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In [1]: #Name:- Kuldeep Ghorpade  
#Div:-B  
#Roll No.:-09  
#ExperimentN No. & Name:-(11) Building a predictive ML model- Decision Tree
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In [3]: #= Decision Tree is a Supervised Learning technique that can be used for both class  
and Regression problems, but mostly it is preferred for solving Classification prob  
It is a tree-structured classifier, where internal nodes represent the features of  
branches represent the decision rules and each Leaf node represents the outcome.=#
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In [4]: using Pandas
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In [5]: df_train=read_csv("ProcessedData.csv")
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Out[5]:	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoappIncome
0	LP001002	1	0	0	0	0	5849	
1	LP001003	1	1	1	0	0	4583	
2	LP001005	1	1	0	0	1	3000	
3	LP001006	1	1	0	1	0	2583	
4	LP001008	1	0	0	0	0	6000	
5	LP001011	1	1	2	0	1	5417	
6	LP001013	1	1	0	1	0	2333	
7	LP001014	1	1	3	0	0	3036	
8	LP001018	1	1	2	0	0	4006	
9	LP001020	1	1	1	0	0	12841	
10	LP001024	1	1	2	0	0	3200	
11	LP001027	1	1	2	0	0	2500	
12	LP001028	1	1	2	0	0	3073	
13	LP001029	1	0	0	0	0	1853	
14	LP001030	1	1	2	0	0	1299	
15	LP001032	1	0	0	0	0	4950	
16	LP001034	1	0	1	1	0	3596	
17	LP001036	0	0	0	0	0	3510	
18	LP001038	1	1	0	1	0	4887	
19	LP001041	1	1	0	0	0	2600	
20	LP001043	1	1	0	1	0	7660	
21	LP001046	1	1	1	0	0	5955	
22	LP001047	1	1	0	1	0	2600	
23	LP001050	1	1	2	1	0	3365	
24	LP001052	1	1	1	0	0	3717	
25	LP001066	1	1	0	0	1	9560	
26	LP001068	1	1	0	0	0	2799	
27	LP001073	1	1	2	1	0	4226	
28	LP001086	1	0	0	1	0	1442	
29	LP001087	0	0	2	0	0	3750	
30	LP001091	1	1	1	0	0	4166	
31	LP001095	1	0	0	0	0	3167	
32	LP001097	1	0	1	0	1	4692	

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoappIncome
33	LP001098	1	1	0	0	0	3500	
34	LP001100	1	0	3	0	0	12500	
35	LP001106	1	1	0	0	0	2275	
36	LP001109	1	1	0	0	0	1828	
37	LP001112	0	1	0	0	0	3667	
38	LP001114	1	0	0	0	0	4166	
39	LP001116	1	0	0	1	0	3748	
40	LP001119	1	0	0	0	0	3600	
41	LP001120	1	0	0	0	0	1800	
42	LP001123	1	1	0	0	0	2400	
43	LP001131	1	1	0	0	0	3941	
44	LP001136	1	1	0	1	1	4695	
45	LP001137	0	0	0	0	0	3410	
46	LP001138	1	1	1	0	0	5649	
47	LP001144	1	1	0	0	0	5821	
48	LP001146	0	1	0	0	0	2645	
49	LP001151	0	0	0	0	0	4000	
50	LP001155	0	1	0	1	0	1928	
51	LP001157	0	0	0	0	0	3086	
52	LP001164	0	0	0	0	0	4230	
53	LP001179	1	1	2	0	0	4616	
54	LP001186	0	1	1	0	1	11500	
55	LP001194	1	1	2	0	0	2708	
56	LP001195	1	1	0	0	0	2132	
57	LP001197	1	1	0	0	0	3366	
58	LP001198	1	1	1	0	0	8080	
59	LP001199	1	1	2	1	0	3357	
60	LP001205	1	1	0	0	0	2500	
61	LP001206	1	1	3	0	0	3029	
62	LP001207	1	1	0	1	1	2609	
63	LP001213	1	1	1	0	0	4945	
64	LP001222	0	0	0	0	0	4166	
65	LP001225	1	1	0	0	0	5726	

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	Coapp
66	LP001228	1	0	0	1	0	3200	
67	LP001233	1	1	1	0	0	10750	
68	LP001238	1	1	3	1	1	7100	
69	LP001241	0	0	0	0	0	4300	
70	LP001243	1	1	0	0	0	3208	
71	LP001245	1	1	2	1	1	1875	
72	LP001248	1	0	0	0	0	3500	
73	LP001250	1	1	3	1	0	4755	
74	LP001253	1	1	3	0	1	5266	
75	LP001255	1	0	0	0	0	3750	
76	LP001256	1	0	0	0	0	3750	
77	LP001259	1	1	1	0	1	1000	
78	LP001263	1	1	3	0	0	3167	
79	LP001264	1	1	3	1	1	3333	
80	LP001265	0	0	0	0	0	3846	
81	LP001266	1	1	1	0	1	2395	
82	LP001267	0	1	2	0	0	1378	
83	LP001273	1	1	0	0	0	6000	
84	LP001275	1	1	1	0	0	3988	
85	LP001279	1	0	0	0	0	2366	
86	LP001280	1	1	2	1	0	3333	
87	LP001282	1	1	0	0	0	2500	
88	LP001289	1	0	0	0	0	8566	
89	LP001310	1	1	0	0	0	5695	
90	LP001316	1	1	0	0	0	2958	
91	LP001318	1	1	2	0	0	6250	
92	LP001319	1	1	2	1	0	3273	
93	LP001322	1	0	0	0	0	4133	
94	LP001325	1	0	0	1	0	3620	
95	LP001326	1	0	0	0	0	6782	
96	LP001327	0	1	0	0	0	2484	
97	LP001333	1	1	0	0	0	1977	
98	LP001334	1	1	0	1	0	4188	

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoappIncome
99	LP001343	1	1	0	0	0	1759	
100	LP001345	1	1	2	1	0	4288	
101	LP001349	1	0	0	0	0	4843	
102	LP001350	1	1	0	0	0	13650	
103	LP001356	1	1	0	0	0	4652	
104	LP001357	1	1	0	0	0	3816	
105	LP001367	1	1	1	0	0	3052	
106	LP001369	1	1	2	0	0	11417	
107	LP001370	1	0	0	1	0	7333	
108	LP001379	1	1	2	0	0	3800	
109	LP001384	1	1	3	1	0	2071	
110	LP001385	1	0	0	0	0	5316	
111	LP001387	0	1	0	0	0	2929	
112	LP001391	1	1	0	1	0	3572	
113	LP001392	0	0	1	0	1	7451	
114	LP001398	1	0	0	0	0	5050	
115	LP001401	1	1	1	0	0	14583	
116	LP001404	0	1	0	0	0	3167	
117	LP001405	1	1	1	0	0	2214	
118	LP001421	1	1	0	0	0	5568	
119	LP001422	0	0	0	0	0	10408	
120	LP001426	1	1	0	0	0	5667	
121	LP001430	0	0	0	0	0	4166	
122	LP001431	0	0	0	0	0	2137	
123	LP001432	1	1	2	0	0	2957	
124	LP001439	1	1	0	1	0	4300	
125	LP001443	0	0	0	0	0	3692	
126	LP001448	1	1	3	0	0	23803	
127	LP001449	1	0	0	0	0	3865	
128	LP001451	1	1	1	0	1	10513	
129	LP001465	1	1	0	0	0	6080	
130	LP001469	1	0	0	0	1	20166	
131	LP001473	1	0	0	0	0	2014	

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoappIncome
132	LP001478	1	0	0	0	0	2718	
133	LP001482	1	1	0	0	1	3459	
134	LP001487	1	0	0	0	0	4895	
135	LP001488	1	1	3	0	0	4000	
136	LP001489	0	1	0	0	0	4583	
137	LP001491	1	1	2	0	1	3316	
138	LP001492	1	0	0	0	0	14999	
139	LP001493	1	1	2	1	0	4200	
140	LP001497	1	1	2	0	0	5042	
141	LP001498	1	0	0	0	0	5417	
142	LP001504	1	0	0	0	1	6950	
143	LP001507	1	1	0	0	0	2698	
144	LP001508	1	1	2	0	0	11757	
145	LP001514	0	1	0	0	0	2330	
146	LP001516	0	1	2	0	0	14866	
147	LP001518	1	1	1	0	0	1538	
148	LP001519	0	0	0	0	0	10000	
149	LP001520	1	1	0	0	0	4860	
150	LP001528	1	0	0	0	0	6277	
151	LP001529	1	1	0	0	1	2577	
152	LP001531	1	0	0	0	0	9166	
153	LP001532	1	1	2	1	0	2281	
154	LP001535	1	0	0	0	0	3254	
155	LP001536	1	1	3	0	0	39999	
156	LP001541	1	1	1	0	0	6000	
157	LP001543	1	1	1	0	0	9538	
158	LP001546	1	0	0	0	0	2980	
159	LP001552	1	1	0	0	0	4583	
160	LP001560	1	1	0	1	0	1863	
161	LP001562	1	1	0	0	0	7933	
162	LP001565	1	1	1	0	0	3089	
163	LP001570	1	1	2	0	0	4167	
164	LP001572	1	1	0	0	0	9323	

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoappIncome
165	LP001574	1	1	0	0	0	3707	
166	LP001577	0	1	0	0	0	4583	
167	LP001578	1	1	0	0	0	2439	
168	LP001579	1	0	0	0	0	2237	
169	LP001580	1	1	2	0	0	8000	
170	LP001581	1	1	0	1	0	1820	
171	LP001585	1	1	3	0	0	51763	
172	LP001586	1	1	3	1	0	3522	
173	LP001594	1	1	0	0	0	5708	
174	LP001603	1	1	0	1	1	4344	
175	LP001606	1	1	0	0	0	3497	
176	LP001608	1	1	2	0	0	2045	
177	LP001610	1	1	3	0	0	5516	
178	LP001616	1	1	1	0	0	3750	
179	LP001630	1	0	0	1	0	2333	
180	LP001633	1	1	1	0	0	6400	
181	LP001634	1	0	0	0	0	1916	
182	LP001636	1	1	0	0	0	4600	
183	LP001637	1	1	1	0	0	33846	
184	LP001639	0	1	0	0	0	3625	
185	LP001640	1	1	0	0	1	39147	
186	LP001641	1	1	1	0	1	2178	
187	LP001643	1	1	0	0	0	2383	
188	LP001644	1	1	0	0	1	674	
189	LP001647	1	1	0	0	0	9328	
190	LP001653	1	0	0	1	0	4885	
191	LP001656	1	0	0	0	0	12000	
192	LP001657	1	1	0	1	0	6033	
193	LP001658	1	0	0	0	0	3858	
194	LP001664	1	0	0	0	0	4191	
195	LP001665	1	1	1	0	0	3125	
196	LP001666	1	0	0	0	0	8333	
197	LP001669	0	0	0	1	0	1907	

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoappIncome
198	LP001671	0	1	0	0	0	3416	
199	LP001673	1	0	0	0	1	11000	
200	LP001674	1	1	1	1	0	2600	
201	LP001677	1	0	2	0	0	4923	
202	LP001682	1	1	3	1	0	3992	
203	LP001688	1	1	1	1	0	3500	
204	LP001691	1	1	2	1	0	3917	
205	LP001692	0	0	0	1	0	4408	
206	LP001693	0	0	0	0	0	3244	
207	LP001698	1	0	0	1	0	3975	
208	LP001699	1	0	0	0	0	2479	
209	LP001702	1	0	0	0	0	3418	
210	LP001708	0	0	0	0	0	10000	
211	LP001711	1	1	3	0	0	3430	
212	LP001713	1	1	1	0	1	7787	
213	LP001715	1	1	3	1	1	5703	
214	LP001716	1	1	0	0	0	3173	
215	LP001720	1	1	3	1	0	3850	
216	LP001722	1	1	0	0	0	150	
217	LP001726	1	1	0	0	0	3727	
218	LP001732	1	1	2	0	0	5000	
219	LP001734	0	1	2	0	0	4283	
220	LP001736	1	1	0	0	0	2221	
221	LP001743	1	1	2	0	0	4009	
222	LP001744	1	0	0	0	0	2971	
223	LP001749	1	1	0	0	0	7578	
224	LP001750	1	1	0	0	0	6250	
225	LP001751	1	1	0	0	0	3250	
226	LP001754	1	1	0	1	1	4735	
227	LP001758	1	1	2	0	0	6250	
228	LP001760	1	1	0	0	0	4758	
229	LP001761	1	0	0	0	1	6400	
230	LP001765	1	1	1	0	0	2491	

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoappIncome
231	LP001768	1	1	0	0	0	3716	
232	LP001770	1	0	0	1	0	3189	
233	LP001776	0	0	0	0	0	8333	
234	LP001778	1	1	1	0	0	3155	
235	LP001784	1	1	1	0	0	5500	
236	LP001786	1	1	0	0	0	5746	
237	LP001788	0	0	0	0	1	3463	
238	LP001790	0	0	1	0	0	3812	
239	LP001792	1	1	1	0	0	3315	
240	LP001798	1	1	2	0	0	5819	
241	LP001800	1	1	1	1	0	2510	
242	LP001806	1	0	0	0	0	2965	
243	LP001807	1	1	2	0	1	6250	
244	LP001811	1	1	0	1	0	3406	
245	LP001813	1	0	0	0	1	6050	
246	LP001814	1	1	2	0	0	9703	
247	LP001819	1	1	1	1	0	6608	
248	LP001824	1	1	1	0	0	2882	
249	LP001825	1	1	0	0	0	1809	
250	LP001835	1	1	0	1	0	1668	
251	LP001836	0	0	2	0	0	3427	
252	LP001841	1	0	0	1	1	2583	
253	LP001843	1	1	1	1	0	2661	
254	LP001844	1	0	0	0	1	16250	
255	LP001846	0	0	3	0	0	3083	
256	LP001849	1	0	0	1	0	6045	
257	LP001854	1	1	3	0	0	5250	
258	LP001859	1	1	0	0	0	14683	
259	LP001864	1	1	3	1	0	4931	
260	LP001865	1	1	1	0	0	6083	
261	LP001868	1	0	0	0	0	2060	
262	LP001870	0	0	1	0	0	3481	
263	LP001871	0	0	0	0	0	7200	

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoappIncome
264	LP001872	1	0	0	0	1	5166	
265	LP001875	1	0	0	0	0	4095	
266	LP001877	1	1	2	0	0	4708	
267	LP001882	1	1	3	0	0	4333	
268	LP001883	0	0	0	0	0	3418	
269	LP001884	0	0	1	0	0	2876	
270	LP001888	0	0	0	0	0	3237	
271	LP001891	1	1	0	0	0	11146	
272	LP001892	1	0	0	0	0	2833	
273	LP001894	1	1	0	0	0	2620	
274	LP001896	1	1	2	0	0	3900	
275	LP001900	1	1	1	0	0	2750	
276	LP001903	1	1	0	0	0	3993	
277	LP001904	1	1	0	0	0	3103	
278	LP001907	1	1	0	0	0	14583	
279	LP001908	0	1	0	1	0	4100	
280	LP001910	1	0	1	1	1	4053	
281	LP001914	1	1	0	0	0	3927	
282	LP001915	1	1	2	0	0	2301	
283	LP001917	0	0	0	0	0	1811	
284	LP001922	1	1	0	0	0	20667	
285	LP001924	1	0	0	0	0	3158	
286	LP001925	0	0	0	0	1	2600	
287	LP001926	1	1	0	0	0	3704	
288	LP001931	0	0	0	0	0	4124	
289	LP001935	1	0	0	0	0	9508	
290	LP001936	1	1	0	0	0	3075	
291	LP001938	1	1	2	0	0	4400	
292	LP001940	1	1	2	0	0	3153	
293	LP001945	0	0	0	0	0	5417	
294	LP001947	1	1	0	0	0	2383	
295	LP001949	1	1	3	0	0	4416	
296	LP001953	1	1	1	0	0	6875	

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoappIncome
297	LP001954	0	1	1	0	0	4666	
298	LP001955	0	0	0	0	0	5000	
299	LP001963	1	1	1	0	0	2014	
300	LP001964	1	1	0	1	0	1800	
301	LP001972	1	1	0	1	0	2875	
302	LP001974	0	0	0	0	0	5000	
303	LP001977	1	1	1	0	0	1625	
304	LP001978	1	0	0	0	0	4000	
305	LP001990	1	0	0	1	0	2000	
306	LP001993	0	0	0	0	0	3762	
307	LP001994	0	0	0	0	0	2400	
308	LP001996	1	0	0	0	0	20233	
309	LP001998	1	1	2	1	0	7667	
310	LP002002	0	0	0	0	0	2917	
311	LP002004	1	0	0	1	0	2927	
312	LP002006	0	0	0	0	0	2507	
313	LP002008	1	1	2	0	1	5746	
314	LP002024	1	1	0	0	0	2473	
315	LP002031	1	1	1	1	0	3399	
316	LP002035	1	1	2	0	0	3717	
317	LP002036	1	1	0	0	0	2058	
318	LP002043	0	0	1	0	0	3541	
319	LP002050	1	1	1	0	1	10000	
320	LP002051	1	1	0	0	0	2400	
321	LP002053	1	1	3	0	0	4342	
322	LP002054	1	1	2	1	0	3601	
323	LP002055	0	0	0	0	0	3166	
324	LP002065	1	1	3	0	0	15000	
325	LP002067	1	1	1	0	1	8666	
326	LP002068	1	0	0	0	0	4917	
327	LP002082	1	1	0	0	1	5818	
328	LP002086	0	1	0	0	0	4333	
329	LP002087	0	0	0	0	0	2500	

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoappIncome
330	LP002097	1	0	1	0	0	4384	
331	LP002098	1	0	0	0	0	2935	
332	LP002100	1	0	0	0	0	2833	
333	LP002101	1	1	0	0	0	63337	
334	LP002103	1	1	1	0	1	9833	
335	LP002106	1	1	0	0	1	5503	
336	LP002110	1	1	1	0	0	5250	
337	LP002112	1	1	2	0	1	2500	
338	LP002113	0	0	3	1	0	1830	
339	LP002114	0	0	0	0	0	4160	
340	LP002115	1	1	3	1	0	2647	
341	LP002116	0	0	0	0	0	2378	
342	LP002119	1	1	1	1	0	4554	
343	LP002126	1	1	3	1	0	3173	
344	LP002128	1	1	2	0	0	2583	
345	LP002129	1	1	0	0	0	2499	
346	LP002130	1	1	0	1	0	3523	
347	LP002131	1	1	2	1	0	3083	
348	LP002137	1	1	0	0	0	6333	
349	LP002138	1	1	0	0	0	2625	
350	LP002139	1	1	0	0	0	9083	
351	LP002140	1	0	0	0	0	8750	
352	LP002141	1	1	3	0	0	2666	
353	LP002142	0	1	0	0	1	5500	
354	LP002143	0	1	0	0	0	2423	
355	LP002144	0	0	0	0	0	3813	
356	LP002149	1	1	2	0	0	8333	
357	LP002151	1	1	1	0	0	3875	
358	LP002158	1	1	0	1	0	3000	
359	LP002160	1	1	3	0	0	5167	
360	LP002161	0	0	1	0	0	4723	
361	LP002170	1	1	2	0	0	5000	
362	LP002175	1	1	0	0	0	4750	

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoappIncome
363	LP002178	1	1	0	0	0	3013	
364	LP002180	1	0	0	0	1	6822	
365	LP002181	1	0	0	1	0	6216	
366	LP002187	1	0	0	0	0	2500	
367	LP002188	1	0	0	0	0	5124	
368	LP002190	1	1	1	0	0	6325	
369	LP002191	1	1	0	0	0	19730	
370	LP002194	0	0	0	0	1	15759	
371	LP002197	1	1	2	0	0	5185	
372	LP002201	1	1	2	0	1	9323	
373	LP002205	1	0	1	0	0	3062	
374	LP002209	0	0	0	0	0	2764	
375	LP002211	1	1	0	0	0	4817	
376	LP002219	1	1	3	0	0	8750	
377	LP002223	1	1	0	0	0	4310	
378	LP002224	1	0	0	0	0	3069	
379	LP002225	1	1	2	0	0	5391	
380	LP002226	1	1	0	0	0	3333	
381	LP002229	1	0	0	0	0	5941	
382	LP002231	0	0	0	0	0	6000	
383	LP002234	1	0	0	0	1	7167	
384	LP002236	1	1	2	0	0	4566	
385	LP002237	1	0	1	0	0	3667	
386	LP002239	1	0	0	1	0	2346	
387	LP002243	1	1	0	1	0	3010	
388	LP002244	1	1	0	0	0	2333	
389	LP002250	1	1	0	0	0	5488	
390	LP002255	1	0	3	0	0	9167	
391	LP002262	1	1	3	0	0	9504	
392	LP002263	1	1	0	0	0	2583	
393	LP002265	1	1	2	1	0	1993	
394	LP002266	1	1	2	0	0	3100	
395	LP002272	1	1	2	0	0	3276	

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoappIncome
396	LP002277	0	0	0	0	0	0	3180
397	LP002281	1	1	0	0	0	0	3033
398	LP002284	1	0	0	1	0	0	3902
399	LP002287	0	0	0	0	0	0	1500
400	LP002288	1	1	2	1	0	0	2889
401	LP002296	1	0	0	1	0	0	2755
402	LP002297	1	0	0	0	0	0	2500
403	LP002300	0	0	0	1	0	0	1963
404	LP002301	0	0	0	0	1	0	7441
405	LP002305	0	0	0	0	0	0	4547
406	LP002308	1	1	0	1	0	0	2167
407	LP002314	0	0	0	1	0	0	2213
408	LP002315	1	1	1	0	0	0	8300
409	LP002317	1	1	3	0	0	0	81000
410	LP002318	0	0	1	1	1	0	3867
411	LP002319	1	1	0	0	0	0	6256
412	LP002328	1	1	0	1	0	0	6096
413	LP002332	1	1	0	1	0	0	2253
414	LP002335	0	1	0	1	0	0	2149
415	LP002337	0	0	0	0	0	0	2995
416	LP002341	0	0	1	0	0	0	2600
417	LP002342	1	1	2	0	1	0	1600
418	LP002345	1	1	0	0	0	0	1025
419	LP002347	1	1	0	0	0	0	3246
420	LP002348	1	1	0	0	0	0	5829
421	LP002357	0	0	0	1	0	0	2720
422	LP002361	1	1	0	0	0	0	1820
423	LP002362	1	1	1	0	0	0	7250
424	LP002364	1	1	0	0	0	0	14880
425	LP002366	1	1	0	0	0	0	2666
426	LP002367	0	0	1	1	0	0	4606
427	LP002368	1	1	2	0	0	0	5935
428	LP002369	1	1	0	0	0	0	2920

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoappIncome
429	LP002370	1	0	0	1	0	2717	
430	LP002377	0	0	1	0	1	8624	
431	LP002379	1	0	0	0	0	6500	
432	LP002386	1	0	0	0	0	12876	
433	LP002387	1	1	0	0	0	2425	
434	LP002390	1	0	0	0	0	3750	
435	LP002393	0	1	0	0	0	10047	
436	LP002398	1	0	0	0	0	1926	
437	LP002401	1	1	0	0	0	2213	
438	LP002403	1	0	0	0	1	10416	
439	LP002407	0	1	0	1	1	7142	
440	LP002408	1	0	0	0	0	3660	
441	LP002409	1	1	0	0	0	7901	
442	LP002418	1	0	3	1	0	4707	
443	LP002422	1	0	1	0	0	37719	
444	LP002424	1	1	0	0	0	7333	
445	LP002429	1	1	1	0	1	3466	
446	LP002434	1	1	2	1	0	4652	
447	LP002435	1	1	0	0	0	3539	
448	LP002443	1	1	2	0	0	3340	
449	LP002444	1	0	1	1	1	2769	
450	LP002446	1	1	2	1	0	2309	
451	LP002447	1	1	2	1	0	1958	
452	LP002448	1	1	0	0	0	3948	
453	LP002449	1	1	0	0	0	2483	
454	LP002453	1	0	0	0	1	7085	
455	LP002455	1	1	2	0	0	3859	
456	LP002459	1	1	0	0	0	4301	
457	LP002467	1	1	0	0	0	3708	
458	LP002472	1	0	2	0	0	4354	
459	LP002473	1	1	0	0	0	8334	
460	LP002478	1	1	0	0	1	2083	
461	LP002484	1	1	3	0	0	7740	

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoappIncome
462	LP002487	1	1	0	0	0	3015	
463	LP002489	0	0	1	1	0	5191	
464	LP002493	1	0	0	0	0	4166	
465	LP002494	1	0	0	0	0	6000	
466	LP002500	1	1	3	1	0	2947	
467	LP002501	1	1	0	0	0	16692	
468	LP002502	0	1	2	1	0	210	
469	LP002505	1	1	0	0	0	4333	
470	LP002515	1	1	1	0	1	3450	
471	LP002517	1	1	1	1	0	2653	
472	LP002519	1	1	3	0	0	4691	
473	LP002522	0	0	0	0	1	2500	
474	LP002524	1	0	2	0	0	5532	
475	LP002527	1	1	2	0	1	16525	
476	LP002529	1	1	2	0	0	6700	
477	LP002530	1	1	2	0	0	2873	
478	LP002531	1	1	1	0	1	16667	
479	LP002533	1	1	2	0	0	2947	
480	LP002534	0	0	0	1	0	4350	
481	LP002536	1	1	3	1	0	3095	
482	LP002537	1	1	0	0	0	2083	
483	LP002541	1	1	0	0	0	10833	
484	LP002543	1	1	2	0	0	8333	
485	LP002544	1	1	1	1	0	1958	
486	LP002545	1	0	2	0	0	3547	
487	LP002547	1	1	1	0	0	18333	
488	LP002555	1	1	2	0	1	4583	
489	LP002556	1	0	0	0	0	2435	
490	LP002560	1	0	0	1	0	2699	
491	LP002562	1	1	1	1	0	5333	
492	LP002571	1	0	0	1	0	3691	
493	LP002582	0	0	0	1	1	17263	
494	LP002585	1	1	0	0	0	3597	

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoappIncome
495	LP002586	0	1	1	0	0	3326	
496	LP002587	1	1	0	1	0	2600	
497	LP002588	1	1	0	0	0	4625	
498	LP002600	1	1	1	0	1	2895	
499	LP002602	1	0	0	0	0	6283	
500	LP002603	0	0	0	0	0	645	
501	LP002606	0	0	0	0	0	3159	
502	LP002615	1	1	2	0	0	4865	
503	LP002618	1	1	1	1	0	4050	
504	LP002619	1	1	0	1	0	3814	
505	LP002622	1	1	2	0	0	3510	
506	LP002624	1	1	0	0	0	20833	
507	LP002625	1	0	0	0	0	3583	
508	LP002626	1	1	0	0	1	2479	
509	LP002634	0	0	1	0	0	13262	
510	LP002637	1	0	0	1	0	3598	
511	LP002640	1	1	1	0	0	6065	
512	LP002643	1	1	2	0	0	3283	
513	LP002648	1	1	0	0	0	2130	
514	LP002652	1	0	0	0	0	5815	
515	LP002659	1	1	3	0	0	3466	
516	LP002670	0	1	2	0	0	2031	
517	LP002682	1	1	0	1	0	3074	
518	LP002683	1	0	0	0	0	4683	
519	LP002684	0	0	0	1	0	3400	
520	LP002689	1	1	2	1	0	2192	
521	LP002690	1	0	0	0	0	2500	
522	LP002692	1	1	3	0	1	5677	
523	LP002693	1	1	2	0	1	7948	
524	LP002697	1	0	0	0	0	4680	
525	LP002699	1	1	2	0	1	17500	
526	LP002705	1	1	0	0	0	3775	
527	LP002706	1	1	1	1	0	5285	

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoappIncome
528	LP002714	1	0	1	1	0	2679	
529	LP002716	1	0	0	1	0	6783	
530	LP002717	1	1	0	0	0	1025	
531	LP002720	1	1	3	0	0	4281	
532	LP002723	1	0	2	0	0	3588	
533	LP002729	1	0	1	0	0	11250	
534	LP002731	0	0	0	1	1	18165	
535	LP002732	1	0	0	1	0	2550	
536	LP002734	1	1	0	0	0	6133	
537	LP002738	1	0	2	0	0	3617	
538	LP002739	1	1	0	1	0	2917	
539	LP002740	1	1	3	0	0	6417	
540	LP002741	0	1	1	0	0	4608	
541	LP002743	0	0	0	0	0	2138	
542	LP002753	0	0	1	0	0	3652	
543	LP002755	1	1	1	1	0	2239	
544	LP002757	0	1	0	1	0	3017	
545	LP002767	1	1	0	0	0	2768	
546	LP002768	1	0	0	1	0	3358	
547	LP002772	1	0	0	0	0	2526	
548	LP002776	0	0	0	0	0	5000	
549	LP002777	1	1	0	0	0	2785	
550	LP002778	1	1	2	0	1	6633	
551	LP002784	1	1	1	1	0	2492	
552	LP002785	1	1	1	0	0	3333	
553	LP002788	1	1	0	1	0	2454	
554	LP002789	1	1	0	0	0	3593	
555	LP002792	1	1	1	0	0	5468	
556	LP002794	0	0	0	0	0	2667	
557	LP002795	1	1	3	0	1	10139	
558	LP002798	1	1	0	0	0	3887	
559	LP002804	0	1	0	0	0	4180	
560	LP002807	1	1	2	1	0	3675	

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	CoappIncome
561	LP002813	0	1	1	0	1	19484	
562	LP002820	1	1	0	0	0	5923	
563	LP002821	1	0	0	1	1	5800	
564	LP002832	1	1	2	0	0	8799	
565	LP002833	1	1	0	1	0	4467	
566	LP002836	1	0	0	0	0	3333	
567	LP002837	1	1	3	0	0	3400	
568	LP002840	0	0	0	0	0	2378	
569	LP002841	1	1	0	0	0	3166	
570	LP002842	1	1	1	0	0	3417	
571	LP002847	1	1	0	0	0	5116	
572	LP002855	1	1	2	0	0	16666	
573	LP002862	1	1	2	1	0	6125	
574	LP002863	1	1	3	0	0	6406	
575	LP002868	1	1	2	0	0	3159	
576	LP002872	1	1	0	0	0	3087	
577	LP002874	1	0	0	0	0	3229	
578	LP002877	1	1	1	0	0	1782	
579	LP002888	1	0	0	0	0	3182	
580	LP002892	1	1	2	0	0	6540	
581	LP002893	1	0	0	0	0	1836	
582	LP002894	0	1	0	0	0	3166	
583	LP002898	1	1	1	0	0	1880	
584	LP002911	1	1	1	0	0	2787	
585	LP002912	1	1	1	0	0	4283	
586	LP002916	1	1	0	0	0	2297	
587	LP002917	0	0	0	1	0	2165	
588	LP002925	1	0	0	0	0	4750	
589	LP002926	1	1	2	0	1	2726	
590	LP002928	1	1	0	0	0	3000	
591	LP002931	1	1	2	0	1	6000	
592	LP002933	1	0	3	0	1	9357	
593	LP002936	1	1	0	0	0	3859	

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	Coapp
594	LP002938	1	1	0	0	1	16120	
595	LP002940	1	0	0	1	0	3833	
596	LP002941	1	1	2	1	1	6383	
597	LP002943	1	0	0	0	0	2987	
598	LP002945	1	1	0	0	1	9963	
599	LP002948	1	1	2	0	0	5780	
600	LP002949	0	0	3	0	0	416	
601	LP002950	1	1	0	1	0	2894	
602	LP002953	1	1	3	0	0	5703	
603	LP002958	1	0	0	0	0	3676	
604	LP002959	0	1	1	0	0	12000	
605	LP002960	1	1	0	1	0	2400	
606	LP002961	1	1	1	0	0	3400	
607	LP002964	1	1	2	1	0	3987	
608	LP002974	1	1	0	0	0	3232	
609	LP002978	0	0	0	0	0	2900	
610	LP002979	1	1	3	0	0	4106	
611	LP002983	1	1	1	0	0	8072	
612	LP002984	1	1	2	0	0	7583	
613	LP002990	0	0	0	0	1	4583	

In [6]: `x=df_train[["Credit_History","Education","Married","Self_Employed","Property_Area"]]
y = df_train["Loan_Status"]`

Out[6]: 0 1 1 0 2 1 3 1 4 1 .. 609 1 610 1 611 1 612 1 613 0 Name: Loan_Status, Length: 614, dtype: int64

In [7]: `using ScikitLearn: fit!, predict, @sk_import, fit_transform!`

In [8]: `@sk_import model_selection: train_test_split`

↳ Warning: Module `model_selection` has been ported to Julia - try ``import ScikitLearn`` instead
 ↳ `@ ScikitLearn.Skcore C:\Users\kulde\julia\packages\ScikitLearn\7Csem\src\Skcore.jl:193`

Out[8]: `PyObject <function train_test_split at 0x0000021A4443EB90>`

In [9]: `x_train, x_test, y_train, y_test = train_test_split(x, y, test_size=0.3, random_st`

```
Out[9]: 4-element Vector{PyCall.PyObject}:
  PyObject      Credit_History   Education  Married  Self_Employed  Property_Area
  553           0               1           1          0             2
  601           1               1           1          0             0
  261           1               0           0          0             1
  496           1               1           1          0             0
  529           1               1           0          0             1
  ..
  ..
  71            1               1           1          1             1
  106          1               0           1          0             2
  270          1               0           0          0             2
  435          1               0           1          0             1
  102          1               0           1          0             2

  [429 rows x 5 columns]
  PyObject      Credit_History   Education  Married  Self_Employed  Property_Area
  350           1               0           1          0             1
  377           1               0           1          0             1
  163           1               0           1          0             0
  609           1               0           0          0             0
  132           1               0           0          0             1
  ..
  ..
  380           1               0           1          0             1
  446           1               1           1          0             0
  144           1               0           1          0             2
  290           1               0           1          0             0
  353           0               0           1          1             0

  [185 rows x 5 columns]
  PyObject 553    0
  601     1
  261     1
  496     1
  529     1
  ..
  71      1
  106    1
  270    1
  435    1
  102    1
  Name: Loan_Status, Length: 429, dtype: int64
  PyObject 350    1
  377     1
  163     1
  609     1
  132     1
  ..
  380     1
  446     1
  144     1
  290     1
  353     0
  Name: Loan_Status, Length: 185, dtype: int64
```

```
In [11]: @sk_import tree: DecisionTreeClassifier
model=DecisionTreeClassifier()
```

```
model.fit(x_train,y_train)

println("Predicted Accuracy of the Model : ",model.score(x_test,y_test))

println("Actual Accuracy of the Model : ",model.score(x_train,y_train))
```

Predicted Accuracy of the Model : 0.772972972972973

Actual Accuracy of the Model : 0.8205128205128205

WARNING: redefinition of constant DecisionTreeClassifier. This may fail, cause incorrect answers, or produce other errors.

In [12]: `@sk_import model_selection: cross_val_score`

```
┌ Warning: Module model_selection has been ported to Julia - try `import ScikitLearn
└ CrossValidation` instead
@ ScikitLearn.Skcore C:\Users\kulde\.julia\packages\ScikitLearn\7Csem\src\Skcor
e.jl:193
```

Out[12]: `PyObject <function cross_val_score at 0x0000021A445B2EF0>`

In [13]: `#5 fold cross validation`

```
cross_score = cross_val_score(model, x, y, cv=5)
#print cross_val_score
println("cross_validation_score: ", mean(cross_score))

cross_validation_score: 0.7817939490870319
```

In []: