071742686

Subset of transformed features: [[-2.684207125103951 -2.7153906156341336 -  
2.889819539617919

-2.746437197308737 -2.728592981831317 -2.2798973610095996

-2.8208906821806328 -2.6264819933238215 -2.8879585653356368

-2.6738446867191232 -2.506526789338906 -2.6131427182710585

-2.7874339759971 -3.225200446274983 -2.6435432169411484

-2.3838693237993778 -2.622526203125811 -2.648322732479129

-2.1990779614307647 -2.5873461889177403 -2.3105317013131357

-2.5432349073036975 -3.2158576949001083 -2.3031285376638846

-2.3561710866839003 -2.507917226837883 -2.4690559975451256

-2.5623909468367527 -2.6398212683765845 -2.6328479080307607

-2.5884620513033942 -2.410077337121598 -2.6476366733969026

-2.597159477075921 -2.6738446867191232 -2.8669998469325364

-2.6252284646804234 -2.6738446867191232 -2.981842664853911

-2.5903230255856764 -2.7701389107463266 -2.852211081566394

-2.9982964428323537 -2.405514101284704 -2.208832954176708

-2.715665190747457 -2.5375733710135098 -2.8403212968270117

-2.542685757077051 -2.703912314863653 1.2847945878450684

0.9324107529829145 1.4640613227790722 0.18096720634769559

1.0871344872069977 0.6404367495231422 1.0952237099384752

-0.75146714064823 1.043297780706278 -0.010190070727856423

-0.5110861958950935 0.5110980606834744 0.26233575615317717  
0.9840445451694276 -0.17486400196569912 0.9275729420326968  
0.6595927890561972 0.23454058625983237 0.9423617073988388  
0.043246400328701584 1.1162407237538123 0.3567865678304582  
1.2964688502855308 0.9205026489090059 0.71400821364283  
0.899640863283773 1.3310414188547166 1.557396272070699  
0.8124555489979988 -0.30733475566340723 -0.07034288894927465  
-0.19188449210314873 0.13499495045137025 1.3787369827755795  
0.5872748535799075 0.8072054966767133 1.2204289662446766  
0.8128677903690666 0.2451951616903428 0.1645134283692527  
0.4630309888714209 0.890160445651153 0.2288790499696445  
-0.7070812839208636 0.3555330391870603 0.3311269473327196  
0.3752382289467627 0.6416902781665399 -0.908463331234979  
0.29780790740693086 2.531726980439555 1.414072225173754  
2.6164846082840403 1.9708149459064783 2.349757983950939  
3.396879920678134 0.5193832450849329 2.9320050969912974  
2.31967279387405 2.918134233644248 1.6619349470194835  
1.8023404526607298 2.165378862953394 1.3445942175098213  
1.5852672993086405 1.904743578213909 1.9492487818644946  
3.4887653796563822 3.794686861209967 1.2983298245678125  
2.4281672590208454 1.1980973722749593 3.4992654842989532  
1.3876682501815527 2.2758536493056907 2.61419383069833  
1.257625182925133 1.2906696477375983 2.1228539805083093  
2.387564402369024 2.8409609252853802 3.232342898295871  
2.158738373133131 1.4431026043759714 1.779640106898566  
3.0765216210206585 2.1449868567093002 1.9048629251371283  
1.1688534694704003 2.1076537311732655 2.314303394629545  
1.9224508848357496 1.414072225173754 2.5633227123408058  
2.419391219804977 1.9440170488777344 1.5256636313138694  
1.7640459355269795 1.9016290752882292 1.3896661333194134]]

The accuracy score for part 2 is 0.9133333333333333

[[50 0 0]

[ 0 44 6]

[ 0 7 43]]

Subset of Features used: ['z1']

### PART 3-----

# Note: terminal output cp to word destroys the format of the table, so I just screenshots to make sure it looks clean

iteration	Set of Features	Accuracy	Pr[Accept]	Random Uniform	Status
0	sepal-length, sepal-width, petal-length, petal-width, z1, z2, z3	0.9			Improved
1	sepal-length, petal-length, petal-width, z2, z3	0.913333			Restart
2	sepal-length, petal-length, petal-width, z2, z3, z4	0.92			Restart
3	sepal-length, sepal-width, petal-length, petal-width, z2, z3, z4	0.92	1.0	0.7999178541073595	Accepted
4	sepal-length, sepal-width, petal-length, petal-width, z2, z3, z4	0.913333	0.9714305430681083	0.38295853455548057	Accepted
5	sepal-length, sepal-width, petal-width, z2, z3, z4	0.94			Restart
6	sepal-length, sepal-width, petal-length, petal-width, z2, z3, z4	0.92	0.8801529546879355	0.2445719535365879	Accepted
7	sepal-length, sepal-width, petal-length, petal-width, z2, z3, z4	0.92	1.0	0.4080442593107836	Accepted
8	sepal-length, sepal-width, petal-length, petal-width, z2, z3, z4	0.913333	0.943677300055998	0.86652090928553	Accepted
9	sepal-length, sepal-width, petal-length, petal-width, z3, z4	0.92			Improved
10	petal-length, petal-width, z3, z4	0.92	1.0	0.8449532285916356	Accepted
11	petal-width, z3, z4	0.893333	0.7269914372542964	0.37076924175571063	Accepted
12	sepal-length, petal-width, z3, z4	0.926667			Improved
13	sepal-length, petal-width, z3, z4	0.893333	0.6264878493792762	0.7463879417620258	Rejected
14	sepal-length, petal-width, z3, z4	0.926667			Improved
15	sepal-length, petal-width, z4	0.886667	0.5233619368561432	0.32258428882897516	Restart
16	sepal-width, z2, z3, z4	0.526667	0.00150991018574557636	0.9678018908223979	Rejected
17	sepal-width, z2, z3	0.66			Improved
18	sepal-width, z2, z3	0.62	0.3359109812391621	0.9691001407549322	Rejected
19	sepal-width, petal-width, z2, z3	0.94			Improved
20	sepal-width, petal-width, z2, z3, z4	0.906667	0.4920278993232287	0.6108603756605415	Rejected
21	sepal-width, petal-width, z1, z2, z3, z4	0.92			Improved
22	sepal-width, z1, z2, z3, z4	0.913333	0.8526379285806464	0.9105539138597148	Rejected
23	sepal-width, z1, z2, z3, z4	0.913333	1.0	0.3640458723044574	Accepted
24	sepal-width, petal-length, z1, z2, z3, z4	0.926667			Improved
25	sepal-width, petal-length, z1, z2, z3, z4	0.913333	0.6978771251273722	0.30358303455629276	Restart
26	sepal-length, sepal-width, petal-width, z2, z3	0.933333			Improved
27	sepal-length, petal-width, z2, z3	0.96			Restart
28	sepal-length, sepal-width, petal-width, z2, z3	0.946667	0.6778095780054508	0.6474355734823636	Accepted
29	sepal-length, sepal-width, petal-width, z2, z3	0.953333			Improved
30	sepal-length, sepal-width, petal-width, z2	0.92	0.3503050092654406	0.14204844084614798	Accepted
31	sepal-length, sepal-width, petal-length, petal-width, z2	0.92	1.0	0.8656401828760913	Accepted
32	sepal-length, sepal-width, petal-length, z2	0.94			Improved
33	sepal-length, sepal-width, petal-length, z2, z4	0.94	1.0	0.23077846144399106	Accepted
34	sepal-length, sepal-width, petal-length, z2, z3, z4	0.9	0.235320112564781	0.9717866099115902	Rejected
35	sepal-length, sepal-width, petal-length, petal-width, z2, z3, z4	0.906667			Improved

-zsh
35   sepal-length, sepal-width, petal-length, petal-width, z2, z3, z4   0.906667
36   sepal-length, sepal-width, petal-length, petal-width, z2, z3, z4   0.913333
37   sepal-length, sepal-width, petal-length, petal-width, z2, z3, z4   0.913333   1.0   0.43566565340478836   Improved
38   sepal-length, petal-width, z3   0.94
39   sepal-length, petal-width, z2, z3   0.953333
40   sepal-length, petal-width, z2   0.913333   0.1866870341562995   0.24760753609501174   Rejected
41   sepal-length, petal-width, z2   0.926667
42   sepal-length, petal-width, z2   0.913333   0.5464477705414803   0.39508823173792496   Accepted
43   sepal-length, petal-width, z2   0.92
44   sepal-length, z2   0.673333   7.526341812473857e-06   0.06673409056642965   Rejected
45   sepal-length, z2   0.646667   0.16827121642351445   0.9062613919135037   Rejected
46   sepal-length, z2   0.673333
47   sepal-length, z2   0.633333   0.06129363911375181   0.8277935995887371   Restart
48   sepal-length, petal-width, z2, z3   0.946667
49   sepal-length, z2, z3   0.753333   4.5081335076211634e-05   0.6925954751788355   Rejected
50   sepal-length, z2, z3   0.78
51   sepal-length, z2, z3   0.753333   0.17489145693268573   0.2891400288044449   Rejected
52   sepal-length, z2, z3   0.753333   1.0   0.10695098705743   Accepted
53   sepal-length, petal-length, z2, z3   0.9
54   sepal-length, petal-length, z2, z3   0.9   1.0   0.7691314331513587   Accepted
55   sepal-length, petal-length, z1, z2, z3   0.926667
56   sepal-length, petal-length, z1, z2, z3   0.9   0.19958585359940675   0.862243792286248   Rejected
57   sepal-length, petal-length, z1, z2   0.92
58   sepal-length, petal-width, z2, z3   0.96
59   sepal-length, petal-width, z1, z2, z3   0.926667   0.12891382628812276   0.9847714608862168   Rejected
60   sepal-length, z1, z3   0.893333   0.11552441555251408   0.6824803053307563   Rejected
61   sepal-length, petal-length, petal-width, z1, z3   0.913333
62   sepal-length, petal-length, petal-width, z1, z3   0.886667   0.16361830405384895   0.852722725250894   Improved
63   petal-length, petal-width, z3   0.92
64   petal-length, petal-width, z3, z4   0.92   1.0   0.3047260552357738   Accepted
65   sepal-length, petal-length, petal-width, z3, z4   0.92   1.0   0.7028802001614963   Accepted
66   sepal-length, petal-length, petal-width, z2, z3, z4   0.913333   0.6198604731563695   0.7326121625899352   Rejected
67   sepal-length, petal-length, petal-width, z2, z3   0.926667
68   sepal-length, petal-width, z2, z3   0.926667   1.0   0.03553260833111016   Accepted
69   sepal-length, z2, z3   0.753333   2.481928149716252e-06   0.04405823602946313   Rejected
70   sepal-length, petal-length, z2, z3   0.9
71   sepal-length, petal-length, z1, z2, z3   0.933333
72   sepal-length, petal-length, z1, z2, z3   0.926667   0.5979275332171674   0.5165804015664709   Accepted
73   sepal-length, petal-length, z1, z2, z3, z4   0.893333   0.07237464265029235   0.23471269997502797   Rejected

			-zsh			
62	sepal-length, petal-length, petal-width, z1, z3		0.886667	0.16361830405384895	0.8527227252508944	Rejected
63	petal-length, petal-width, z3		0.92			Improved
64	petal-length, petal-width, z3, z4		0.92	1.0	0.3047260552357738	Accepted
65	sepal-length, petal-length, petal-width, z3, z4		0.92	1.0	0.7028082001614963	Accepted
66	sepal-length, petal-length, petal-width, z2, z3, z4		0.913333	0.6198604731563695	0.7326121625899352	Rejected
67	sepal-length, petal-length, petal-width, z2, z3		0.926667	1.0	0.0355326083111016	Restart
68	sepal-length, petal-width, z2, z3		0.926667	1.0	0.04405823602946313	Accepted
69	sepal-length, z2, z3		0.753333	2.481928149716252e-06		Rejected
70	sepal-length, petal-length, z2, z3		0.9			Improved
71	sepal-length, petal-length, z1, z2, z3		0.933333			Improved
72	sepal-length, petal-length, z1, z2, z3		0.926667	0.5979275332171674	0.5165804015664709	Accepted
73	sepal-length, petal-length, z1, z2, z3, z4		0.893333	0.07237464265029235	0.23471269997502797	Rejected
74	sepal-length, petal-length, z1, z3, z4		0.926667			Improved
75	sepal-length, petal-length, z3		0.926667	1.0	0.39023000017240494	Accepted
76	sepal-length, petal-length		0.933333			Improved
77	sepal-length, petal-length		0.933333			Improved
78	sepal-length, petal-width, z2, z3		0.946667		0.719232324924323	Restart
79	sepal-length, petal-width, z2, z3		0.946667	1.0		Improved
80	sepal-length, petal-width, z2, z3		0.96		0.052129190471637554	Accepted
81	sepal-length, sepal-width, petal-width, z2, z3		0.946667	0.3246524673583504	0.41604125534117153	Improved
82	sepal-length, sepal-width, petal-width, z1, z2, z3		0.9	0.017557860789339085	0.2736206373096126	Rejected
83	sepal-length, z1, z2, z3		0.9	1.0	0.5586119175326085	Accepted
84	sepal-length, z1, z2, z3		0.9	1.0	0.23218544824084664	Accepted
85	sepal-length, z1, z2, z3		0.94			Improved
86	z1, z2, z3		0.94	1.0	0.9501982181738037	Accepted
87	petal-width, z1, z2, z3		0.926667	0.29111335453019144	0.9742532829255769	Restart
88	sepal-length, petal-width, z2, z3		0.946667			Improved
89	sepal-length, z2, z3		0.753333	1.2771415363148421e-08	0.13904627497571775	Rejected
90	z2, z3		0.426667	1.1245668151815346e-17	0.2644992257042702	Rejected
91	petal-length, z2, z3, z4		0.926667			Improved
92	z2, z3, z4		0.526667	5.664969202795643e-18	0.19765576391505724	Rejected
93	z1, z2, z3, z4		0.94			Improved
94	petal-width, z1, z2, z3, z4		0.926667	0.26359713811572744	0.07025675015069299	Accepted
95	z2, z3, z4		0.546667	1.2057623813770519e-17	0.044385868385168226	Rejected
96	sepal-width, z2, z3, z4		0.52	0.009251895502438927	0.7685741880004668	Rejected
97	sepal-width, z3, z4		0.566667			Restart
98	sepal-length, petal-width, z2, z3, z4		0.92			Improved
99	sepal-length, petal-width, z1, z2, z3, z4		0.926667			Improved

The best set: [sepal-length, petal-width, z2, z3],

The accuracy score for best set is 0.9533333333333334

```
[[50 0 0]
 [0 48 2]
 [0 5 45]]
```

Features used: sepal-length, petal-width, z2, z3

#### PART 4

5 Best sets in generation 2:

[1, 3, 4] with accuracy: 0.9466666666666667

[0, 1, 2, 3, 4] with accuracy: 0.9533333333333334

[1, 2, 3, 4] with accuracy: 0.9533333333333334

[0, 4] with accuracy: 0.9533333333333334

[4, 5] with accuracy: 0.9533333333333334

5 Best sets in generation 3:

[1, 3, 4] with accuracy: 0.9466666666666667

[0, 1, 2, 3, 4] with accuracy: 0.9533333333333334

[1, 2, 3, 4] with accuracy: 0.9533333333333334

[0, 4] with accuracy: 0.9533333333333334

[4, 5] with accuracy: 0.9533333333333334

5 Best sets in generation 4:













[1, 3, 4] with accuracy: 0.9466666666666667  
[0, 1, 2, 3, 4] with accuracy: 0.953333333333334  
[1, 2, 3, 4] with accuracy: 0.953333333333334  
[0, 4] with accuracy: 0.953333333333334  
[4, 5] with accuracy: 0.953333333333334  
5 Best sets in generation 49:  
[1, 3, 4] with accuracy: 0.9466666666666667  
[0, 1, 2, 3, 4] with accuracy: 0.953333333333334  
[1, 2, 3, 4] with accuracy: 0.953333333333334  
[0, 4] with accuracy: 0.953333333333334  
[4, 5] with accuracy: 0.953333333333334  
5 Best sets in generation 50:  
[1, 3, 4] with accuracy: 0.9466666666666667  
[0, 1, 2, 3, 4] with accuracy: 0.953333333333334  
[1, 2, 3, 4] with accuracy: 0.953333333333334  
[0, 4] with accuracy: 0.953333333333334  
[4, 5] with accuracy: 0.953333333333334  
The accuracy score for best set is 0.953333333333334  
[[50 0 0]  
 [ 0 47 3]  
 [ 0 4 46]]  
Features used: z1, z2