

STUDY OF EXOPLANETS

Overview

The Kepler Space Observatory, launched by NASA in 2009, is dedicated to exploring exoplanets within star systems beyond our own. By May 2016, Kepler had verified 1,284 new exoplanets, contributing to the total count of over 3,000 confirmed exoplanets as of October 2017.

The dataset of our research comprises a comprehensive compilation of all Kepler "objects of interest," essentially encompassing approximately 10,000 exoplanet candidates that Kepler has observed.

Dataset - 9564 rows & 50 columns

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Cumulative KOI Data		Q1-Q17 DR25 Supp Done		Q1-Q17 DR25 Done		Q1-Q17 DR24 Done		Q1-Q16 Done		Q1-Q12 Done		Q1-Q8 Done		
KOI Name	Exoplanet Archive Disposition	Disposition Using Kepler Data	Disposition Score	Orbital Period [days]	Transit Epoch [BKJD]	Impact Parameter	Transit Duration [hrs]	Transit Depth [ppm]	Planetary Radius [Earth radii]	Equilibrium Temperature [K]	Insolation Flux [Earth flux]	Transit Signal-to-Noise	Stellar Effective Temperature [K]	Stellar Surface Gravity [log10(cm/s**2)]
K00752.01	CONFIRMED	CANDIDATE	1.0000	9.48803557±2.775e-05	170.53875±0.00216	0.146 ±0.148	2.9575±0.0819	615.8±19.5	2.26 ±0.26	793 ±16.65	35.80	5455±81	4.467 ±0.096	
K00752.02	CONFIRMED	CANDIDATE	0.9690	54.4183827±0.0002479	162.513844±0.00352	0.586 ±0.443	4.5070±0.116	874.8±35.5	2.83 ±0.32	443 ±1.62	25.80	5455±81	4.467 ±0.094	
K00753.01	CANDIDATE	CANDIDATE	0.0000	19.89913995±1.494e-07	175.850252±0.00058	0.969 ±0.077	1.7822±0.0341	10829±171	14.6 ±3.92	638 ±31.04	39.30 ±10.49	76.30	5853 ±158	4.544 ±0.176
K00754.01	FALSE POSITIVE	FALSE POSITIVE	0.0000	1.736952453±2.636e-07	170.307565±0.00011	1.276 ±0.115	2.40641±0.00537	8079.2±12.8	33.46 ±8.5	1395 ±2.43	891.96 ±668.35	505.60	5805 ±174	4.564 ±0.168
K00755.01	CONFIRMED	CANDIDATE	1.0000	2.525591777±3.761e-07	171.59555±0.00113	0.701 ±0.478	1.6545±0.042	603.3±16.9	2.75 ±0.88	1406 ±34.24	926.16 ±314.24	40.90	6031 ±211	4.438 ±0.21
K00756.01	CONFIRMED	CANDIDATE	1.0000	11.09432054±2.036e-07	171.20116±0.00141	0.538 ±0.498	4.5945±0.061	1517.5±24.2	3.9 ±0.42	835 ±0.27	114.81 ±112.85	66.50	6046 ±189	4.486 ±0.054
K00756.02	CONFIRMED	CANDIDATE	1.0000	4.13443512±1.046e-05	172.97937±0.00101	0.762 ±0.532	3.1402±0.0673	686±18.7	2.77 ±0.9	1160 ±1.36	427.65 ±136.70	40.20	6046 ±232	4.486 ±0.229
K00756.03	CONFIRMED	CANDIDATE	0.9920	2.566568897±1.781e-05	179.55437±0.00461	0.755 ±0.552	2.4299±0.165	226.5±16.8	1.59 ±0.52	1360 ±0.17	807.74 ±200.20	15.00	6046 ±189	4.486 ±0.054
K00114.01	FALSE POSITIVE	FALSE POSITIVE	0.0000	7.36178958±2.128e-05	132.25053±0.00253	1.169 ±0.044	5.0220±0.136	233.7±5.8	39.21 ±6.45	1342 ±3.49	767.22 ±365.49	47.70	6227 ±111	3.986 ±0.182
K00757.01	CONFIRMED	CANDIDATE	1.0000	16.086864674±1.088e-07	173.621937±0.00051	0.052 ±0.352	3.5347±0.0241	4914.3±33.3	5.76 ±0.22	600 ±0.49	30.75 ±4.46	161.90	5031 ±75	4.485 ±0.083
K00001.01	CONFIRMED	CANDIDATE	0.8110	2.470613377±2.76e-08	122.763305±8.7e-08	0.818±0.001	1.74319±0.00107	14230.9±4.2	13.04±0.51	1339 ±1.33	761.46 ±106.21	4304.30	5820±78	4.457±0.024
K00002.01	CONFIRMED	CANDIDATE	1.0000	2.204735417±4.3e-08	121.3585417±1.6e-08	0.224 ±0.159	3.88864±0.0203	6674.7±1.7	16.1 ±0.81	2048 ±0.91	4148.92 ±1651.59	5945.90	6440 ±78	4.019 ±0.033
K00010.01	CONFIRMED	CANDIDATE	0.9980	3.522498429±1.98e-07	121.1194228±4.71e-07	0.631±0.007	3.19843±0.00653	9145.7±6.6	14.59 ±1.11	1521 ±1.11	1264.67 ±276.48	1741.50	6225 ±112	4.169 ±0.045
K00112.02	CONFIRMED	CANDIDATE	1.0000	3.709214104±6.536e-07	133.98318±0.00143	0.051 ±0.398	2.6302±0.0427	131.1±3	1.16 ±0.17	1206 ±0.15	500.46 ±197.98	50.60	5833 ±105	4.407 ±0.085
K00742.01	FALSE POSITIVE	FALSE POSITIVE	0.0000	11.521446064±1.98e-01	170.839688±0.00013	2.483 ±0.673	3.6399±0.0114	17984.3±31.9	150.51 ±39.76	753 ±13.31	75.84 ±19.99	622.10	5795 ±172	4.555 ±0.176
K00743.01	FALSE POSITIVE	FALSE POSITIVE	0.0000	19.40393776±2.068e-07	172.484253±0.0084	0.804 ±0.007	12.2155±0.0598	8918.7±53.3	7.18 ±0.76	523 ±0.68	214.70	5043±151	4.591 ±0.088	
K00744.01	FALSE POSITIVE	FALSE POSITIVE	0.0000	19.22138894±2.123e-07	184.552163±4.5e-01	1.065 ±0.034	4.79843±0.00235	74284±21.9	49.29 ±5	698 ±0.33	55.97 ±145.55	2317.00	6117 ±200	4.496 ±0.208
K00745.01	FALSE POSITIVE	FALSE POSITIVE	0.0000	16.46883774±1.361e-01	180.881761±0.00062	0.292 ±0.101	9.4378±0.06	10478.9±39.9	7.94 ±0.89	595 ±8.91	29.61 ±12.01	303.40	5152 ±168	4.517 ±0.072
K00746.01	CONFIRMED	CANDIDATE	1.0000	9.27358173±1.037e-05	173.258155±0.00087	0.387 ±0.386	3.2875±0.0309	1288.3±16.8	2.47 ±0.2	649 ±0.24	41.85 ±11.70	87.20	4856 ±146	4.583 ±0.033
K00747.01	CONFIRMED	CANDIDATE	1.0000	6.02930329±5.509e-06	171.602959±0.00071	0.258 ±0.258	1.5821±0.0311	1912.7±34.4	2.85 ±0.15	678 ±0.15	50.04 ±9.88	65.40	4537±123	4.648 ±0.02
K00748.01	FALSE POSITIVE	FALSE POSITIVE	0.0000	2.696370652±7.534e-01	170.73769±0.00234	0.044 ±0.044	3.6129±0.0686	397.9±9.5	1.58 ±0.16	1066 ±0.13	305.34 ±80.64	48.20	4989±149	4.500 ±0.09
K00749.01	CONFIRMED	CANDIDATE	1.0000	5.349553819±8.834e-01	171.80694±0.00127	0.092 ±0.092	3.0278±0.0471	831±14.8	2.55 ±0.16	919 ±0.11	168.99 ±34.66	60.60	5185 ±85	4.44 ±0.045
K00749.02	CONFIRMED	CANDIDATE	0.9800	3.94105221±1.094e-05	136.08662±0.00233	0.226 ±0.226	2.5984±0.0737	363.3±13.9	1.7 ±0.16	1018 ±0.11	253.15 ±57.65	28.90	5185 ±77	4.44 ±0.045
K00749.03	CONFIRMED	CANDIDATE	0.9710	8.10904807±6.787e-05	132.8031±0.00716	0.025 ±0.025	3.596±0.198	217.4±16.8	1.3 ±0.09	800 ±0.12	97.03 ±22.09	14.10	5185 ±77	4.44 ±0.098
K00113.01	FALSE POSITIVE	FALSE POSITIVE	0.0000	386.6030528±0.00136	166.342079±0.00029	0.9765 ±0.0197	6.8057±0.1084	24926.6±45.8	41.51 ±1.68	297 ±0.24	994.00	5543±79	4.081±0.014	
K00750.01	CONFIRMED	CANDIDATE	1.0000	21.67699193±7.01e-05	171.53594±0.00258	0.896 ±0.663	3.4555±0.0656	857.2±27.1	2.95 ±0.12	530 ±3.80	18.64 ±2.78	34.30	4954±79	4.5 ±0.075
K00751.01	CONFIRMED	CANDIDATE	1.0000	4.99677968±1.389e-05	171.74208±0.00219	0.7 ±0.533	2.1717±0.0762	934.7±39.7	2.78 ±0.52	917 ±42.14	166.95 ±110.46	28.20	5339 ±175	4.552 ±0.136

Showing records 1 to 28 of 9564 (9564 total) DOI 10.26133/NEA4

Clear Checked Check All Reset Filters

<https://exoplanetarchive.ipac.caltech.edu/cgi-bin/TblView/nph-tblView?app=ExoTbls&config=koi>

Dataset

Kepler Exoplanet Dataset

Target Variable

Koi_disposition
(Confirmed, False Positive)

Null Values

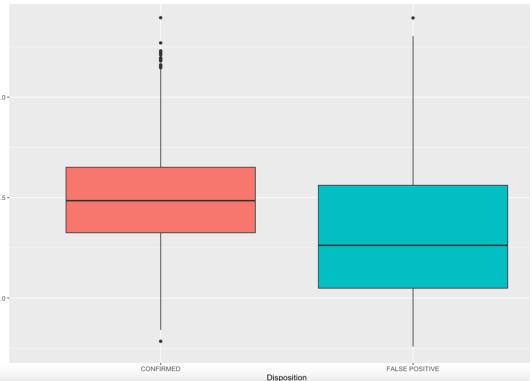
Zero

Research question 1

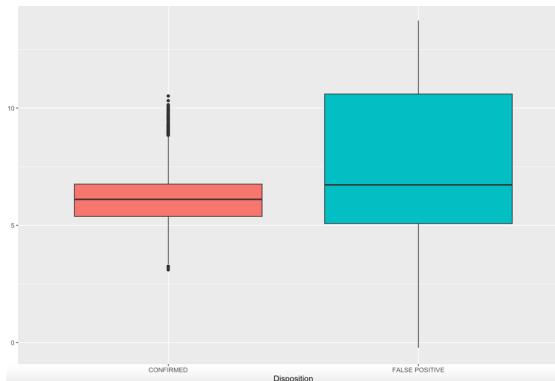
- How do the various observational parameters of Kepler Objects of Interest (KOIs) influence their classification as actual planets?
 - ❖ Impact of stellar parameters such as effective temperature and metallicity
 - ❖ Impact of transit properties such as duration and depth

Visualization

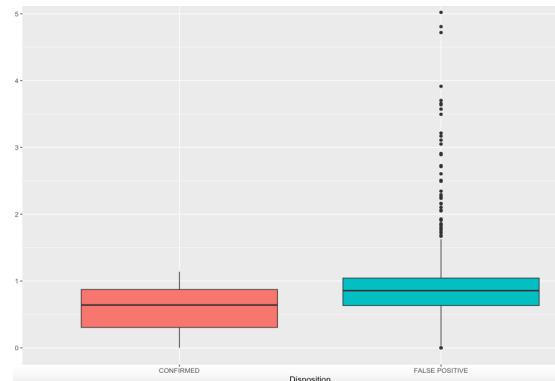
Transit Properties



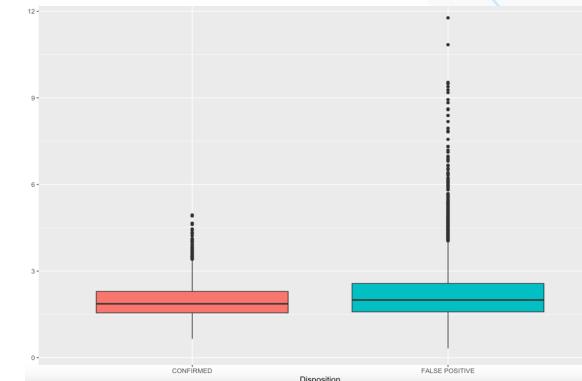
Koi_period



Koi_depth

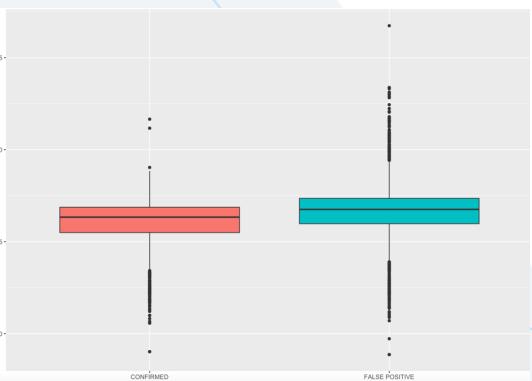


Koi_impact

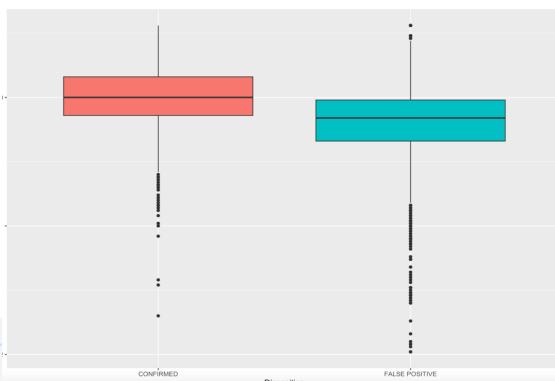


Koi_duration

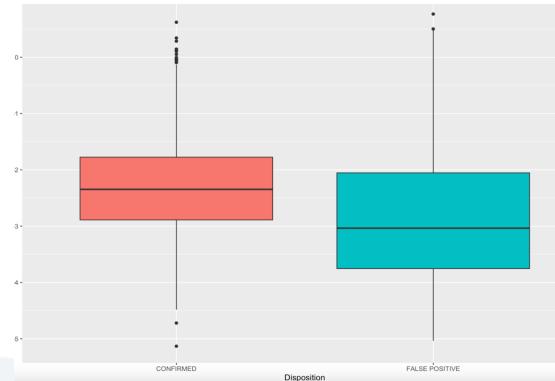
Stellar Properties



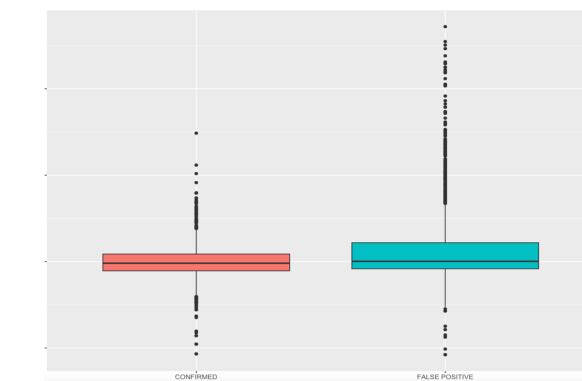
Koi_steff



Koi_smet



Koi_sma



Koi_srad

EDA

Summary

```

> summary(data)
      koi_period      koi_time0bk      koi_impact      koi_duration      koi_depth      koi_prad      koi_teq
Min. : 0.24 Min. : 120.5 Min. : 0.0000 Min. : 0.052 Min. : 0 Min. : 0.08 Min. : 25
1st Qu.: 2.73 1st Qu.: 132.8 1st Qu.: 0.1970 1st Qu.: 2.438 1st Qu.: 160 1st Qu.: 1.40 1st Qu.: 539
Median : 9.75 Median : 137.2 Median : 0.5370 Median : 3.793 Median : 421 Median : 2.39 Median : 878
Mean   : 75.67 Mean   : 166.2 Mean   : 0.7351 Mean   : 5.622 Mean   : 23792 Mean   : 102.89 Mean   : 1085
3rd Qu.: 40.72 3rd Qu.: 170.7 3rd Qu.: 0.8890 3rd Qu.: 6.277 3rd Qu.: 1470 3rd Qu.: 14.93 3rd Qu.: 1379
Max.   :129995.78 Max.   :1472.5 Max.   :100.8060 Max.   :138.540 Max.   :1540000 Max.   :200346.00 Max.   :14667

      koi_insol      koi_model_snr      koi_steff      koi_slogg      koi_smets      koi_srads      koi_smass
Min. :     0 Min. : 0.0 Min. : 2661 Min. : 0.047 Min. :-2.5000 Min. : 0.109 Min. : 0.000
1st Qu.:    20 1st Qu.: 12.0 1st Qu.: 5310 1st Qu.: 4.218 1st Qu.:-0.2600 1st Qu.: 0.829 1st Qu.: 0.845
Median : 142 Median : 23.0 Median : 5767 Median : 4.438 Median :-0.1000 Median : 1.000 Median : 0.974
Mean   : 7746 Mean   : 259.9 Mean   : 5707 Mean   : 4.310 Mean   :-0.1244 Mean   : 1.729 Mean   : 1.024
3rd Qu.:  870 3rd Qu.: 78.0 3rd Qu.: 6112 3rd Qu.: 4.543 3rd Qu.: 0.0700 3rd Qu.: 1.345 3rd Qu.: 1.101
Max.   :10947555 Max.   :9054.7 Max.   :15896 Max.   :5.364 Max.   : 0.5600 Max.   :229.908 Max.   :3.735
NA's   :321 NA's   :363 NA's   :363 NA's   :363 NA's   :386 NA's   :363 NA's   :363

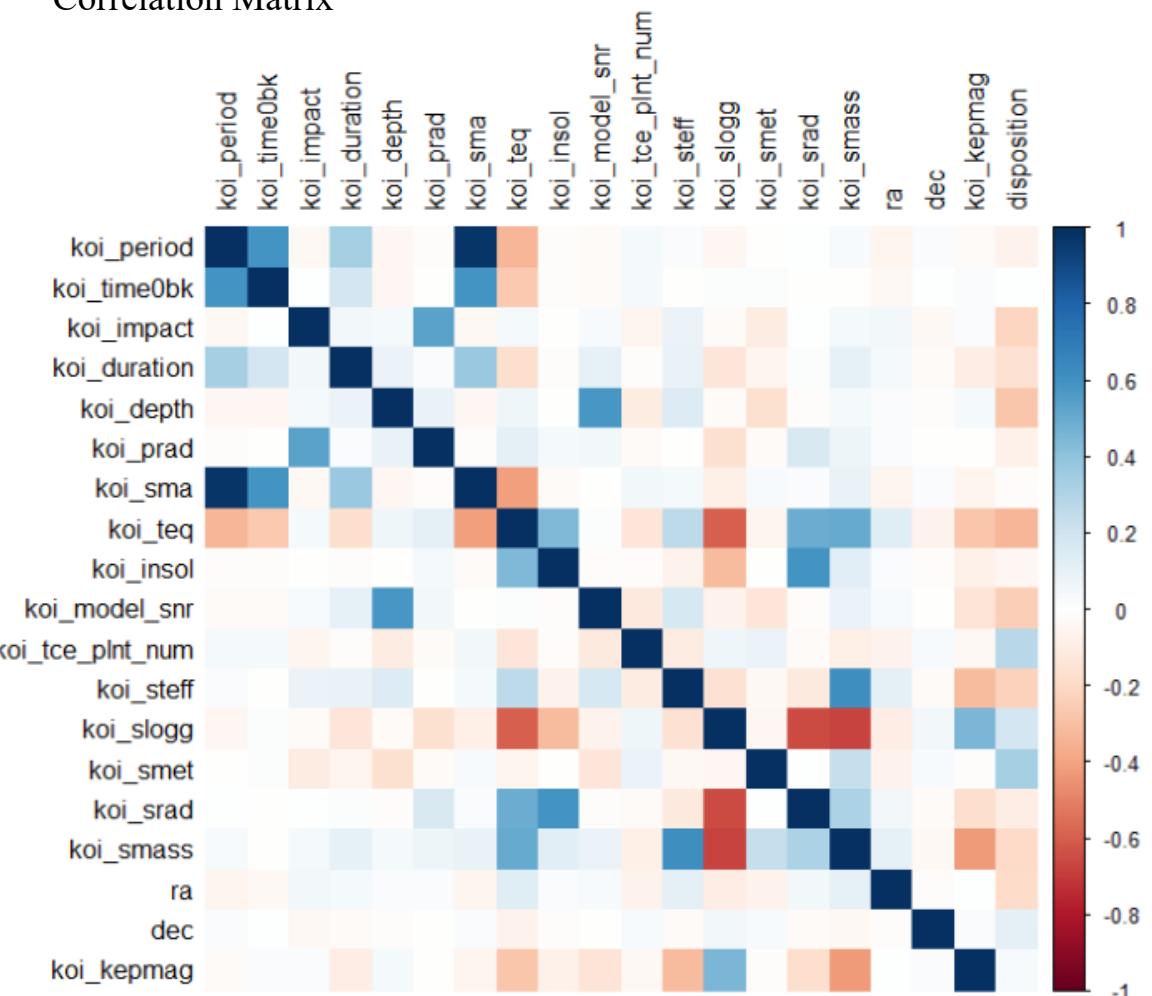
      ra          dec          koi_kepmag
Min. :279.9 Min. :36.58 Min. : 6.966
1st Qu.:288.7 1st Qu.:40.78 1st Qu.:13.440
Median :292.3 Median :43.68 Median :14.520
Mean   :292.1 Mean   :43.81 Mean   :14.265
3rd Qu.:295.9 3rd Qu.:46.71 3rd Qu.:15.322
Max.   :301.7  Max. :52.34 Max. : 20.003
NA's   :       1

```

Selected predictors

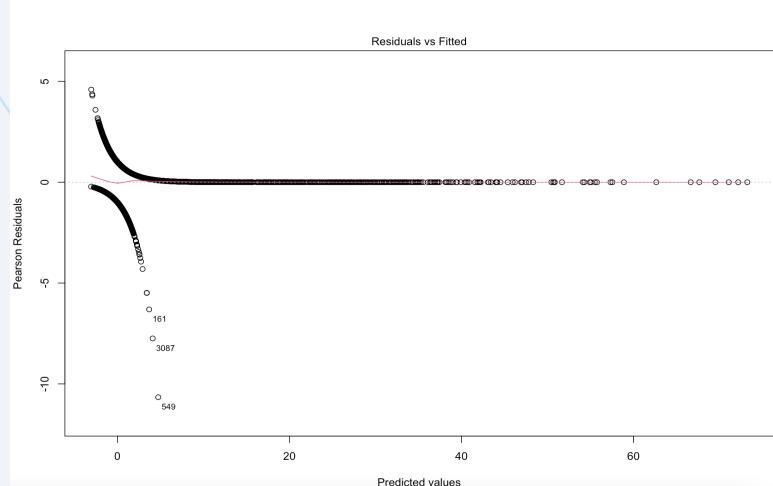
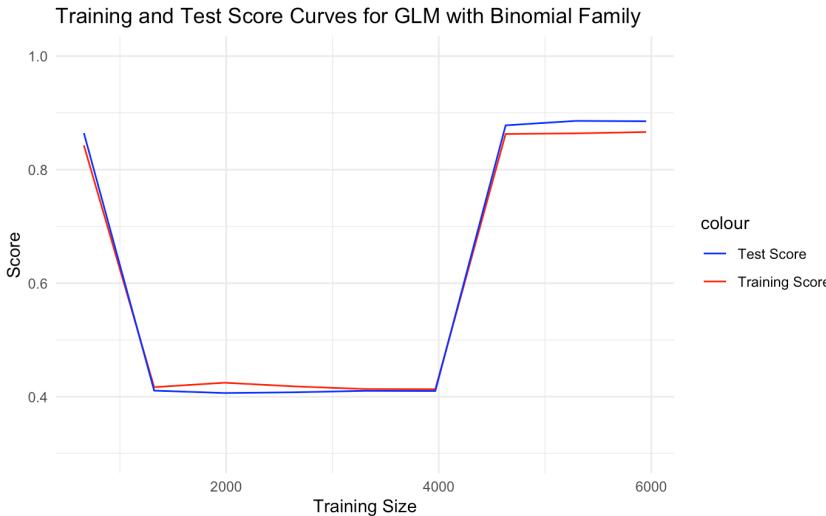
koi_prad	koi_sma
koi_model_snr	koi_insol
koi_depth	koi_teq
koi_period	koi_duration
koi_impact	koi_smet

Correlation Matrix

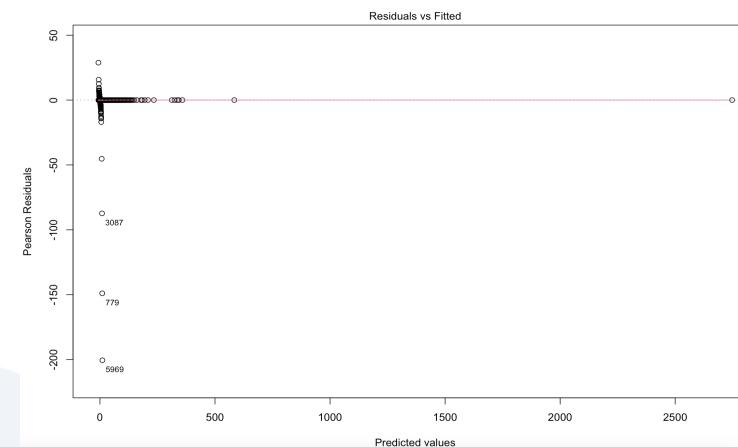
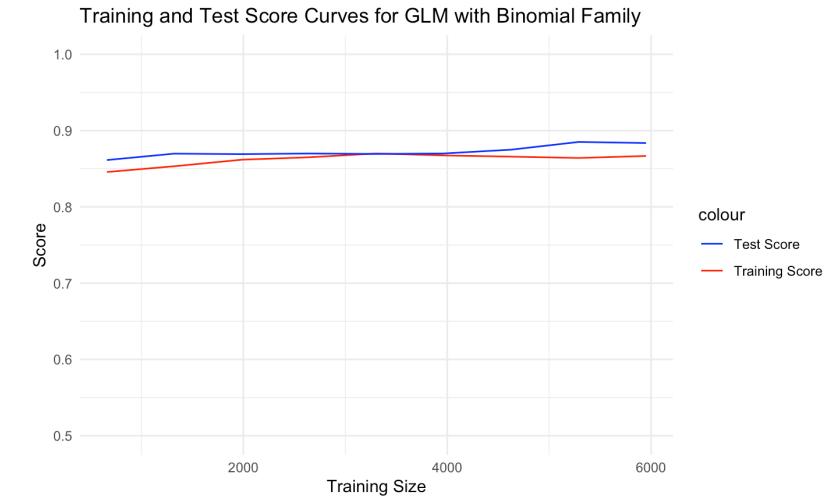


Parametric Modeling -> GLM

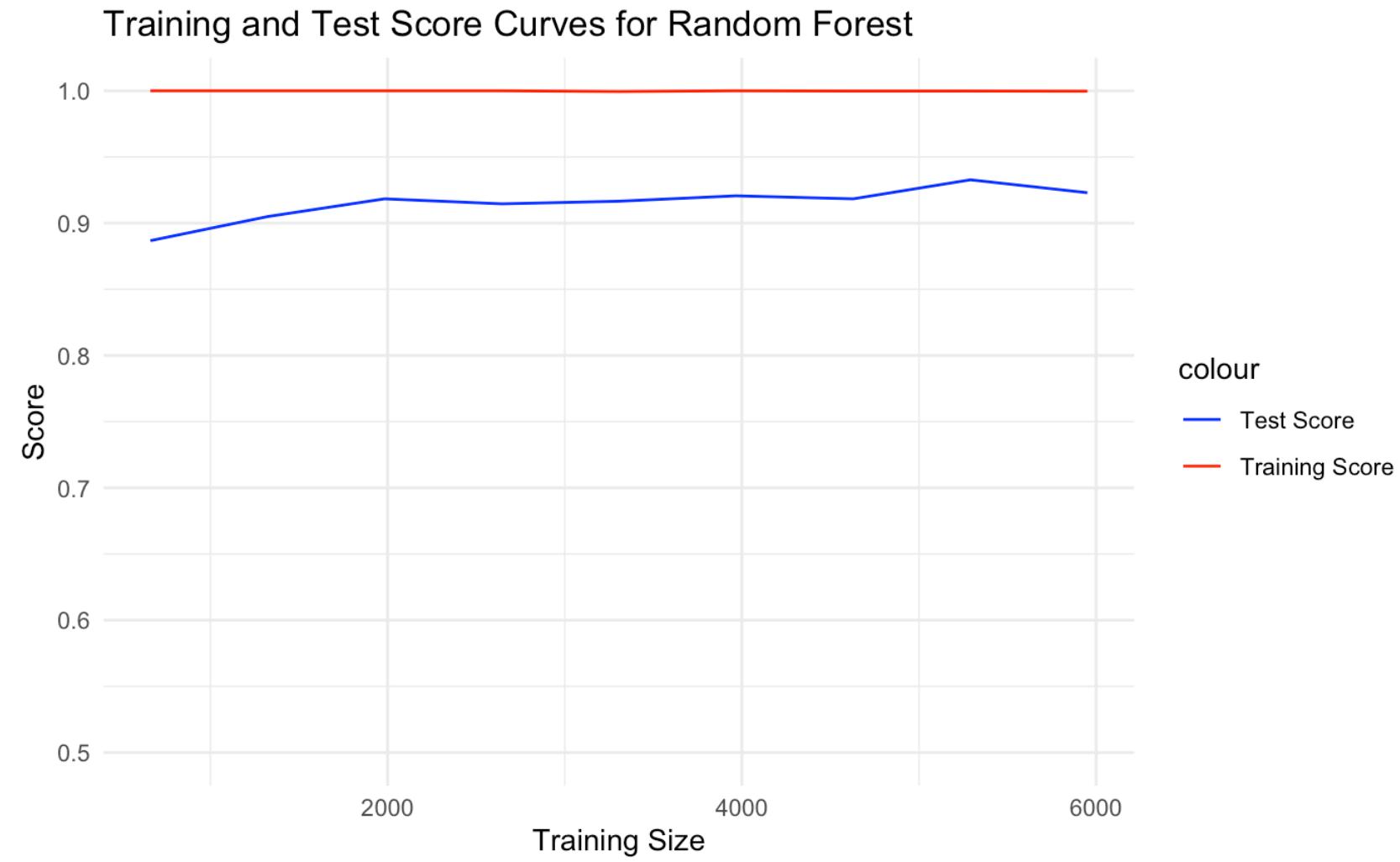
Without Regularization



With Regularization



Non-Parametric Modeling -> Random Forest



Evaluation

Standard deviation of accuracy for glm :
0.199362

"GLM Metrics:"
Confusion Matrix and Statistics

		Reference	
Prediction	CONFIRMED	FALSE POSITIVE	
CONFIRMED	713	131	
FALSE POSITIVE	93	1047	

Accuracy : 0.8871
95% CI : (0.8723, 0.9007)
No Information Rate : 0.5938
P-Value [Acc > NIR] : < 2e-16

Kappa : 0.7677

McNemar's Test P-Value : 0.01343

Sensitivity : 0.8846
Specificity : 0.8888
Pos Pred Value : 0.8448
Neg Pred Value : 0.9184
Prevalence : 0.4062
Detection Rate : 0.3594
Detection Prevalence : 0.4254
Balanced Accuracy : 0.8867

'Positive' Class : CONFIRMED

[1] "Random Forest Metrics:"
Confusion Matrix and Statistics



		Reference	
Prediction	CONFIRMED	FALSE POSITIVE	
CONFIRMED	750	80	
FALSE POSITIVE	73	1081	

Accuracy : 0.9229
95% CI : (0.9103, 0.9342)
No Information Rate : 0.5852
P-Value [Acc > NIR] : <2e-16

Kappa : 0.8414

McNemar's Test P-Value : 0.6276

Sensitivity : 0.9113
Specificity : 0.9311
Pos Pred Value : 0.9036
Neg Pred Value : 0.9367
Prevalence : 0.4148
Detection Rate : 0.3780
Detection Prevalence : 0.4183
Balanced Accuracy : 0.9212

'Positive' Class : CONFIRMED

Standard deviation of accuracy for random forest model : 0.002164

Results

	Predicted_Class CONFIRMED :750	Predicted_Class FALSE POSITIVE:1074
Transit Properties	koi_impact Min. : 0.00100 Max. :1.00600 koi_depth Min. : 22.2 Max. :20300.0 koi_prad Min. : 0.490 Max. :13.440 koi_period Min. : 0.4533 Max. :321.2124 koi_duration Min. : 0.4445 Max. :19.5280 koi_teq Min. : 207.0 Max. :1897.0 koi_insol Min. : 0.44 Max. :3069.59 koi_model_snr Min. : 8.60 Max. :1586.20	koi_impact Min. : 0.0000 Max. :13.2390 koi_depth Min. : 7.7 Max. :702000.0 koi_prad Min. : 0.18 Max. :2637.60 koi_period Min. : 0.2997 Max. :670.6455 koi_duration Min. : 0.1046 Max. :86.0500 koi_teq Min. : 133.0 Max. :14667.0 koi_insol Min. : 0 Max. :10947555 koi_model_snr Min. : 1.5 Max. :8251.5
Stellar Properties	koi_smet Min. : -1.700000 Max. : 0.560000 koi_srad Min. : 0.1180 Max. :3.3240 koi_steff Min. : 2703 Max. :7121	koi_smet Min. : -1.980 Max. : 0.560 koi_srad Min. : 0.116 Max. :138.056 koi_steff Min. : 2661 Max. :15896

Research question 2

- To gauge Earth-size+ planets in the habitable zone ("Goldilocks") across various star types

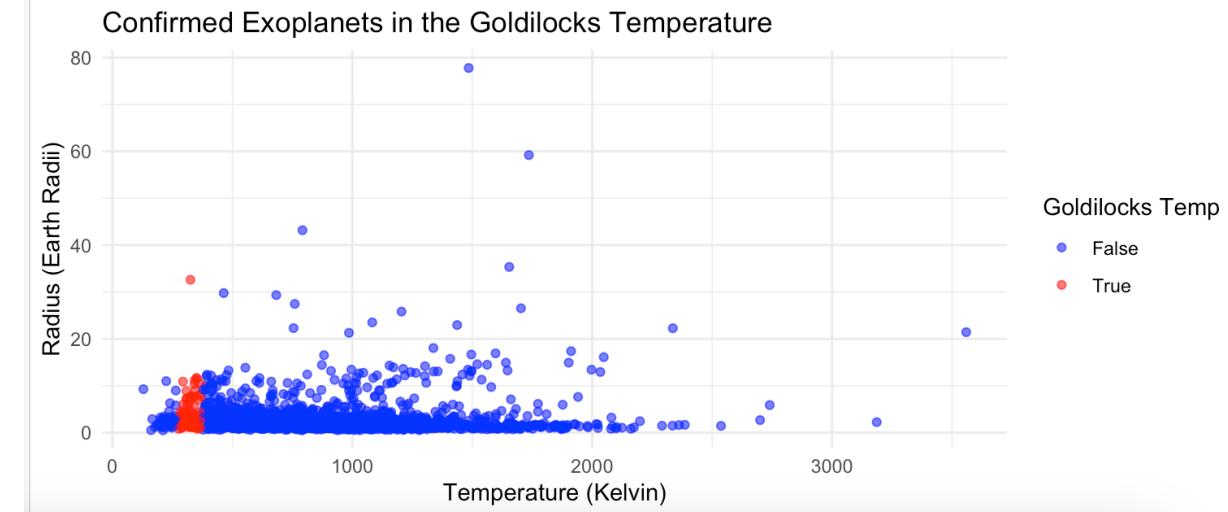
Temperature & Radii

- Earth like habitable planet is equilibrium temperature (Kelvin) range – (273.2K - 373.2K)
 - Relevant column → “koi_teq”

```
Exoplanets that are too_cold : 52 ( 1.91%)
Exoplanets that are just_right: 135 ( 4.96%)
Exoplanets that are too_hot   : 2537 (93.14%)
```

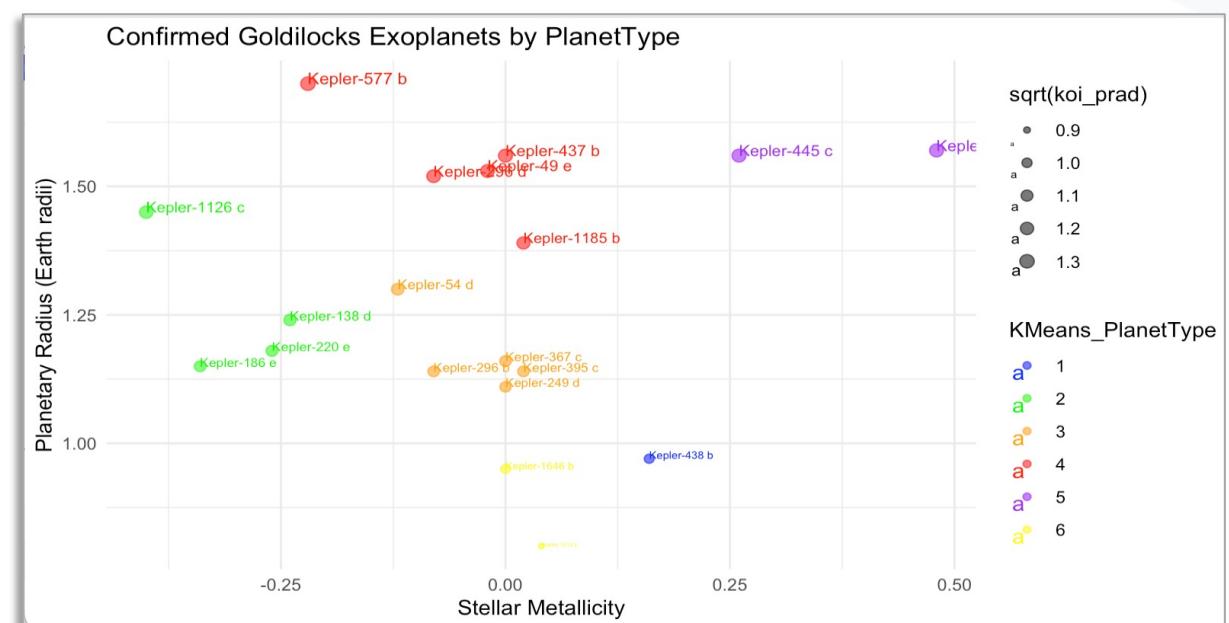
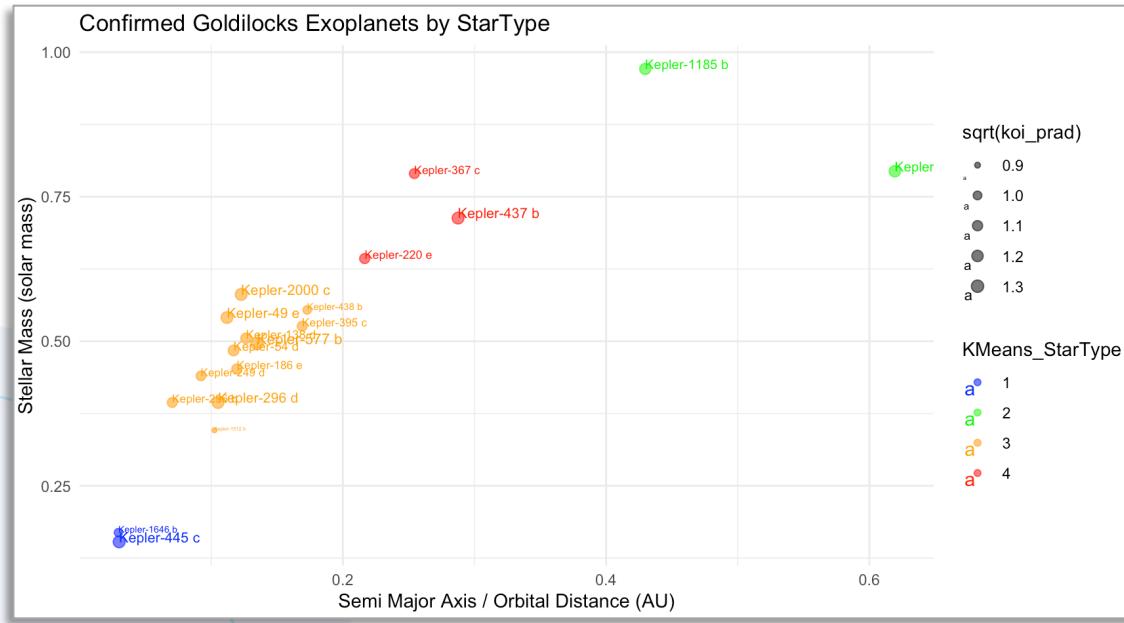
- Potentially habitable exoplanets radii is in the range of 0.8-1.7
 - Relevant column → “koi_prad”

```
Exoplanets that are too_small : 72 ( 2.64%)
Exoplanets that are just_right: 853 (31.31%)
Exoplanets that are too_big   : 1820 (66.81%)
```



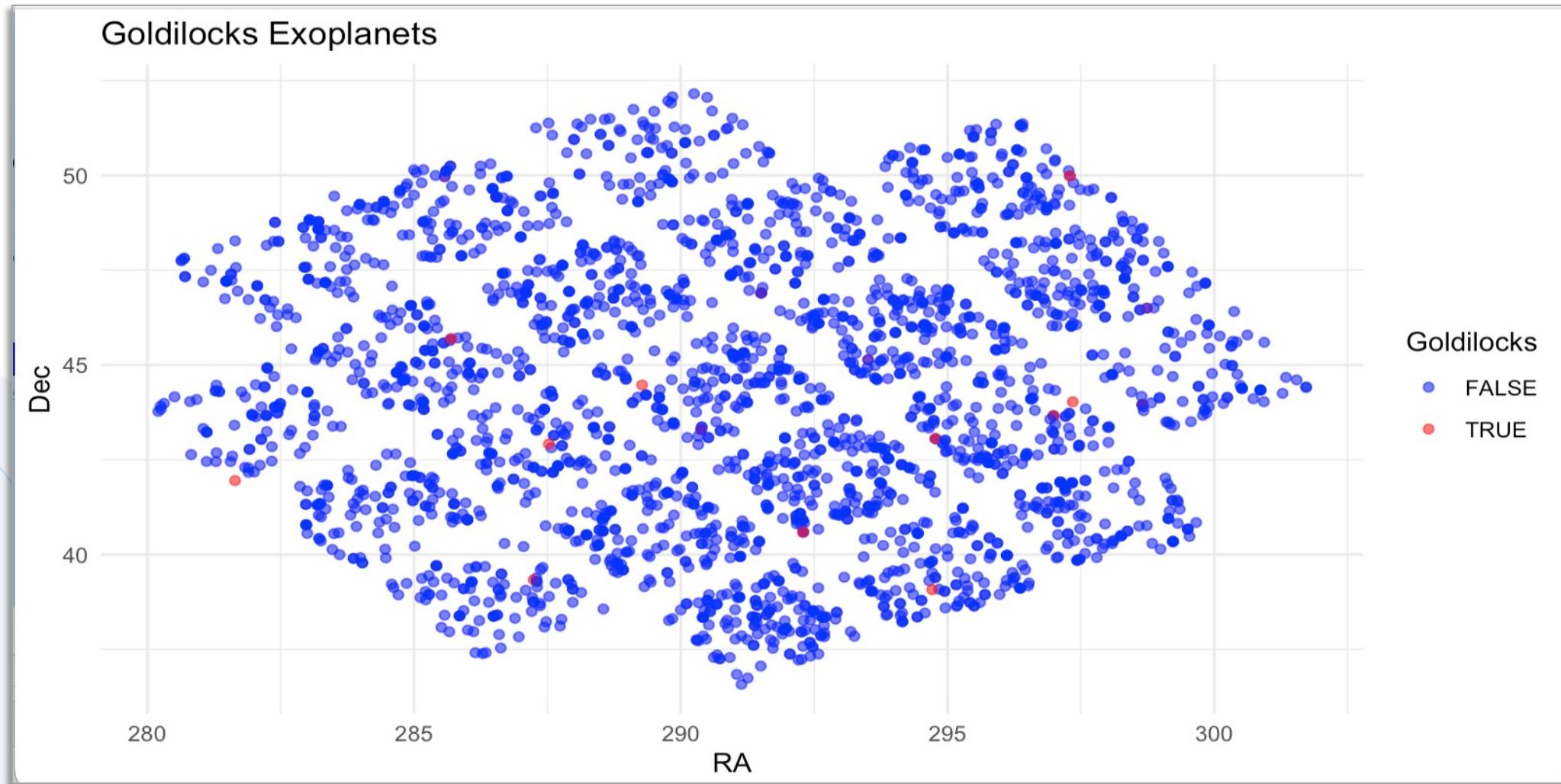
```
Exoplanets that are "just right" temp      : 110 ( 4.78%)
Exoplanets that are "just right" size       : 713 (30.96%)
Exoplanets that are "just right" combined   : 17 ( 0.74%)
```

Clustering of planets



Names of potentially habitable exoplanets: Kepler-54 d, Kepler-249 d, Kepler-296 d, Kepler-296 b, Kepler-367 c, Kepler-2000 c, Kepler-395 c, Kepler-49 e, Kepler-445 c, Kepler-138 d, Kepler-577 b, Kepler-186 e, Kepler-220 e, Kepler-437 b, Kepler-438 b, Kepler-1512 b, Kepler-1126 c, Kepler-1185 b, Kepler-1646 b

Star Map



Research question 3

- To establish the correlation between the different causes for disposition values "FALSE", "POSITIVE", "CONFIRMED" and "CANDIDATE".
- Also to establish the correlation between disposition values and flag variables.

EDA

COUNT OF TARGET VALUE CATEGORIES

Confirmed Planets: 2724
Candidate Planets: 1375
False Positive Planets: 3889

COMMENT VALUES

```
print(unique(data_set$koi_comment))

[1] "NO_COMMENT"
[3] "MOD_ODDEVEN_DV"
[5] "CENT_SATURATED"
[7] "CENT_UNRESOLVED_OFFSET"
[9] "DEPTH_ODDEVEN_ALT"
[11] "CENT_RESOLVED_OFFSET"
[13] "LPP_DV"
[15] "SEASONAL_DEPTH_DV"
[17] "LPP_ALT"
[19] "MOD_NONUNIQ_ALT"
[21] "DEPTH_ODDEVEN_DV"
[23] "CENT_FEW_DIFFS"
[25] "INDIV_TRANS_RUBBLE_SKYE_ZUMA_TRACKER"
[27] "TRANS_GAPPED"
[29] "SWEET_NTL"
[31] "CENT_UNCERTAIN"
[33] "INDIV_TRANS_SKYE"
[35] "INDIV_TRANS_RUBBLE"
[37] "INDIV_TRANSCHASES_MARSHALL_ZUMA"
[39] "MOD_POS_DV"
[41] "INDIV_TRANS_RUBBLE_SKYE"
[43] "CENT_NOFITS"
[45] "INDIV_TRANS_SKYE_ZUMA_TRACKER"
[47] "INDIV_TRANS_ZUMA"
[49] "RESIDUAL_TCE"
[51] "INDIV_TRANSCHASES"

[1] "DEEP_V_SHAPED"
[3] "MOD_SEC_DV"
[5] "CENT_KIC_POS"
[7] "INDIV_TRANSCHASES_MARSHALL"
[9] "SAME_NTL_PERIOD"
[11] "CENT_CROWDED"
[13] "MOD_SEC_ALT"
[15] "PLANET_IN_STAR"
[17] "HAS_SEC_TCE"
[19] "MOD_ODDEVEN_ALT"
[21] "CENT_FEW_MEAS"
[23] "INCONSISTENT_TRANS"
[25] "SWEET_EB"
[27] "INDIV_TRANS_MARSHALL_SKYE"
[29] "EPHEM_MATCH"
[31] "HALO_GHOST"
[33] "INDIV_TRANS_RUBBLE_SKYE_ZUMA"
[35] "ALL_TRANSCHASES"
[37] "INDIV_TRANS_MARSHALL"
[39] "INDIV_TRANS_MARSHALL_ZUMA"
[41] "INDIV_TRANSCHASES_SKYE"
[43] "IS_SEC_TCE"
[45] "INDIV_TRANSCHASES_MARSHALL_SKYE"
[47] "INDIV_TRANS_RUBBLE_MARSHALL_SKYE"
[49] "INDIV_TRANS_SKYE_ZUMA"
[51] "MOD_NONUNIQ_DV"
```

ONE HOT ENCODING

TARGET VARIABLE ENCODING

```
$ koi_disposition_CANDIDATE  
$ koi_disposition_CONFIRMED  
$ koi_disposition_FALSE_POSITIVE
```

COMMENT VARIABLE ENCODING

```
$ koi_comment_ALL_TRANS_CHASES
$ koi_comment_CENT_CROWDED
$ koi_comment_CENT_FEW_DIFFS
$ koi_comment_CENT_FEW_MEAS
$ koi_comment_CENT_KIC_POS
$ koi_comment_CENT_NOFITS
$ koi_comment_CENT_RESOLVED_OFFSET
$ koi_comment_CENT_SATURATED
$ koi_comment_CENT_UNCERTAIN
$ koi_comment_CENT_UNRESOLVED_OFFSET
$ koi_comment_DEEP_V_SHAPED
$ koi_comment_DEPTH_ODDEVEN_ALT
$ koi_comment_DEPTH_ODDEVEN_DV
$ koi_comment_EPHEM_MATCH
$ koi_comment_HALO_GHOST
$ koi_comment_HAS_SEC_TCE
$ koi_comment_INCONSISTENT_TRANS
$ koi_comment_INDIV_TRANS_CHASES
$ koi_comment_INDIV_TRANS_CHASES_MARSHALL
$ koi_comment_INDIV_TRANS_CHASES_MARSHALL_SKYE
$ koi_comment_INDIV_TRANS_CHASES_MARSHALL_ZUMA
$ koi_comment_INDIV_TRANS_CHASES_SKYE
$ koi_comment_INDIV_TRANS_MARSHALL
$ koi_comment_INDIV_TRANS_MARSHALL_SKYE
$ koi_comment_INDIV_TRANS_MARSHALL_ZUMA
```

```
: int 0 0 1 0 0 0 0 0 0 0 ...  
: int 1 1 0 0 1 1 1 1 0 1 ...  
: int 0 0 0 1 0 0 0 0 1 0 ...
```

Results

[1] 7988 52			
[1] 7988 3			
koi_comment_ALL_TRANS_CHASES	-0.054145153	-0.0210288775	0.0672348150
koi_comment_CENT_CROWDED	-0.011201277	0.0046788253	0.0070898859
koi_comment_CENT_FEW_DIFFS	-0.068361676	0.1914161840	-0.0797317130
koi_comment_CENT_FEW_MEAS	-0.031155302	0.1264585433	-0.0659597367
koi_comment_CENT_KIC_POS	0.142203996	0.0959048434	-0.2073024591
koi_comment_CENT_NOFITS	-0.031201851	0.0491621404	-0.0075372186
koi_comment_CENT_RESOLVED_OFFSET	-0.177824662	-0.0972464951	0.2420993201
koi_comment_CENT_SATURATED	0.05272738017	0.0172738017	-0.0630541622
koi_comment_CENT_UNCERTAIN	-0.022492218	0.0474071565	-0.0144722055
koi_comment_CENT_UNRESOLVED_OFFSET	-0.096928233	-0.0442620016	0.1253583062
koi_comment_DEEP_V_SHAPED	-0.107457814	-0.0016283816	0.1031456510
koi_comment_DEPTH_ODDEVEN_ALT	-0.036573564	-0.0257296342	0.0541197208
koi_comment_DEPTH_ODDEVEN_DV	-0.096671102	-0.0588814099	0.1361557942
koi_comment_EPHEM_MATCH	-0.058410478	-0.0389968467	0.0848505301
koi_comment_HALO_GHOST	-0.065062548	-0.0378582455	0.0902995960
koi_comment_HAS_SEC_TCE	-0.033980624	-0.0293689869	0.0544091420
koi_comment_INCONSISTENT_TRANS	-0.044996206	-0.0239804057	0.0607868646
koi_comment_INDIV_TRANS_CHASES	-0.013943403	0.0082770582	0.0069730130
koi_comment_INDIV_TRANS_CHASES_MARSHALL	-0.022776614	0.0274997304	0.0008326738
koi_comment_INDIV_TRANS_CHASES_MARSHALL_SKYE	-0.011384028	0.0137446990	0.0004161805
koi_comment_INDIV_TRANS_CHASES_MARSHALL_ZUMA	-0.008049219	0.0245389553	-0.0108990381
koi_comment_INDIV_TRANS_CHASES_SKYE	-0.013943403	0.0425080399	-0.0188800517
koi_comment_INDIV_TRANS_MARSHALL	-0.035125337	-0.0086495583	0.0398463994
koi_comment_INDIV_TRANS_MARSHALL_SKYE	-0.045896085	-0.0170665432	0.0564186162
koi_comment_INDIV_TRANS_MARSHALL_ZUMA	0.015554732	-0.0051022325	-0.0108990381
koi_comment_INDIV_TRANS_RUBBLE	-0.019722655	0.0359172350	-0.0084211299
koi_comment_INDIV_TRANS_RUBBLE_MARSHALL_SKYE	-0.008049219	0.0245389553	-0.0108990381
koi_comment_INDIV_TRANS_RUBBLE_SKYE	-0.007444458	0.0018474661	0.0056652143

INFERENCE for COMMENTS:
NO_COMMENT : High negative correlation with "False Positive" values and High positive correlation with "Confirmed" Values

Major comments for False Positive Values:
MOD_SEC_DV
LPP_DV
MOD_SEC_ALT
CENT_RESOLVED_OFFSET

	koi_disposition_CONFIRMED	koi_disposition_CANDIDATE	koi_disposition_FALSE POSITIVE
koi_fpflag_nt	0.001322653	-0.0140699	0.009371904
koi_fpflag_ss	-0.427372103	-0.2746942	0.612794606
koi_fpflag_co	-0.383801693	-0.2432839	0.547748582
koi_fpflag_ec	-0.284586130	-0.1803932	0.406151542

All the flags except for koi_flag_nt strongly-correlates with FALSE POSITIVE and hence can be major contributor for False Positive indication

Results

	koi_disposition_CONFIRMED	koi_disposition_CANDIDATE	koi_disposition_FALSE POSITIVE
koi_comment_NO_COMMENT	0.632855339	0.20173287	-0.752576042
koi_comment_MOD_SEC_DV	-0.271121874	-0.159752731	0.377792891
koi_comment_CENT_RESOLVED_OFFSET	-0.177824662	-0.097246495	0.24209932
koi_comment_LPP_DV	-0.161574099	-0.08808772	0.219769664
koi_comment_CENT_KIC_POS	0.142203996	0.095904843	-0.207302459
koi_comment_MOD_SEC_ALT	-0.128828889	-0.082614312	0.184579438
koi_comment_CENT_CROWDED	-0.011201277	0.004678825	0.007089886
koi_comment_INDIV_TRANS_CHASES	-0.013943403	0.008277058	0.006973013
koi_comment_INDIV_TRANS_RUBBLE_SKYE	-0.007444458	0.001847466	0.005665214
koi_comment_INDIV_TRANS_CHASES_MARSHALL	-0.022776614	0.02749973	0.000832674
koi_comment_INDIV_TRANS_CHASES_MARSHALL_SKYE	-0.011384028	0.013744699	0.000416181
koi_comment_CENT_NOFITS	-0.031201851	0.04916214	-0.007537219
koi_comment_INDIV_TRANS_RUBBLE	-0.019722655	0.035917235	-0.00842113

Thank
You

