

행복지수 분석

201804193 김민주 · 201804246 정유진 · 201804251 최아름



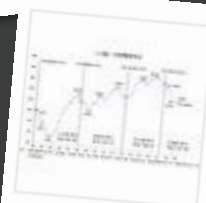
// 우리나라 국민의 경제력과 행복지수 //



빛 많이 늘어난 탓에 국민행복지수 낮아져 - 2019년 1분기 국민행복지수

ifspost | 2019.06.30. | [🔗](#)

2019년 1분기 국민행복지수(2003.1분기=100.0)는 고용률 하락과 국가 및 기업부채 증가 등이 두드러지게 나타나 전 분기에 비해 하락한 것으로 집계됐다. 지수는 2019년 1분기 135.59로 전 분기 137.21에 비해 1.62p 하락했다....



경제지속 가능성 불안감으로 국민행복지수 미세하락 - 2019.2분기

ifspost | 2일 전 | [🔗](#)

2019년 2분기 국민행복지수(2003.1분기=100.0)는 134.98으로 전분기 135.59에 비해 0.61p 하락하였다. 3개 대(大)항목 가운데 '삶의 질'과 '경제사회 안정 및 안전'은 전분기와 비슷하거나 미세한 상승을 보였지만...

데이터셋 : Happiness_score.csv

	A	B	C	D	E	F	G	H	I
1	Country	Happiness	Economy	Family	Health..Life	Freedom	Generosity	Trust..Gov	Dystopia.Re
2	Norway	7.504	.616463	1.533524	0.79	0.362012	0.315964	2.277027	
3	Denmark	7.454	.482383	1.551122	0.79	0.35528	0.40077	2.313707	
4	Iceland	7.504	1.480633	1.610574	0.833552	0.627163	0.47554	0.153527	2.322715
5	Switzerland	7.494	1.56498	1.516912	0.858131	0.620071	0.290549	0.367007	2.276716
6	Finland	7.469	1.443572	1.540247	0.809158	0.617951	0.245483	0.382612	2.430182
7	Netherlands	7.377	1.503945	1.428939	0.810696	0.585384	0.47049	0.282662	2.294804
8	Canada	7.316	1.479204	1.481349	0.834558	0.611101	0.43554	0.287372	2.187264
9	New Zealand	7.314	1.405706	1.548195	0.81676	0.614062	0.500005	0.382817	2.046456
10	Sweden	7.284	1.494387	1.478162	0.830875	0.612924	0.385399	0.384399	2.097538
11	Australia	7.284	1.484415	1.510042	0.843887	0.601607	0.477699	0.301184	2.065211

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147	Yemen	3.593	0.591683	0.935382	0.310081	0.249464	0.104125	0.056767	1.345601
148	South Sudan	3.591	0.397249	0.601323	0.163486	0.147062	0.285671	0.116794	1.879567
149	Liberia	3.533	0.119042	0.872118	0.229918	0.332881	0.26655	0.038948	1.673286
150	Guinea	3.507	0.24455	0.791245	0.194129	0.348588	0.264815	0.110938	1.552312
151	Togo	3.495	0.305445	0.431883	0.247106	0.380426	0.196896	0.095665	1.837229
152	Rwanda	3.471	0.368746	0.945707	0.326425	0.581844	0.252756	0.45522	0.540061
153	Syria	3.462	0.777153	0.396103	0.500533	0.081539	0.493664	0.151347	1.061574
154	Tanzania	3.349	0.511136	1.04199	0.364509	0.390018	0.354256	0.066035	0.62113
155	Burundi	2.905	0.091623	0.629794	0.151611	0.059901	0.204435	0.084148	1.683024
156	Central Africa	2.693	0	0	0.018773	0.270842	0.280876	0.056565	2.066005

[출처] kaggle

독립 변수

ECONOMY

FAMILY

FREEDOM

FREEDOM

GENEROSITY

Trust
Government
Corruption

Dystopia
Residual

Happiness Rank

Nicaragua	43	6.0710001	6.1865836	5.9554166	0.7372992	1.2872157	0.653096	0.4475518	0.3016742	0.130688	2.5139306
Ecuador	44	6.0079999	6.1058477	5.9101521	1.0008204	1.2861688	0.6856362	0.4551982	0.1501125	0.1401346	2.2903526
El Salvador	45	6.0029998	6.1086351	5.8973644	0.9097845	1.1821251	0.5960186	0.4324525	0.078258	0.089981	2.7145939
Poland	46	5.973	6.0539083	5.8920918	1.2917879	1.445712	0.6994753	0.5203421	0.158466	0.0593078	1.7977228
Uzbekistan	47	5.9710002	6.0655376	5.8764628	0.7864411	1.5489691	0.4982726	0.6582487	0.4159836	0.2465282	1.8169136
Italy	48	5.9640002	6.0427369	5.8852635	1.3950666	1.4449233	0.8531443	0.2564507	0.1727896	0.0280281	1.8133121
Russia	49	5.9629998	6.0302749	5.8957247	1.2817781	1.4692824	0.5473493	0.3737831	0.0522638	0.0329629	2.2056074
Belize	50	5.9559999	6.1972423	5.7147574	0.9079753	1.0814178	0.4501918	0.5475094	0.2400156	0.0965811	2.6319556
Japan	51	5.9200001	5.9907194	5.8492807	1.4169152	1.4363378	0.9134759	0.5056255	0.1205728	0.1637607	1.3632236
Lithuania	52	5.902	5.9826696	5.8213303	1.3145823	1.4735161	0.6289499	0.2342318	0.0101647	0.0118656	2.2284405
Algeria	53	5.8720002	5.9782864	5.765714	1.0918645	1.1462175	0.6175846	0.2333358	0.0694366	0.1460961	2.5676038
Latvia	54	5.8499999	5.9202635	5.7797363	1.2607486	1.4047149	0.638567	0.3257079	0.1530748	0.0738427	1.9936552
South Korea	55	5.8379998	5.922559	5.7534406	1.4016784	1.1282744	0.9002141	0.2579217	0.2066744	0.0632827	1.880378
Moldova	56	5.8379998	5.9083708	5.7676288	0.7288706	1.2518256	0.5894652	0.240729	0.2087791	0.0100913	2.8078084
Romania	57	5.8249998	5.9196942	5.7303055	1.2176839	1.1500913	0.6851583	0.4570037	0.1335199	0.0043879	2.1768315
Bolivia	58	5.823	5.9039769	5.742023	0.8337566	1.2276191	0.5736202	0.4567753	0.2255607	0.0604777	2.443279
Turkmenistan	59	5.822	5.8851809	5.7588192	1.1207768	1.1837772	0.4737729	0.418219	0.249925	0.2592703	1.8329098
Kazakhstan	60	5.8189998	5.9036418	5.7343578	1.2855563	1.1837772	0.5830416	0.4374043	0.2019644	0.1192829	1.7848926
North Cyprus	61	5.8099999	5.8873025	5.7512441	1.113	1.186304	0.8346472	0.4712036	0.2668457	0.1553534	1.5491576
Slovenia	62	5.7579999	5.8227746	5.737746	1.347006	1.4525188	0.7908282	0.5725758	0.2426491	0.045129	1.3133173
Peru	63	5.7150001	5.79468	5.6180535	1.0352253	1.2187704	0.6301661	0.4500029	0.1268197	0.0470491	2.2072694
Mauritius	64	5.6290002	5.7298622	5.5281382	1.1893955	1.209561	0.630005	0.4312473	0.3609338	0.0421816	1.6975839
Cyprus	65	5.6209998	5.7146927	5.5273069	1.3552381	1.1135533	0.8347147	0.3351115	0.2712543	0.041238	1.6212492
Estonia	66	5.6110001	5.6881099	5.538602	1.208722	1.4735161	0.6990683	0.4731314	0.0988908	0.1832489	1.3575087
Belarus	67	5.5689998	5.636742	5.4913043	1.1665	1.4449232	0.6377143	0.2954003	0.1551375	0.1563138	1.723233
Libya	68	5.5250001	5.63695	5.530464	1.1018037	1.3575643	0.520169	0.4657332	0.1520737	0.0926102	1.8350112
Turkey	69	5.5	5.54486	5.405135	1.1982744	1.3377532	0.6376056	0.3007406	0.046693	0.0996716	1.8792779
Paraguay	70	5.493	5.5773813	5.4086188	0.9325373	1.5072849	0.5792507	0.4735078	0.2241507	0.0910659	1.6853335
Hong Kong	71	5.4720001	5.5495942	5.3944061	1.5516748	1.2627909	0.9430624	0.4909686	0.3744658	0.2939337	0.5546331
Philippines	72	5.4299998	5.5453351	5.3146646	0.8576992	1.2539176	0.4680091	0.5852147	0.1935134	0.0993319	1.9726048
Serbia	73	5.395	5.4915697	5.2984303	1.0693176	1.2581898	0.6507847	0.2087155	0.2201259	0.0409038	1.9470844

대한민국 행복지수
15위 중 상위

Happines_High.csv

	A	B	C	D	E	F	G	H	I
1	Country	Happines	Economy	Family	Health, Li	Freedom	Generos	Trust, Go	Dystopia
2	Norway	7,537	1,616463	1,533524	0,796667	0,635423	0,362012	0,315964	2,277027
3	Denmark	7,522	1,482383	1,551122	0,792566	0,626007	0,355228	0,400777	2,313707
4	Iceland	7,504	1,480633	1,610574	0,833552	0,627163	0,47554	0,153527	2,322715
5	Switzerland	7,494	1,56498	1,516912	0,858131	0,620071	0,290549	0,367007	2,276716
6	Finland	7,469	1,443572	1,540247	0,809158	0,617951	0,245483	0,382612	2,430182
7	Netherlar	7,377	1,503945	1,428939	0,810696	0,585384	0,47049	0,282662	2,294804
8	Canada	7,316	1,479204	1,481349	0,834558	0,611101	0,43554	0,287372	2,187264
9	New Zea	7,314	1,405706	1,548195	0,81676	0,614062	0,500005	0,382817	2,046456
10	Sweden	7,284	1,494387	1,478162	0,830875	0,612924	0,385399	0,384399	2,097538
11	Australia	7,284	1,484415	1,510042	0,843887	0,601607	0,477699	0,301184	2,065211
12	Israel	7,213	1,375382	1,37629	0,838404	0,405989	0,330083	0,085242	2,801757
13	Costa Ric	7,079	1,109706	1,416404	0,759509	0,580132	0,214613	0,100107	2,898639
14	Austria	7,006	1,487097	1,459945	0,815328	0,567766	0,316472	0,22106	2,138506
15	United S	6,993	1,546259	1,419921	0,774287	0,505741	0,392579	0,135639	2,218113
16	Ireland	6,977	1,535707	1,558231	0,809783	0,57311	0,427858	0,298386	1,773869
17	Germany	6,951	1,487923	1,47252	0,798951	0,582511	0,336289	0,276732	2,01577
18	Belgium	6,891	1,463781	1,462313	0,818092	0,539771	0,231503	0,251343	2,12421
19	Luxembo	6,863	1,741944	1,457584	0,845089	0,596628	0,283181	0,318834	1,619512
20	United Ki	6,714	1,441634	1,49646	0,805336	0,50819	0,492774	0,265428	1,704144
21	Chile	6,652	1,252785	1,284025	0,81948	0,376895	0,326682	0,082288	2,509586
22	United Ar	6,637	1,470766	1,470766	0,770766	0,607666	0,32449	1,734704	
23	Brazil	6,637	1,470766	1,470766	0,770766	0,607666	0,32449	1,734704	
24	Czech Rep	6,637	1,470766	1,470766	0,770766	0,607666	0,32449	1,734704	
25	Argentina	6,599	1,185295	1,440451	0,695137	0,494519	0,109457	0,05974	2,614005
26	Mexico	6,578	1,170766	1,470766	0,770766	0,607666	0,32449	1,734704	
27	Singapor	6,572	1,470766	1,470766	0,770766	0,607666	0,32449	1,734704	
28	Malta	6,527	1,470766	1,470766	0,770766	0,607666	0,32449	1,734704	
29	Uruguay	6,454	1,21756	1,41222	0,791217	0,479392	0,175097	0,178062	2,17241
30	Guatemala	6,454	0,872002	1,255585	0,54024	0,531311	0,283488	0,077223	2,893891
31	Panama	6,452	1,233748	1,373193	0,706156	0,550027	0,210557	0,070984	2,3072
32	France	6,442	1,430923	1,387777	0,844466	0,470222	0,129762	0,172502	2,005955
33	Thailand	6,424	1,127869	1,425792	0,847239	0,580201	0,572123	0,031613	2,039508
34	Taiwan F	6,422	1,433627	1,384565	0,793984	0,361467	0,25836	0,063829	2,126607
35	Spain	6,403	1,384398	1,532091	0,838961	0,408781	0,190134	0,070914	1,927758
36	Qatar	6,375	1,870766	1,274297	0,710098	0,604131	0,330474	0,439299	1,145464
37	Colombia	6,357	1,070622	1,402183	0,595028	0,477487	0,149014	0,046669	2,616068
38	Saudi Ara	6,344	1,530624	1,286678	0,590148	0,449751	0,147616	0,273432	2,06543
39	Trinidad	6,168	1,361356	1,380229	0,519983	0,518631	0,325296	0,008965	2,053247
40	Kuwait	6,105	1,632952	1,259699	0,632106	0,496338	0,22829	0,21516	1,640425
41	Slovakia	6,098	1,325394	1,505059	0,712733	0,295817	0,136544	0,024211	2,097777
42	Bahrain	6,087	1,488412	1,32311	0,653133	0,536747	0,172668	0,257042	1,656149
43	Malaysia	6,084	1,291215	1,284646	0,618784	0,402265	0,416609	0,065601	2,004449
44	Nicaragu	6,071	0,737299	1,287216	0,653096	0,447552	0,301674	0,130688	2,513931
45	Ecuador	6,008	1,00082	1,286169	0,685636	0,455198	0,150112	0,140135	2,290353
46	El Salvad	6,003	0,909784	1,182125	0,596019	0,432453	0,078258	0,089891	2,714594
47	Poland	5,973	1,291788	1,445712	0,689475	0,520342	0,158466	0,059308	1,797723
48	Uzbekist	5,971	0,786441	1,548969	0,498273	0,658249	0,415984	0,246528	1,816914
49	Italy	5,964	1,395067	1,444923	0,853144	0,256451	0,17279	0,028028	1,813312
50	Russia	5,963	1,281778	1,469282	0,547349	0,373783	0,052264	0,032963	2,205607
51	Belize	5,956	0,907975	1,081418	0,450192	0,547509	0,240016	0,096581	2,631956

행복지수 상위
50개 국가

Happines_Low.csv

	A	B	C	D	E	F	G	H	I
1	Country	Happines	Economy	Family	Health, Li	Freedom	Generos	Trust, Go	Dystopia
2	Japan	5,92	1,416915	1,436338	0,913476	0,505626	0,120573	0,163761	1,363224
3	Lithuania	5,902	1,314582	1,473516	0,62895	0,234232	0,010165	0,011866	2,228441
4	Algeria	5,872	1,091864	1,146217	0,617585	0,233336	0,069437	0,146096	2,567604
5	Latvia	5,85	1,260749	1,404715	0,638567	0,325708	0,153075	0,073843	1,993655
6	South Ko	5,838	1,401678	1,128274	0,900214	0,257922	0,206674	0,063283	1,880378
7	Moldova	5,838	0,728871	1,251826	0,589465	0,240729	0,208779	0,010091	2,807808
8	Romania	5,825	1,217684	1,150091	0,685158	0,457004	0,13352	0,004388	2,176831
9	Bolivia	5,823	0,833757	1,227619	0,477363	0,558733	0,225561	0,060478	2,443279
10	Turkmeni	5,822	1,130777	1,493149	0,437726	0,418272	0,249925	0,25927	1,83291
11	Kazakhs	5,819	1,284556	1,384369	0,606042	0,437454	0,201964	0,119283	1,784893
12	North Cy	5,81	1,346911	1,186303	0,834647	0,471204	0,266846	0,155353	1,549158
13	Slovenia	5,758	1,341206	1,452519	0,790828	0,572576	0,242649	0,045129	1,313317
14	Peru	5,715	1,035225	1,21877	0,630166	0,450003	0,12682	0,047049	2,207269
15	Mauritius	5,629	1,189396	1,209561	0,638007	0,491247	0,360934	0,042182	1,697584
16	Cyprus	5,621	1,355938	1,131863	0,844715	0,355112	0,271254	0,041288	1,621249
17	Estonia	5,611	1,320879	1,476671	0,695168	0,479131	0,098891	0,183249	1,357509
18	Belarus	5,569	1,156558	1,444945	0,637714	0,2954	0,155138	0,156314	1,723233
19	Libya	5,525	1,101803	1,357564	0,520169	0,465733	0,152074	0,09261	1,835011
20	Turkey	5,525	1,101803	1,357564	0,520169	0,465733	0,152074	0,09261	1,835011
21	Paraguay	5,525	1,101803	1,357564	0,520169	0,465733	0,152074	0,09261	1,835011
22	Hong Kong	5,525	1,101803	1,357564	0,520169	0,465733	0,152074	0,09261	1,835011
23	Philippin	5,435	0,857699	1,253918	0,468009	0,585215	0,193513	0,099332	1,972605
24	Serbia	5,395	1,010768	1,357564	0,520169	0,465733	0,152074	0,09261	1,835011
25	Jordan	5,336	0,701803	1,357564	0,520169	0,465733	0,152074	0,09261	1,835011
26	Hungary	5,324	1,101803	1,357564	0,520169	0,465733	0,152074	0,09261	1,835011
27	Jamaica	5,311	0,925579	1,368216	0,41022	0,74307	0,233818	0,055268	1,612326
28	Croatia	5,293	1,222556	0,967983	0,701289	0,255772	0,248003	0,043123	1,854492
29	China	5,285	1,110766	1,470766	0,770766	0,607666	0,32449	1,734704	
30	Thailand	5,285	1,110766	1,470766	0,770766	0,607666	0,32449	1,734704	
31	Malaysia	5,285	1,110766	1,470766	0,770766	0,607666	0,32449	1,734704	
32	Indonesia	5,262	0,995539	1,274445	0,492348	0,443323	0,611705	0,015317	1,429477
33	Venezue	5,25	1,128431	1,431338	0,617144	0,153997	0,06502	0,064491	1,789464
34	Montene	5,237	1,121129	1,238376	0,667465	0,194989	0,197911	0,088174	1,729192
35	Morocco	5,235	0,878115	0,774864	0,597711	0,408158	0,03221	0,087763	2,456189
36	Azerbaijan	5,234	1,153602	1,1524	0,540776	0,398156	0,045269	0,180988	1,762482
37	Dominica	5,23	1,079374	1,402417	0,574874	0,55259	0,186968	0,113945	1,319465
38	Greece	5,227	1,289487	1,239415	0,810199	0,095731	0	0,04329	1,749222
39	Lebanon	5,225	1,074988	1,129624	0,735081	0,288516	0,264451	0,037514	1,695074
40	Portugal	5,195	1,315175	1,367043	0,795844	0,498465	0,095103	0,015869	1,107683
41	Bosnia a	5,182	0,982409	1,069336	0,705186	0,204403	0,328867	0	1,892173
42	Honduras	5,181	0,730573	1,143945	0,582569	0,34808	0,236189	0,073345	2,065811
43	Macedon	5,175	1,064578	1,207893	0,644948	0,325906	0,253761	0,060278	1,617469
44	Somalia	5,151	0,022643	0,721151	0,113989	0,602127	0,291631	0,28241	3,117485
45	Vietnam	5,074	0,788548	1,277491	0,652169	0,571056	0,234968	0,087633	1,462319
46	Nigeria	5,074	0,783756	1,21577	0,056916	0,394953	0,230947	0,026122	2,365391
47	Tajikistan	5,041	0,524714	1,271463	0,529235	0,471567	0,248998	0,146377	1,849049
48	Bhutan	5,011	0,885416	1,340127	0,495879	0,501538	0,474055	0,17338	1,140184
49	Kyrgyzst	5,004	0,59822	1,394239	0,553458	0,454943	0,42858	0,039439	1,536723
50	Nepal	4,962	0,47982	1,179283	0,504131	0,440306	0,394096	0,072976	1,891241
51	Mongolia	4,955	1,027236	1,493011	0,557783	0,394144	0,338464	0,032902	1,111292

행복지수 중위
50개 국가
(South Korea 포함)

행복지수 중위 50개국 데이터 분석

상관관계 분석

```
> cor(low_happy)
```

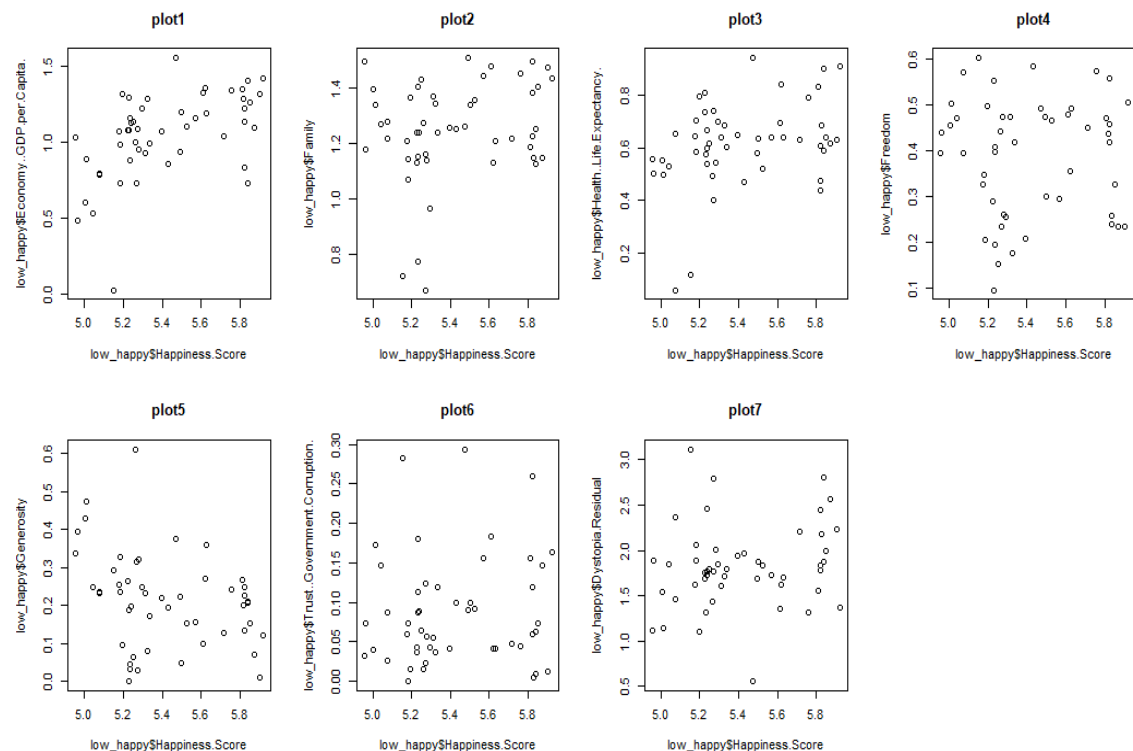
	Happiness.Score	Economy..GDP.per.Capita.	Family	Health..Life.Expectancy.
Happiness.Score	1.0000000000	0.52786116	0.22593343	0.3442324
Economy..GDP.per.Capita.	0.5278611631	1.00000000	0.40701312	0.7515915
Family	0.2259334338	0.40701312	1.00000000	0.2313766
Health..Life.Expectancy.	0.3442324056	0.75159154	0.23137656	1.0000000
Freedom	-0.0009422752	-0.22878246	0.12567463	-0.1824728
Generosity	-0.3237775172	-0.34401614	-0.09454123	-0.2291507
Trust..Government.Corruption.	0.0818998795	-0.07756628	-0.05076554	-0.1371739
Dystopia.Residual	0.1772003292	-0.52995055	-0.58326519	-0.5487908

	Freedom	Generosity	Trust..Government.Corruption.	Dystopia.Residual
Happiness.Score	-0.0009422752	-0.32377752	0.08189988	0.1772003
Economy..GDP.per.Capita.	-0.2287824577	-0.34401614	-0.07756628	-0.5299506
Family	0.1256746316	-0.09454123	-0.05076554	-0.5832652
Health..Life.Expectancy.	-0.1824728243	-0.22915070	-0.13717388	-0.5487908
Freedom	1.0000000000	0.26383222	0.32858559	-0.2452170
Generosity	0.2638322189	1.00000000	0.05216095	-0.2282820
Trust..Government.Corruption.	0.3285855915	0.05216095	1.00000000	-0.0874384
Dystopia.Residual	-0.2452169507	-0.22828197	-0.08743840	1.0000000

“ 독립 변수 간의 상관관계가 존재,
경제력(Economy)과 강한 상관관계 ”

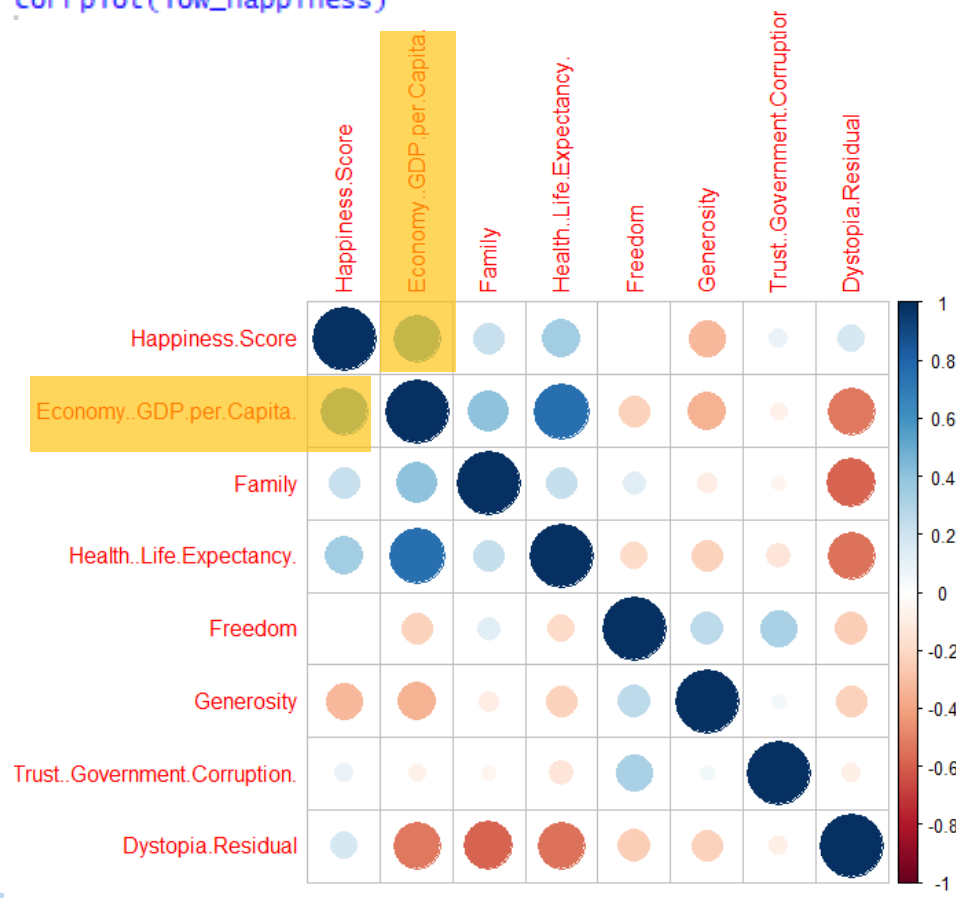
행복도와 변수끼리의 상관관계 시각화 (plot)

```
> attach(low_happy)
> str(low_happy)
'data.frame': 50 obs. of 8 variables:
 $ Happiness.Score      : num  5.92 5.9 5.87 5.85 5.84 ...
 $ Economy..GDP.per.Capita.: num  1.42 1.31 1.09 1.26 1.4 ...
 $ Family               : num  1.44 1.47 1.15 1.4 1.13 ...
 $ Health..Life.Expectancy.: num  0.913 0.629 0.618 0.639 0.9 ...
 $ Freedom              : num  0.506 0.234 0.233 0.326 0.258 ...
 $ Generosity           : num  0.1206 0.0102 0.0694 0.1531 0.2067 ...
 $ Trust..Government.Corruption.: num  0.1638 0.0119 0.1461 0.0738 0.0633 ...
 $ Dystopia.Residual     : num  1.36 2.23 2.57 1.99 1.88 ...
> cor(low_happy$Happiness.Score, low_happy$Economy..GDP.per.Capita.)
[1] 0.5278612
> cor(low_happy$Happiness.Score, low_happy$Family)
[1] 0.2259334
> cor(low_happy$Happiness.Score, low_happy$Health..Life.Expectancy.)
[1] 0.3442324
> cor(low_happy$Happiness.Score, low_happy$Freedom)
[1] -0.0009422752
> cor(low_happy$Happiness.Score, low_happy$Generosity)
[1] -0.3237775
> cor(low_happy$Happiness.Score, low_happy$Trust..Government.Corruption.)
[1] 0.08189988
> cor(low_happy$Happiness.Score, low_happy$Dystopia.Residual)
[1] 0.1772003
> par(mfrow=c(2,4))
> plot(low_happy$Happiness.Score, low_happy$Economy..GDP.per.Capita., main="plot1")
> plot(low_happy$Happiness.Score, low_happy$Family, main="plot2")
> plot(low_happy$Happiness.Score, low_happy$Health..Life.Expectancy., main="plot3")
> plot(low_happy$Happiness.Score, low_happy$Freedom, main="plot4")
> plot(low_happy$Happiness.Score, low_happy$Generosity, main="plot5")
> plot(low_happy$Happiness.Score, low_happy$Trust..Government.Corruption., main="plot6")
> plot(low_happy$Happiness.Score, low_happy$Dystopia.Residual, main="plot7")
```



행복도와 변수 간의 관계 분석 (corrplot)

```
> library(corrplot)
> low_happiness<-cor(low_happy)
> corrplot(low_happiness)
```



파란색일수록 행복도와 변수 간의
강한 양의 상관관계를 나타냄

행복 지수 중위 국가에서
행복도와 가장 상관관계가 높은 변수는

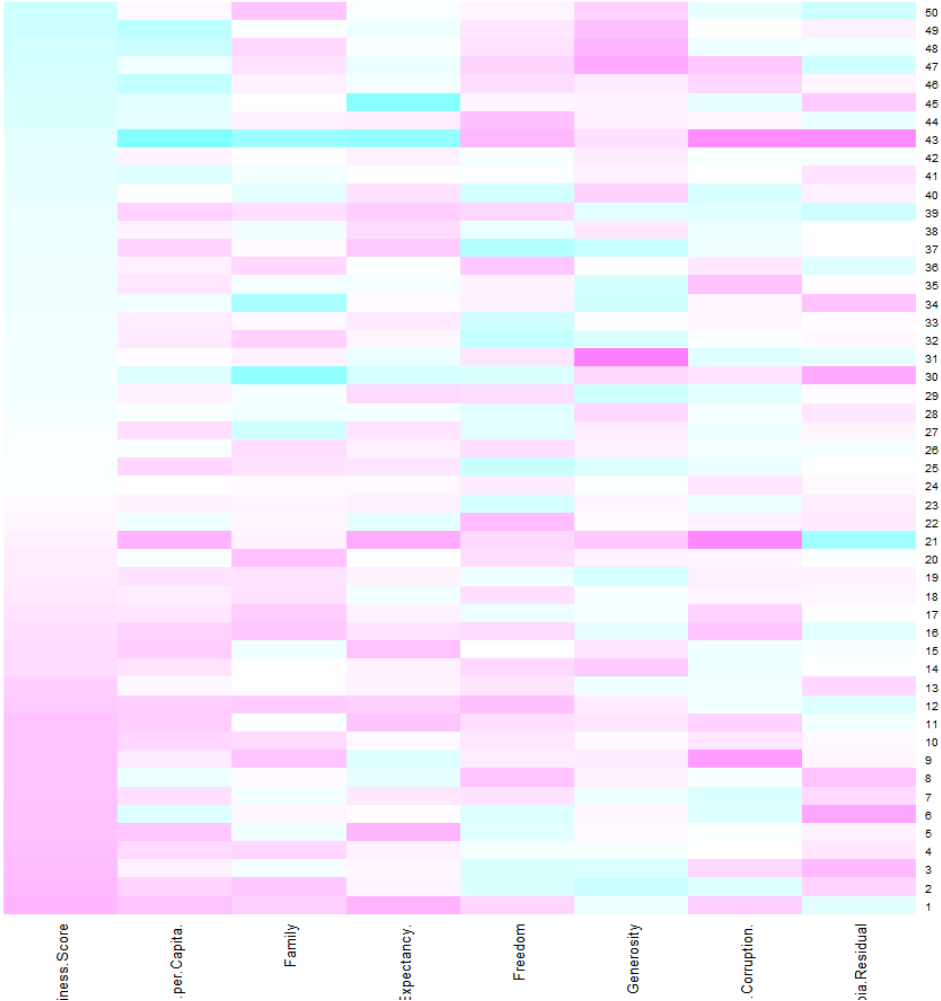
“ 경제력 ”

국가 별 행복지수 시각화 (히트맵)

```
> row.names(low)<-low$Country
> low_happy<-low[,c(2,3,4,5,6,7,8,9)]
> str(low_happy)
'data.frame': 50 obs. of 8 variables:
 $ Happiness.Score      : num  5.92 5.9 5.87 5.85 5.84 ...
 $ Economy..GDP.per.Capita.: num  1.42 1.31 1.09 1.26 1.4 ...
 $ Family              : num  1.44 1.47 1.15 1.4 1.13 ...
 $ Health..Life.Expectancy.: num  0.913 0.629 0.618 0.639 0.9 ...
 $ Freedom             : num  0.506 0.234 0.233 0.326 0.258 ...
 $ Generosity          : num  0.1206 0.0102 0.0694 0.1531 0.2067 ...
 $ Trust..Government.Corruption.: num  0.1638 0.0119 0.1461 0.0738 0.0633 ...
 $ Dystopia.Residual    : num  1.36 2.23 2.57 1.99 1.88 ...
> Happy_matix1<-data.matrix(low_happy)
> Happy_matix1
```

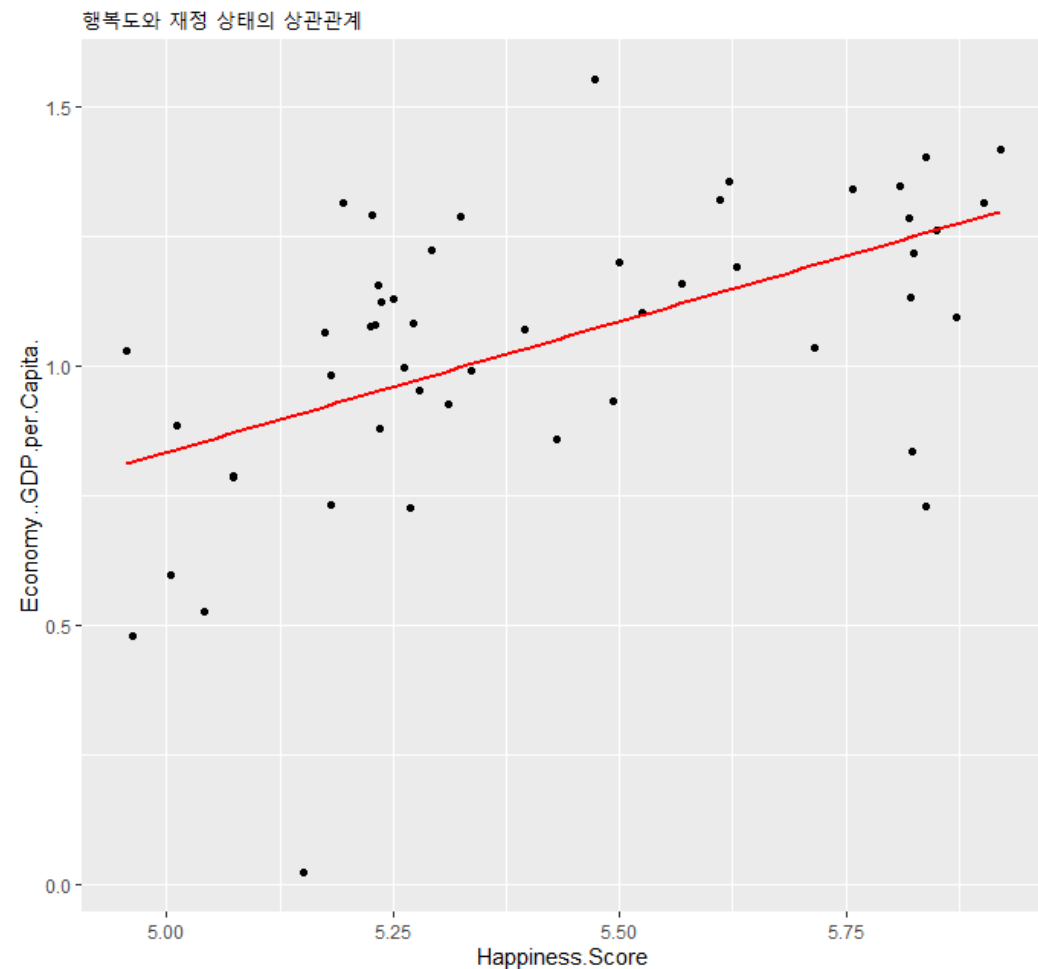
	Happiness.Score	Economy..GDP.per.Capita.	Family	Health..Life.Expectancy.
Japan	5.920	1.41691518	1.4363378	0.91347587
Lithuania	5.902	1.31458235	1.4735161	0.62894994
Algeria	5.872	1.09186447	1.1462175	0.61758465
Latvia	5.850	1.26074862	1.4047149	0.63856697
South Korea	5.838	1.40167844	1.1282744	0.90021408
Moldova	5.838	0.72887063	1.2518256	0.58946520
Morocco	5.235	0.87811458	0.7748644	0.59771067
Azerbaijan	5.234	1.15360177	1.1524003	0.54077578
Dominican Republic	5.230	1.07937384	1.4024167	0.57487374
Greece	5.227	1.28948748	1.2394146	0.81019890
Lebanon	5.225	1.07498753	1.1296242	0.73508108
Portugal	5.195	1.31517529	1.3670430	0.79584354
Bosnia and Herzegovina	5.182	0.98240942	1.0693359	0.70518631
Honduras	5.181	0.73057312	1.1439450	0.58256948
Macedonia	5.175	1.06457794	1.2078930	0.64494818
Somalia	5.151	0.02264318	0.7211514	0.11398914
Vietnam	5.074	0.78854757	1.2774913	0.65216899
Nigeria	5.074	0.78375626	1.2157705	0.05691573
Tajikistan	5.041	0.52471364	1.2714633	0.52923513
Bhutan	5.011	0.88541639	1.3401265	0.49587929
Kyrgyzstan	5.004	0.59622008	1.3942386	0.55345780
Nepal	4.962	0.47982019	1.1792833	0.50413078
Mongolia	4.955	1.02723587	1.4930112	0.55778348

```
> heatmap(Happy_matix1,Rowv=NA,Colv=NA,col=cm.colors(256),scale="column",margin=c(5,5),cexCol = 1)
```



행복도와 경제력의 상관관계 유의도 검정 (ggplot)

```
> install.packages("tidyverse", dependencies = TRUE)
Installing package into 'C:/Users/82108/Documents/R/win-library/3.5'
(as 'lib' is unspecified)
Warning in install.packages :
  package 'tidyverse' is not available (for R version 3.5.1)
> library(ggplot2)
> H2<- ggplot(data=low_happy, aes(x=Happiness.Score, y=Economy..GDP.per.Capita.))
> H2<- H2 + geom_point()
> H2<- H2 + ggtitle("행복도와 재정 상태의 상관관계")
> H2<- H2 + stat_smooth(method="lm", se=FALSE, colour="red")
> H2
```



행복도와 재정 상태의 단순선형회귀분석

```
> A<-lm(formula = low_happy$Happiness.Score~low_happy$Economy..GDP.per.Capita.,data=low_happy)
> summary(A)
```

```
Call:
lm(formula = low_happy$Happiness.Score ~ low_happy$Economy..GDP.per.Capita.,
    data = low_happy)
```

```
Residuals:
    Min       1Q   Median       3Q      Max
-0.45578 -0.20843 -0.04922  0.20882  0.59196
```

```
Coefficients:
                Estimate Std. Error t value Pr(>|t|)
(Intercept)      4.8436     0.1386  34.938  < 2e-16 ***
low_happy$Economy..GDP.per.Capita.  0.5521     0.1282   4.306 8.17e-05 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
Residual standard error: 0.2516 on 48 degrees of freedom
Multiple R-squared:  0.2786,    Adjusted R-squared:  0.2636
F-statistic: 18.54 on 1 and 48 DF,  p-value: 8.166e-05
```

잔차 표준오차
: 건강으로부터 행복도를 예측할 때
발생하는 오차들의 평균

회귀식 : 행복도 = 4.8436 + 0.5521 x 경제력

행복도와 재정 상태의 상관관계 유의도 검정

```
> cor.test(low_happy$Happiness.Score, low_happy$Economy..GDP.per.Capita.)
```

Pearson's product-moment correlation

data: low_happy\$Happiness.Score and low_happy\$Economy..GDP.per.Capita.

t = 4.3059, df = 48, p-value = 8.166e-05

alternative hypothesis: true correlation is not equal to 0

95 percent confidence interval:

0.2924885 0.7029284

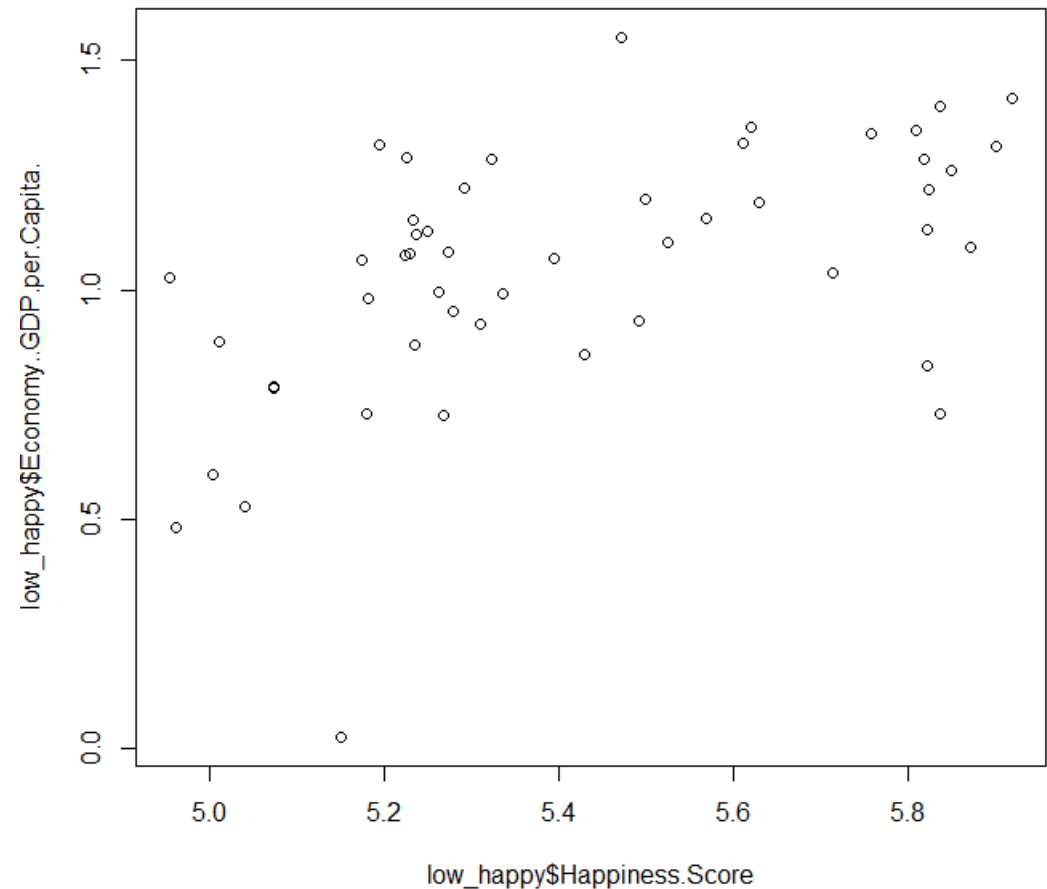
sample estimates:

cor

0.5278612

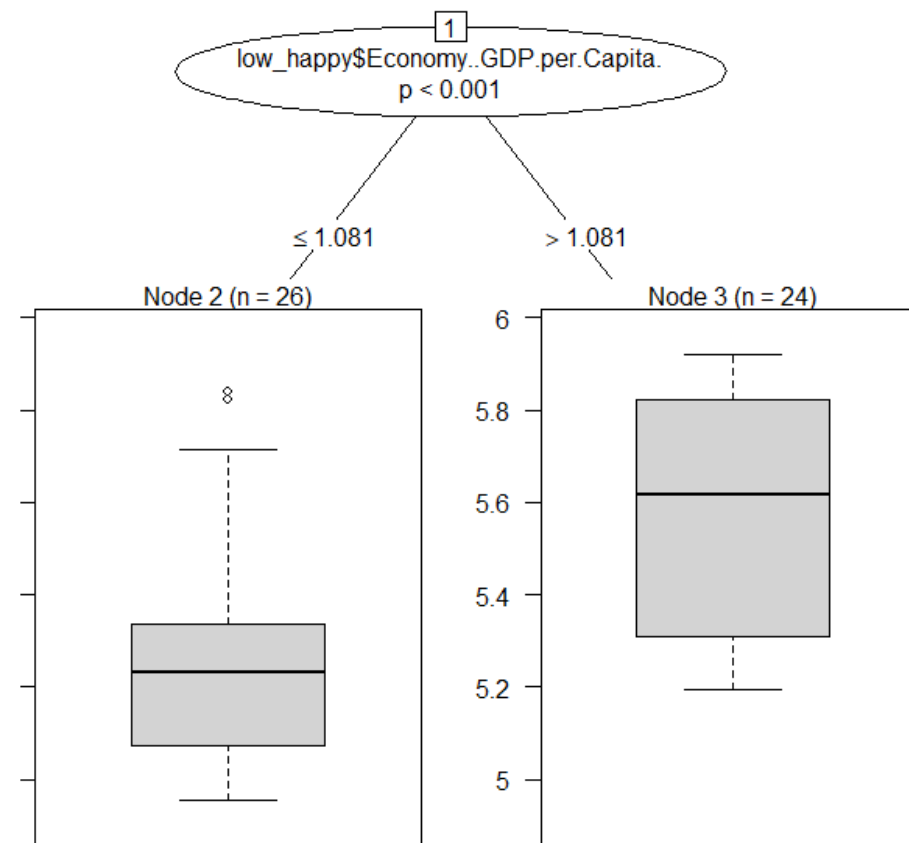
```
> plot(low_happy$Happiness.Score, low_happy$Economy..GDP.per.Capita.)
```

P-value 값이 0.05보다 낮으므로
상관관계 존재



분류 모델 예측

```
> install.packages("party")
Installing package into 'C:/Users/82108/Documents/R/win-library/3.5'
(as 'lib' is unspecified)
Warning in install.packages :
  package 'party' is in use and will not be installed
> library(party)
> library(ggplot2)
> str(low_happy)
'data.frame':  50 obs. of  8 variables:
 $ Happiness.Score      : num  5.92 5.9 5.87 5.85 5.84 ...
 $ Economy..GDP.per.Capita.: num  1.42 1.31 1.09 1.26 1.4 ...
 $ Family               : num  1.44 1.47 1.15 1.4 1.13 ...
 $ Health..Life.Expectancy.: num  0.913 0.629 0.618 0.639 0.9 ...
 $ Freedom              : num  0.506 0.234 0.233 0.326 0.258 ...
 $ Generosity           : num  0.1206 0.0102 0.0694 0.1531 0.2067 ...
 $ Trust..Government.Corruption.: num  0.1638 0.0119 0.1461 0.0738 0.0633 ...
 $ Dystopia.Residual     : num  1.36 2.23 2.57 1.99 1.88 ...
> idx<-sample(1:nrow(low_happy),nrow(low_happy)*0.7)
> train<-low_happy[idx,]
> dim(train)
[1] 35  8
> test<-low_happy[-idx,]
> dim(test)
[1] 15  8
> formula<-low_happy$Happiness.Score~low_happy$Economy..GDP.per.Capita.
> Happy_train<-ctree(formula,data=train)
> Happy_test<-ctree(formula,data=test)
> plot(Happy_test)
```



행복지수 상위 50개국 데이터 분석

상관관계 분석

> cor(high_happy)

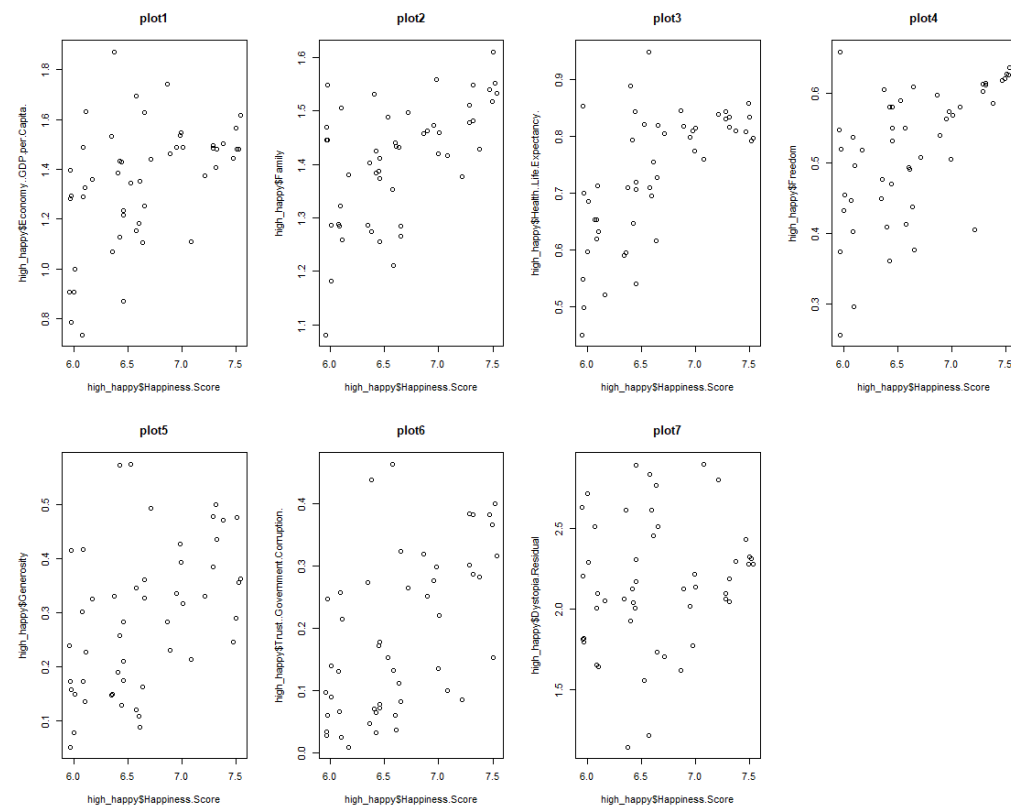
	Happiness.Score	Economy..GDP.per.Capita.	Family	Health..Life.Expectancy.
Happiness.Score	1.0000000	0.4664157	0.5621287	0.6426350
Economy..GDP.per.Capita.	0.4664157	1.0000000	0.3174294	0.6146290
Family	0.5621287	0.3174294	1.0000000	0.5164847
Health..Life.Expectancy.	0.6426350	0.6146290	0.5164847	1.0000000
Freedom	0.5643013	0.2496431	0.3278753	0.1420465
Generosity	0.4757804	0.2503810	0.3470217	0.3043388
Trust..Government.Corruption.	0.5612271	0.5922300	0.2503079	0.4358329
Dystopia.Residual	0.1632091	-0.6129765	-0.1836183	-0.2660661
	Freedom	Generosity	Trust..Government.Corruption.	Dystopia.Residual
Happiness.Score	0.5643013	0.4757804	0.5612271	0.1632091
Economy..GDP.per.Capita.	0.2496431	0.2503810	0.5922300	-0.6129765
Family	0.3278753	0.3470217	0.2503079	-0.1836183
Health..Life.Expectancy.	0.1420465	0.3043388	0.4358329	-0.2660661
Freedom	1.0000000	0.5426240	0.6629668	-0.1999100
Generosity	0.5426240	1.0000000	0.4025830	-0.3253560
Trust..Government.Corruption.	0.6629668	0.4025830	1.0000000	-0.4544989
Dystopia.Residual	-0.1999100	-0.3253560	-0.4544989	1.0000000

“ 변수 간의 상관관계가 존재 ”

경제 (0.4664157) < 건강 (0.6426350)

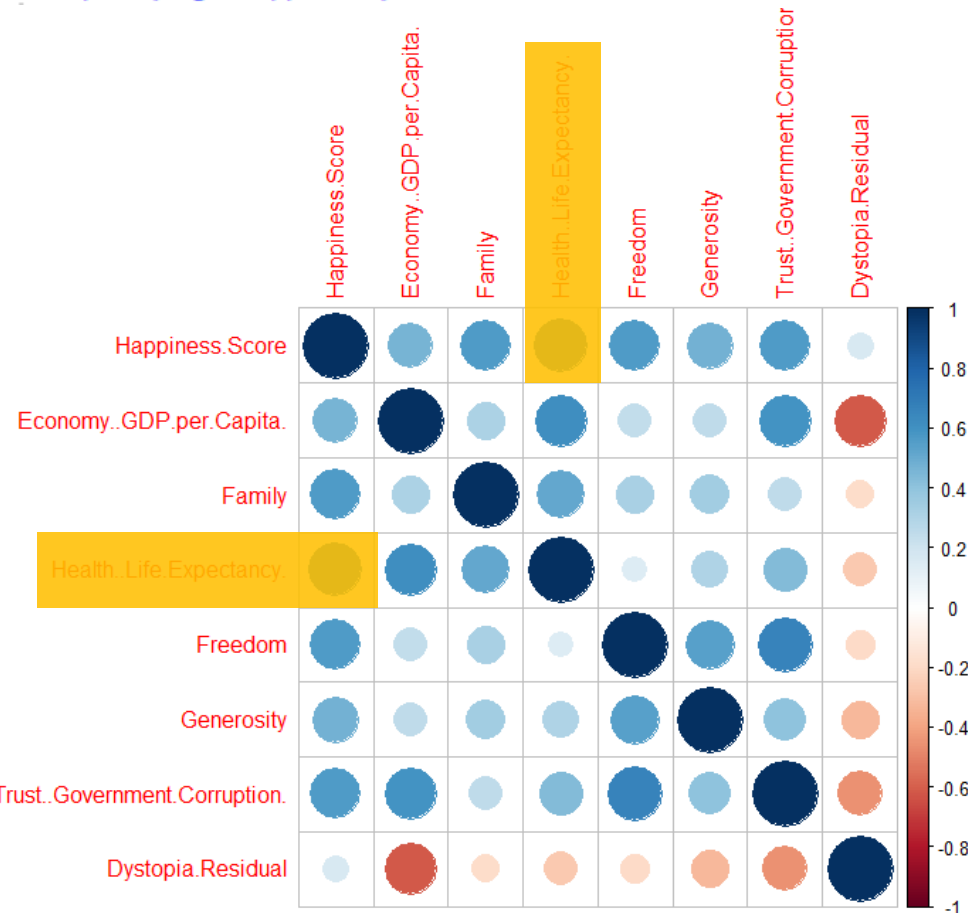
행복도와 변수끼리의 상관관계 시각화 (plot)

```
> attach(high_happy)
> str(high_happy)
'data.frame': 50 obs. of 8 variables:
 $ Happiness.Score      : num  7.54 7.52 7.5 7.49 7.47 ...
 $ Economy..GDP.per.Capita.: num  1.62 1.48 1.48 1.56 1.44 ...
 $ Family               : num  1.53 1.55 1.61 1.52 1.54 ...
 $ Health..Life.Expectancy.: num  0.797 0.793 0.834 0.858 0.809 ...
 $ Freedom              : num  0.635 0.626 0.627 0.62 0.618 ...
 $ Generosity           : num  0.362 0.355 0.476 0.291 0.245 ...
 $ Trust..Government.Corruption.: num  0.316 0.401 0.154 0.367 0.383 ...
 $ Dystopia.Residual     : num  2.28 2.31 2.32 2.28 2.43 ...
> cor(high_happy$Happiness.Score,high_happy$Economy..GDP.per.Capita.)
[1] 0.4664157
> cor(high_happy$Happiness.Score,high_happy$Family)
[1] 0.5621287
> cor(high_happy$Happiness.Score,high_happy$Health..Life.Expectancy.)
[1] 0.642635
> cor(high_happy$Happiness.Score,high_happy$Freedom)
[1] 0.5643013
> cor(high_happy$Happiness.Score,high_happy$Generosity)
[1] 0.4757804
> cor(high_happy$Happiness.Score,high_happy$Trust..Government.Corruption.)
[1] 0.5612271
> cor(high_happy$Happiness.Score,high_happy$Dystopia.Residual)
[1] 0.1632091
> par(mfrow=c(2,4))
> plot(high_happy$Happiness.Score,high_happy$Economy..GDP.per.Capita.,main="plot1")
> plot(high_happy$Happiness.Score,high_happy$Family,main="plot2")
> plot(high_happy$Happiness.Score,high_happy$Health..Life.Expectancy.,main="plot3")
> plot(high_happy$Happiness.Score,high_happy$Freedom,main="plot4")
> plot(high_happy$Happiness.Score,high_happy$Generosity,main="plot5")
> plot(high_happy$Happiness.Score,high_happy$Trust..Government.Corruption.,main="plot6")
> plot(high_happy$Happiness.Score,high_happy$Dystopia.Residual,main="plot7")
```



행복도와 변수 간의 관계 분석 (corrplot)

```
> library(corrplot)
> high_happiness<-cor(high_happy)
> corrplot(high_happiness)
```



파란색일수록 행복도와 변수 간의
강한 양의 상관관계를 나타냄

행복 지수 상위 국가에서
행복도와 가장 상관관계가 높은 변수는

“ 건강 ”

국가 별 행복지수 시각화 (히트맵)

```
> row.names(high)<-high$Country
> high_happy<-high[,c(2,3,4,5,6,7,8,9)]
> str(high_happy)
'data.frame': 50 obs. of 8 variables:
 $ Happiness.Score      : num  7.54 7.52 7.5 7.49 7.47 ...
 $ Economy..GDP.per.Capita.: num  1.62 1.48 1.48 1.56 1.44 ...
 $ Family               : num  1.53 1.55 1.61 1.52 1.54 ...
 $ Health..Life.Expectancy.: num  0.797 0.793 0.834 0.858 0.809 ...
 $ Freedom              : num  0.635 0.626 0.627 0.62 0.618 ...
 $ Generosity           : num  0.362 0.355 0.476 0.291 0.245 ...
 $ Trust..Government.Corr.: num  0.316 0.401 0.154 0.367 0.383 ...
 $ Dystopia.Residual     : num  2.28 2.31 2.32 2.28 2.43 ...
> Happy_matix1<-data.matrix(high_happy)
> Happy_matix1
```

	Happiness.Score	Economy..GDP.per.Capita.	Family	Health..Life.Expectancy.
Norway	7.537	1.6164632	1.533524	0.7966665
Denmark	7.522	1.4823830	1.551122	0.7925655
Iceland	7.504	1.4806330	1.610574	0.8335521
Switzerland	7.494	1.5649796	1.516912	0.8581313
Finland	7.469	1.4435719	1.540247	0.8091577
Netherlands	7.377	1.5039446	1.428939	0.8106961
Canada	7.316	1.4792044	1.481349	0.8345577

~

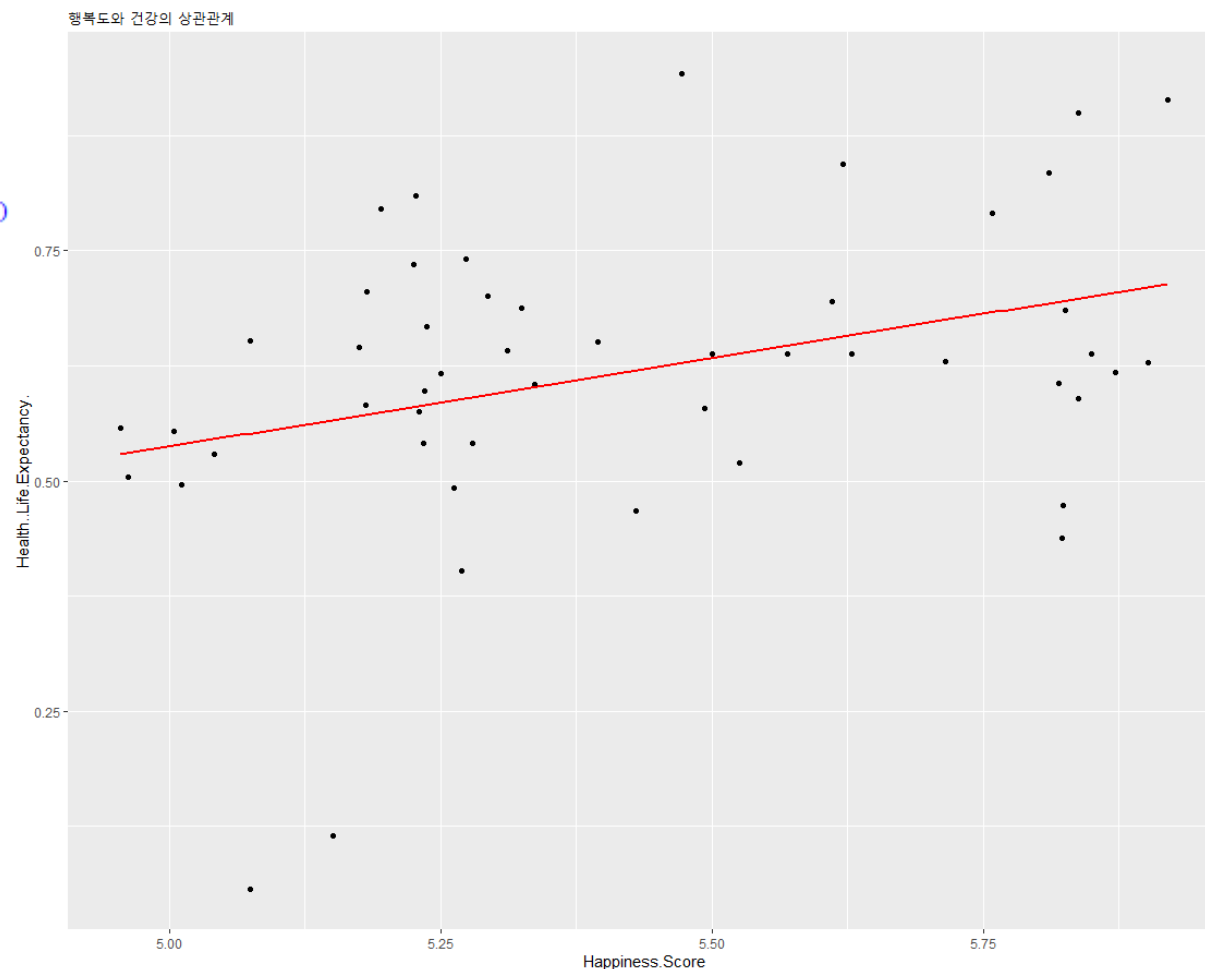
Spain	6.403	1.3843979	1.532091	0.8889606
Qatar	6.375	1.8707657	1.274297	0.7100981
Colombia	6.357	1.0706223	1.402183	0.5950279
Saudi Arabia	6.344	1.5306236	1.286678	0.5901483
Trinidad and Tobago	6.168	1.3613559	1.380229	0.5199833
Kuwait	6.105	1.6329525	1.259699	0.6321057
Slovakia	6.098	1.3253936	1.505059	0.7127329
Bahrain	6.087	1.4884123	1.323110	0.6531330
Malaysia	6.084	1.2912154	1.284646	0.6187844
Nicaragua	6.071	0.7372992	1.287216	0.6530960
Ecuador	6.008	1.0008204	1.286169	0.6856362
El Salvador	6.003	0.9097845	1.182125	0.5960186
Poland	5.973	1.2917879	1.445712	0.6994753
Uzbekistan	5.971	0.7864411	1.548969	0.4982726
Italy	5.964	1.3950666	1.444923	0.8531443
Russia	5.963	1.2817781	1.469282	0.5473493
Belize	5.956	0.9079753	1.081418	0.4501918

```
> heatmap(Happy_matix1,Rowv=NA,Colv=NA,col=cm.colors(256),scale="column",margin=c(5,5),cexCol = 1)
```



행복도와 건강의 상관관계 유의도 검정 (ggplot)

```
> install.packages("ggplot2")
> library(ggplot2)
warning message:
패키지 'ggplot2'는 R 버전 3.5.3에서 작성되었습니다
> H1<- ggplot(data=high, aes(x=Happiness.Score, y=Health..Life.Expectancy.))
> H1<- H1 + geom_point()
> H1<-H1 + ggtitle("행복도와 건강의 상관관계")
> H1<-H1 + stat_smooth(method="lm", se=FALSE, colour="red")
> H1
```



행복도와 건강의 단순선형회귀분석

```
> B<-lm(formula = high_happy$Happiness.Score~high_happy$Health..Life.Expectancy.,data=high_happy)
> summary(B)
```

```
Call:
lm(formula = high_happy$Happiness.Score ~ high_happy$Health..Life.Expectancy.,
    data = high_happy)
```

```
Residuals:
    Min       1Q   Median       3Q      Max
-1.01814 -0.24127  0.01816  0.31450  0.71639
```

```
Coefficients:
                Estimate Std. Error t value Pr(>|t|)
(Intercept)      4.5421     0.3659   12.415  < 2e-16 ***
high_happy$Health..Life.Expectancy.  2.8601     0.4922    5.811 4.87e-07 ***
---

```

```
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
Residual standard error: 0.3912 on 48 degrees of freedom
Multiple R-squared:  0.413,    Adjusted R-squared:  0.4008
F-statistic: 33.77 on 1 and 48 DF,  p-value: 4.866e-07
```

잔차 표준오차

: 건강으로부터 행복도를 예측할 때
발생하는 오차들의 평균

회귀식 : 행복도 = $4.5421 + 2.8601 \times \text{건강}$

행복도와 건강의 상관관계 유의도 검정

```
> cor.test(low_happy$Happiness.Score, low_happy$Health..Life.Expectancy.)
```

Pearson's product-moment correlation

data: low_happy\$Happiness.Score and low_happy\$Health..Life.Expectancy.

t = 2.5402, df = 48, p-value = 0.01437

alternative hypothesis: true correlation is not equal to 0

95 percent confidence interval:

0.07286648 0.56814278

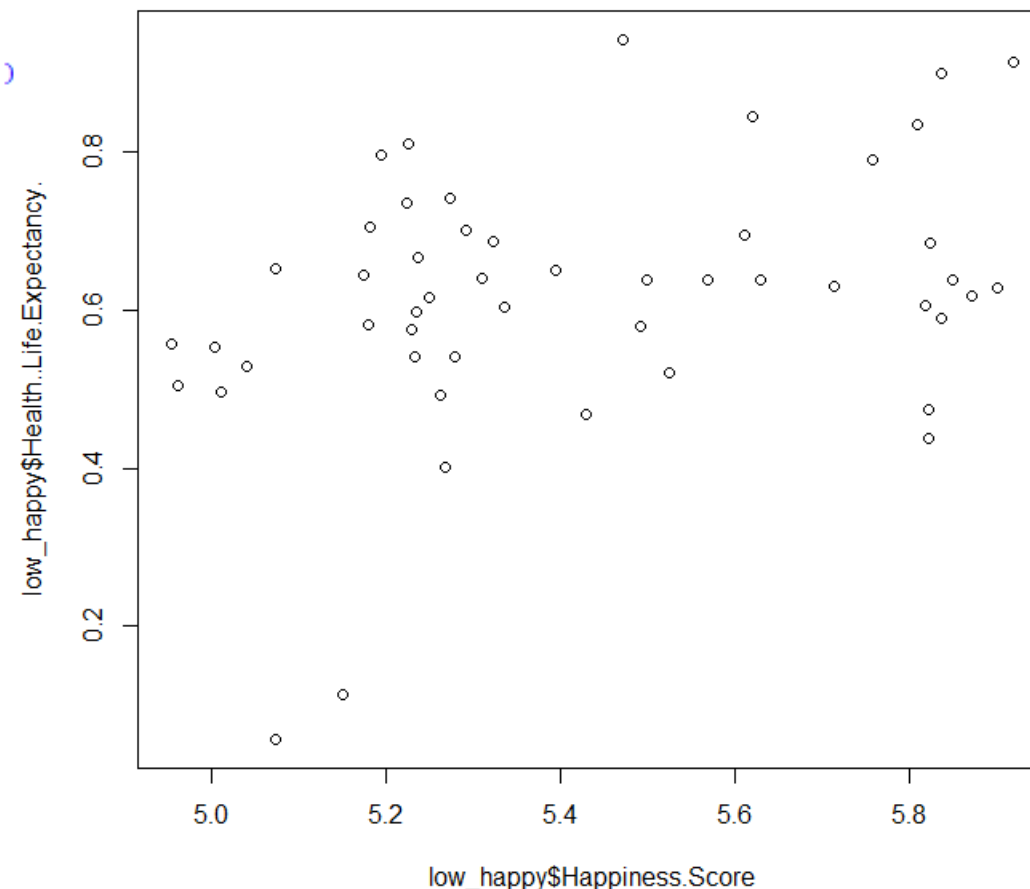
sample estimates:

cor

0.3442324

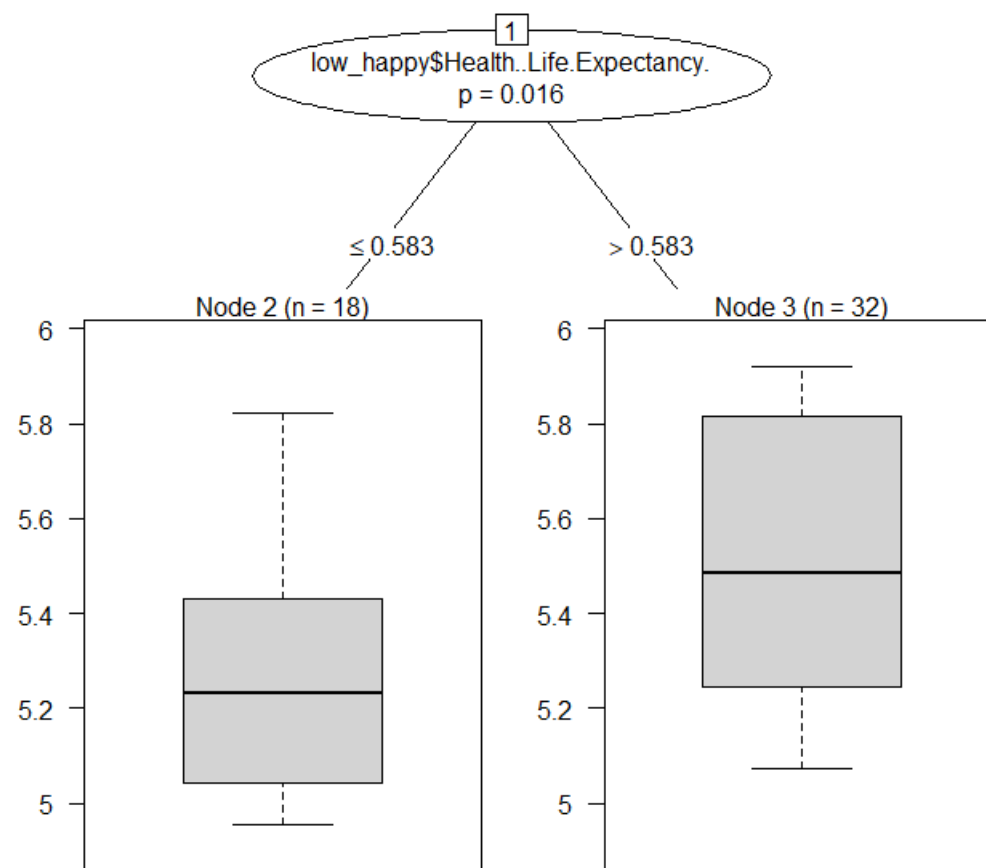
```
> plot(low_happy$Happiness.Score, low_happy$Health..Life.Expectancy.)
```


P-value 값이 0.05보다 낮으므로
상관관계 존재



분류 모델 예측

```
> install.packages("party")
> library(party)
> library(ggplot2)
Warning message:
패키지 'ggplot2'는 R 버전 3.5.3에서 작성되었습니다
> str(low_happy)
'data.frame': 50 obs. of 8 variables:
 $ Happiness.Score      : num  5.92 5.9 5.87 5.85 5.84 ...
 $ Economy..GDP.per.Capita.: num  1.42 1.31 1.09 1.26 1.4 ...
 $ Family               : num  1.44 1.47 1.15 1.4 1.13 ...
 $ Health..Life.Expectancy.: num  0.913 0.629 0.618 0.639 0.9 ...
 $ Freedom              : num  0.506 0.234 0.233 0.326 0.258 ...
 $ Generosity           : num  0.1206 0.0102 0.0694 0.1531 0.2067 ...
 $ Trust..Government.Corruption.: num  0.1638 0.0119 0.1461 0.0738 0.0633 ...
 $ Dystopia.Residual     : num  1.36 2.23 2.57 1.99 1.88 ...
> idx<-sample(1:nrow(low_happy),nrow(low_happy)*0.7)
> train<-low_happy[idx,]
> dim(train)
[1] 35 8
> test<-low_happy[-idx,]
> dim(test)
[1] 15 8
> formula<-low_happy$Happiness.Score~low_happy$Health..Life.Expectancy.
> Happy_train<-ctree(formula,data=train)
> Happy_test<-ctree(formula,data=test)
> plot(Happy_test)
```





행복지수
중위국가

경제력

행복지수
상위국가

건강

감사합니다