

## 模型-机器学习-分类-K邻近【hxy】

1. 模型名称
2. 模型评价
  - 2.1 优点
  - 2.2 缺点
3. 基本算法
4. 实例
  - 4.1 数据介绍
  - 4.2 实验目的
  - 4.3 代码实现
5. 参考资料

## 模型-机器学习-分类-K邻近【hxy】

### 1. 模型名称

K邻近 (k-Nearest Neighbor, KNN)

### 2. 模型评价

#### 2.1 优点

- 精度高
- 对异常值不敏感
- 无数据输入假定

#### 2.2 缺点

- 计算复杂度高，空间复杂度高

### 3. 基本算法

#### 1. 标准化数据

假设进行  $KNN$  分类使用的样本的特征是  $\{(x_{i1}, x_{i2}, \dots, x_{in})_{i=1}^m\}$

将每一列的数据减去每一列的最小值  $\min_{i=1,2,\dots,m} x_{ij}$

再除以每一列上的最大值减最小值  $M_j = \max_{i=1,2,\dots,m} x_{ij} - \min_{i=1,2,\dots,m} x_{ij}$

#### 2. 计算已有数据集中各个点与当前未知数据点的距离

设特征空间 $\chi$ 是 $n$ 维实数向量空间 $R^n$ ,  $x_i, x_j \in \chi$ ,

$x_i = (x_i^{(1)}, x_i^{(2)}, \dots, x_i^{(n)})^T$ ,  $x_j = (x_j^{(1)}, x_j^{(2)}, \dots, x_j^{(n)})^T$ ,  $x_i, x_j$ 的 $L_p(p \geq 1)$ 距离定义为

$$L_p(x_i, x_j) = \left( \sum_{l=1}^n |x_i^{(l)} - x_j^{(l)}|^p \right)^{\frac{1}{p}}$$

当 $p = 2$ 时, 称为欧式距离(*Euclidean Distance*), 即

$$L_2(x_i, x_j) = \left( \sum_{l=1}^n |x_i^{(l)} - x_j^{(l)}|^2 \right)^{\frac{1}{2}}$$

当 $p = 1$ 时, 称为曼哈顿距离(*Manhattan Distance*), 即

$$L_1(x_i, x_j) = \sum_{l=1}^n |x_i^{(l)} - x_j^{(l)}|$$

当 $p = \infty$ 时, 是各个坐标距离的最大值, 即

$$L_\infty(x_i, x_j) = \max_l |x_i^{(l)} - x_j^{(l)}|$$

3. 按照距离递增排序

4. 选取与未知点距离最近的 $k$ 组数据

- $k$ 不能过小: 容易发生过拟合, 容易学习到噪声
- $k$ 不能过大: 模型过于简单, 完全忽略训练数据实例中的大量有用信息
- 可以不断调整 $k$ 的取值来达到分类最佳效果

5. 确定这 $k$ 组数据的各标签出现的频率

6. 返回这 $k$ 组数据出现频率最高的标签作为未知点的标签

## 4. 实例

### 4.1 数据介绍

海伦收集约会数据已经有了一段时间, 她把这些数据存放在文本文件datingTestSet.txt中, 每个样本数据占据一行, 总共有1000行。海伦的样本主要包含以下3种特征: 每年获得的飞行常客里程数, 玩视频游戏所耗时间百分比, 有3种类型: 不喜欢的人, 魅力一般的人, 极具魅力的人

```
40920 8.326976 0.953952 largeDoses
14488 7.153469 1.673904 smallDoses
26052 1.441871 0.805124 didntLike
75136 13.147394 0.428964 didntLike
38344 1.669788 0.134296 didntLike
72993 10.141740 1.032955 didntLike
35948 6.830792 1.213192 largeDoses
42666 13.276369 0.543880 largeDoses
67497 8.631577 0.749278 didntLike
35483 12.273169 1.508053 largeDoses
50242 3.723498 0.831917 didntLike
63275 8.385879 1.669485 didntLike
5569 4.875435 0.728658 smallDoses
51052 4.680098 0.625224 didntLike
```

77372	15.299570	0.331351	didntLike
43673	1.889461	0.191283	didntLike
61364	7.516754	1.269164	didntLike
69673	14.239195	0.261333	didntLike
15669	0.000000	1.250185	smallDoses
28488	10.528555	1.304844	largeDoses
6487	3.540265	0.822483	smallDoses
37708	2.991551	0.833920	didntLike
22620	5.297865	0.638306	smallDoses
28782	6.593803	0.187108	largeDoses
19739	2.816760	1.686209	smallDoses
36788	12.458258	0.649617	largeDoses
5741	0.000000	1.656418	smallDoses
28567	9.968648	0.731232	largeDoses
6808	1.364838	0.640103	smallDoses
41611	0.230453	1.151996	didntLike
36661	11.865402	0.882810	largeDoses
43605	0.120460	1.352013	didntLike
15360	8.545204	1.340429	largeDoses
63796	5.856649	0.160006	didntLike
10743	9.665618	0.778626	smallDoses
70808	9.778763	1.084103	didntLike
72011	4.932976	0.632026	didntLike
5914	2.216246	0.587095	smallDoses
14851	14.305636	0.632317	largeDoses
33553	12.591889	0.686581	largeDoses
44952	3.424649	1.004504	didntLike
17934	0.000000	0.147573	smallDoses
27738	8.533823	0.205324	largeDoses
29290	9.829528	0.238620	largeDoses
42330	11.492186	0.263499	largeDoses
36429	3.570968	0.832254	didntLike
39623	1.771228	0.207612	didntLike
32404	3.513921	0.991854	didntLike
27268	4.398172	0.975024	didntLike
5477	4.276823	1.174874	smallDoses
14254	5.946014	1.614244	smallDoses
68613	13.798970	0.724375	didntLike
41539	10.393591	1.663724	largeDoses
7917	3.007577	0.297302	smallDoses
21331	1.031938	0.486174	smallDoses
8338	4.751212	0.064693	smallDoses
5176	3.692269	1.655113	smallDoses
18983	10.448091	0.267652	largeDoses
68837	10.585786	0.329557	didntLike
13438	1.604501	0.069064	smallDoses
48849	3.679497	0.961466	didntLike
12285	3.795146	0.696694	smallDoses
7826	2.531885	1.659173	smallDoses

5565	9.733340	0.977746	smallDoses
10346	6.093067	1.413798	smallDoses
1823	7.712960	1.054927	smallDoses
9744	11.470364	0.760461	largeDoses
16857	2.886529	0.934416	smallDoses
39336	10.054373	1.138351	largeDoses
65230	9.972470	0.881876	didntLike
2463	2.335785	1.366145	smallDoses
27353	11.375155	1.528626	largeDoses
16191	0.000000	0.605619	smallDoses
12258	4.126787	0.357501	smallDoses
42377	6.319522	1.058602	didntLike
25607	8.680527	0.086955	largeDoses
77450	14.856391	1.129823	didntLike
58732	2.454285	0.222380	didntLike
46426	7.292202	0.548607	largeDoses
32688	8.745137	0.857348	largeDoses
64890	8.579001	0.683048	didntLike
8554	2.507302	0.869177	smallDoses
28861	11.415476	1.505466	largeDoses
42050	4.838540	1.680892	didntLike
32193	10.339507	0.583646	largeDoses
64895	6.573742	1.151433	didntLike
2355	6.539397	0.462065	smallDoses
0	2.209159	0.723567	smallDoses
70406	11.196378	0.836326	didntLike
57399	4.229595	0.128253	didntLike
41732	9.505944	0.005273	largeDoses
11429	8.652725	1.348934	largeDoses
75270	17.101108	0.490712	didntLike
5459	7.871839	0.717662	smallDoses
73520	8.262131	1.361646	didntLike
40279	9.015635	1.658555	largeDoses
21540	9.215351	0.806762	largeDoses
17694	6.375007	0.033678	smallDoses
22329	2.262014	1.022169	didntLike
46570	5.677110	0.709469	didntLike
42403	11.293017	0.207976	largeDoses
33654	6.590043	1.353117	didntLike
9171	4.711960	0.194167	smallDoses
28122	8.768099	1.108041	largeDoses
34095	11.502519	0.545097	largeDoses
1774	4.682812	0.578112	smallDoses
40131	12.446578	0.300754	largeDoses
13994	12.908384	1.657722	largeDoses
77064	12.601108	0.974527	didntLike
11210	3.929456	0.025466	smallDoses
6122	9.751503	1.182050	largeDoses
15341	3.043767	0.888168	smallDoses

44373	4.391522	0.807100	didntLike
28454	11.695276	0.679015	largeDoses
63771	7.879742	0.154263	didntLike
9217	5.613163	0.933632	smallDoses
69076	9.140172	0.851300	didntLike
24489	4.258644	0.206892	didntLike
16871	6.799831	1.221171	smallDoses
39776	8.752758	0.484418	largeDoses
5901	1.123033	1.180352	smallDoses
40987	10.833248	1.585426	largeDoses
7479	3.051618	0.026781	smallDoses
38768	5.308409	0.030683	largeDoses
4933	1.841792	0.028099	smallDoses
32311	2.261978	1.605603	didntLike
26501	11.573696	1.061347	largeDoses
37433	8.038764	1.083910	largeDoses
23503	10.734007	0.103715	largeDoses
68607	9.661909	0.350772	didntLike
27742	9.005850	0.548737	largeDoses
11303	0.000000	0.539131	smallDoses
0	5.757140	1.062373	smallDoses
32729	9.164656	1.624565	largeDoses
24619	1.318340	1.436243	didntLike
42414	14.075597	0.695934	largeDoses
20210	10.107550	1.308398	largeDoses
33225	7.960293	1.219760	largeDoses
54483	6.317292	0.018209	didntLike
18475	12.664194	0.595653	largeDoses
33926	2.906644	0.581657	didntLike
43865	2.388241	0.913938	didntLike
26547	6.024471	0.486215	largeDoses
44404	7.226764	1.255329	largeDoses
16674	4.183997	1.275290	smallDoses
8123	11.850211	1.096981	largeDoses
42747	11.661797	1.167935	largeDoses
56054	3.574967	0.494666	didntLike
10933	0.000000	0.107475	smallDoses
18121	7.937657	0.904799	largeDoses
11272	3.365027	1.014085	smallDoses
16297	0.000000	0.367491	smallDoses
28168	13.860672	1.293270	largeDoses
40963	10.306714	1.211594	largeDoses
31685	7.228002	0.670670	largeDoses
55164	4.508740	1.036192	didntLike
17595	0.366328	0.163652	smallDoses
1862	3.299444	0.575152	smallDoses
57087	0.573287	0.607915	didntLike
63082	9.183738	0.012280	didntLike
51213	7.842646	1.060636	largeDoses

6487	4.750964	0.558240	smallDoses
4805	11.438702	1.556334	largeDoses
30302	8.243063	1.122768	largeDoses
68680	7.949017	0.271865	didntLike
17591	7.875477	0.227085	smallDoses
74391	9.569087	0.364856	didntLike
37217	7.750103	0.869094	largeDoses
42814	0.000000	1.515293	didntLike
14738	3.396030	0.633977	smallDoses
19896	11.916091	0.025294	largeDoses
14673	0.460758	0.689586	smallDoses
32011	13.087566	0.476002	largeDoses
58736	4.589016	1.672600	didntLike
54744	8.397217	1.534103	didntLike
29482	5.562772	1.689388	didntLike
27698	10.905159	0.619091	largeDoses
11443	1.311441	1.169887	smallDoses
56117	10.647170	0.980141	largeDoses
39514	0.000000	0.481918	didntLike
26627	8.503025	0.830861	largeDoses
16525	0.436880	1.395314	smallDoses
24368	6.127867	1.102179	didntLike
22160	12.112492	0.359680	largeDoses
6030	1.264968	1.141582	smallDoses
6468	6.067568	1.327047	smallDoses
22945	8.010964	1.681648	largeDoses
18520	3.791084	0.304072	smallDoses
34914	11.773195	1.262621	largeDoses
6121	8.339588	1.443357	smallDoses
38063	2.563092	1.464013	didntLike
23410	5.954216	0.953782	didntLike
35073	9.288374	0.767318	largeDoses
52914	3.976796	1.043109	didntLike
16801	8.585227	1.455708	largeDoses
9533	1.271946	0.796506	smallDoses
16721	0.000000	0.242778	smallDoses
5832	0.000000	0.089749	smallDoses
44591	11.521298	0.300860	largeDoses
10143	1.139447	0.415373	smallDoses
21609	5.699090	1.391892	smallDoses
23817	2.449378	1.322560	didntLike
15640	0.000000	1.228380	smallDoses
8847	3.168365	0.053993	smallDoses
50939	10.428610	1.126257	largeDoses
28521	2.943070	1.446816	didntLike
32901	10.441348	0.975283	largeDoses
42850	12.478764	1.628726	largeDoses
13499	5.856902	0.363883	smallDoses
40345	2.476420	0.096075	didntLike

43547	1.826637	0.811457	didntLike
70758	4.324451	0.328235	didntLike
19780	1.376085	1.178359	smallDoses
44484	5.342462	0.394527	didntLike
54462	11.835521	0.693301	largeDoses
20085	12.423687	1.424264	largeDoses
42291	12.161273	0.071131	largeDoses
47550	8.148360	1.649194	largeDoses
11938	1.531067	1.549756	smallDoses
40699	3.200912	0.309679	didntLike
70908	8.862691	0.530506	didntLike
73989	6.370551	0.369350	didntLike
11872	2.468841	0.145060	smallDoses
48463	11.054212	0.141508	largeDoses
15987	2.037080	0.715243	smallDoses
70036	13.364030	0.549972	didntLike
32967	10.249135	0.192735	largeDoses
63249	10.464252	1.669767	didntLike
42795	9.424574	0.013725	largeDoses
14459	4.458902	0.268444	smallDoses
19973	0.000000	0.575976	smallDoses
5494	9.686082	1.029808	largeDoses
67902	13.649402	1.052618	didntLike
25621	13.181148	0.273014	largeDoses
27545	3.877472	0.401600	didntLike
58656	1.413952	0.451380	didntLike
7327	4.248986	1.430249	smallDoses
64555	8.779183	0.845947	didntLike
8998	4.156252	0.097109	smallDoses
11752	5.580018	0.158401	smallDoses
76319	15.040440	1.366898	didntLike
27665	12.793870	1.307323	largeDoses
67417	3.254877	0.669546	didntLike
21808	10.725607	0.588588	largeDoses
15326	8.256473	0.765891	smallDoses
20057	8.033892	1.618562	largeDoses
79341	10.702532	0.204792	didntLike
15636	5.062996	1.132555	smallDoses
35602	10.772286	0.668721	largeDoses
28544	1.892354	0.837028	didntLike
57663	1.019966	0.372320	didntLike
78727	15.546043	0.729742	didntLike
68255	11.638205	0.409125	didntLike
14964	3.427886	0.975616	smallDoses
21835	11.246174	1.475586	largeDoses
7487	0.000000	0.645045	smallDoses
8700	0.000000	1.424017	smallDoses
26226	8.242553	0.279069	largeDoses
65899	8.700060	0.101807	didntLike

6543	0.812344	0.260334	smallDoses
46556	2.448235	1.176829	didntLike
71038	13.230078	0.616147	didntLike
47657	0.236133	0.340840	didntLike
19600	11.155826	0.335131	largeDoses
37422	11.029636	0.505769	largeDoses
1363	2.901181	1.646633	smallDoses
26535	3.924594	1.143120	didntLike
47707	2.524806	1.292848	didntLike
38055	3.527474	1.449158	didntLike
6286	3.384281	0.889268	smallDoses
10747	0.000000	1.107592	smallDoses
44883	11.898890	0.406441	largeDoses
56823	3.529892	1.375844	didntLike
68086	11.442677	0.696919	didntLike
70242	10.308145	0.422722	didntLike
11409	8.540529	0.727373	smallDoses
67671	7.156949	1.691682	didntLike
61238	0.720675	0.847574	didntLike
17774	0.229405	1.038603	smallDoses
53376	3.399331	0.077501	didntLike
30930	6.157239	0.580133	didntLike
28987	1.239698	0.719989	didntLike
13655	6.036854	0.016548	smallDoses
7227	5.258665	0.933722	smallDoses
40409	12.393001	1.571281	largeDoses
13605	9.627613	0.935842	smallDoses
26400	11.130453	0.597610	largeDoses
13491	8.842595	0.349768	largeDoses
30232	10.690010	1.456595	largeDoses
43253	5.714718	1.674780	largeDoses
55536	3.052505	1.335804	didntLike
8807	0.000000	0.059025	smallDoses
25783	9.945307	1.287952	largeDoses
22812	2.719723	1.142148	didntLike
77826	11.154055	1.608486	didntLike
38172	2.687918	0.660836	didntLike
31676	10.037847	0.962245	largeDoses
74038	12.404762	1.112080	didntLike
44738	10.237305	0.633422	largeDoses
17410	4.745392	0.662520	smallDoses
5688	4.639461	1.569431	smallDoses
36642	3.149310	0.639669	didntLike
29956	13.406875	1.639194	largeDoses
60350	6.068668	0.881241	didntLike
23758	9.477022	0.899002	largeDoses
25780	3.897620	0.560201	smallDoses
11342	5.463615	1.203677	smallDoses
36109	3.369267	1.575043	didntLike



14292	5.234562	0.825954	smallDoses
11160	0.000000	0.722170	smallDoses
23762	12.979069	0.504068	largeDoses
39567	5.376564	0.557476	didntLike
25647	13.527910	1.586732	largeDoses
14814	2.196889	0.784587	smallDoses
73590	10.691748	0.007509	didntLike
35187	1.659242	0.447066	didntLike
49459	8.369667	0.656697	largeDoses
31657	13.157197	0.143248	largeDoses
6259	8.199667	0.908508	smallDoses
33101	4.441669	0.439381	largeDoses
27107	9.846492	0.644523	largeDoses
17824	0.019540	0.977949	smallDoses
43536	8.253774	0.748700	largeDoses
67705	6.038620	1.509646	didntLike
35283	6.091587	1.694641	largeDoses
71308	8.986820	1.225165	didntLike
31054	11.508473	1.624296	largeDoses
52387	8.807734	0.713922	largeDoses
40328	0.000000	0.816676	didntLike
34844	8.889202	1.665414	largeDoses
11607	3.178117	0.542752	smallDoses
64306	7.013795	0.139909	didntLike
32721	9.605014	0.065254	largeDoses
33170	1.230540	1.331674	didntLike
37192	10.412811	0.890803	largeDoses
13089	0.000000	0.567161	smallDoses
66491	9.699991	0.122011	didntLike
15941	0.000000	0.061191	smallDoses
4272	4.455293	0.272135	smallDoses
48812	3.020977	1.502803	didntLike
28818	8.099278	0.216317	largeDoses
35394	1.157764	1.603217	didntLike
71791	10.105396	0.121067	didntLike
40668	11.230148	0.408603	largeDoses
39580	9.070058	0.011379	largeDoses
11786	0.566460	0.478837	smallDoses
19251	0.000000	0.487300	smallDoses
56594	8.956369	1.193484	largeDoses
54495	1.523057	0.620528	didntLike
11844	2.749006	0.169855	smallDoses
45465	9.235393	0.188350	largeDoses
31033	10.555573	0.403927	largeDoses
16633	6.956372	1.519308	smallDoses
13887	0.636281	1.273984	smallDoses
52603	3.574737	0.075163	didntLike
72000	9.032486	1.461809	didntLike
68497	5.958993	0.023012	didntLike

35135	2.435300	1.211744	didntLike
26397	10.539731	1.638248	largeDoses
7313	7.646702	0.056513	smallDoses
91273	20.919349	0.644571	didntLike
24743	1.424726	0.838447	didntLike
31690	6.748663	0.890223	largeDoses
15432	2.289167	0.114881	smallDoses
58394	5.548377	0.402238	didntLike
33962	6.057227	0.432666	didntLike
31442	10.828595	0.559955	largeDoses
31044	11.318160	0.271094	largeDoses
29938	13.265311	0.633903	largeDoses
9875	0.000000	1.496715	smallDoses
51542	6.517133	0.402519	largeDoses
11878	4.934374	1.520028	smallDoses
69241	10.151738	0.896433	didntLike
37776	2.425781	1.559467	didntLike
68997	9.778962	1.195498	didntLike
67416	12.219950	0.657677	didntLike
59225	7.394151	0.954434	didntLike
29138	8.518535	0.742546	largeDoses
5962	2.798700	0.662632	smallDoses
10847	0.637930	0.617373	smallDoses
70527	10.750490	0.097415	didntLike
9610	0.625382	0.140969	smallDoses
64734	10.027968	0.282787	didntLike
25941	9.817347	0.364197	largeDoses
2763	0.646828	1.266069	smallDoses
55601	3.347111	0.914294	didntLike
31128	11.816892	0.193798	largeDoses
5181	0.000000	1.480198	smallDoses
69982	10.945666	0.993219	didntLike
52440	10.244706	0.280539	largeDoses
57350	2.579801	1.149172	didntLike
57869	2.630410	0.098869	didntLike
56557	11.746200	1.695517	largeDoses
42342	8.104232	1.326277	largeDoses
15560	12.409743	0.790295	largeDoses
34826	12.167844	1.328086	largeDoses
8569	3.198408	0.299287	smallDoses
77623	16.055513	0.541052	didntLike
78184	7.138659	0.158481	didntLike
7036	4.831041	0.761419	smallDoses
69616	10.082890	1.373611	didntLike
21546	10.066867	0.788470	largeDoses
36715	8.129538	0.329913	largeDoses
20522	3.012463	1.138108	smallDoses
42349	3.720391	0.845974	didntLike
9037	0.773493	1.148256	smallDoses

26728	10.962941	1.037324	largeDoses
587	0.177621	0.162614	smallDoses
48915	3.085853	0.967899	didntLike
9824	8.426781	0.202558	smallDoses
4135	1.825927	1.128347	smallDoses
9666	2.185155	1.010173	smallDoses
59333	7.184595	1.261338	didntLike
36198	0.000000	0.116525	didntLike
34909	8.901752	1.033527	largeDoses
47516	2.451497	1.358795	didntLike
55807	3.213631	0.432044	didntLike
14036	3.974739	0.723929	smallDoses
42856	9.601306	0.619232	largeDoses
64007	8.363897	0.445341	didntLike
59428	6.381484	1.365019	didntLike
13730	0.000000	1.403914	smallDoses
41740	9.609836	1.438105	largeDoses
63546	9.904741	0.985862	didntLike
30417	7.185807	1.489102	largeDoses
69636	5.466703	1.216571	didntLike
64660	0.000000	0.915898	didntLike
14883	4.575443	0.535671	smallDoses
7965	3.277076	1.010868	smallDoses
68620	10.246623	1.239634	didntLike
8738	2.341735	1.060235	smallDoses
7544	3.201046	0.498843	smallDoses
6377	6.066013	0.120927	smallDoses
36842	8.829379	0.895657	largeDoses
81046	15.833048	1.568245	didntLike
67736	13.516711	1.220153	didntLike
32492	0.664284	1.116755	didntLike
39299	6.325139	0.605109	largeDoses
77289	8.677499	0.344373	didntLike
33835	8.188005	0.964896	largeDoses
71890	9.414263	0.384030	didntLike
32054	9.196547	1.138253	largeDoses
38579	10.202968	0.452363	largeDoses
55984	2.119439	1.481661	didntLike
72694	13.635078	0.858314	didntLike
42299	0.083443	0.701669	didntLike
26635	9.149096	1.051446	largeDoses
8579	1.933803	1.374388	smallDoses
37302	14.115544	0.676198	largeDoses
22878	8.933736	0.943352	largeDoses
4364	2.661254	0.946117	smallDoses
4985	0.988432	1.305027	smallDoses
37068	2.063741	1.125946	didntLike
41137	2.220590	0.690754	didntLike
67759	6.424849	0.806641	didntLike

11831	1.156153	1.613674	smallDoses
34502	3.032720	0.601847	didntLike
4088	3.076828	0.952089	smallDoses
15199	0.000000	0.318105	smallDoses
17309	7.750480	0.554015	largeDoses
42816	10.958135	1.482500	largeDoses
43751	10.222018	0.488678	largeDoses
58335	2.367988	0.435741	didntLike
75039	7.686054	1.381455	didntLike
42878	11.464879	1.481589	largeDoses
42770	11.075735	0.089726	largeDoses
8848	3.543989	0.345853	smallDoses
31340	8.123889	1.282880	largeDoses
41413	4.331769	0.754467	largeDoses
12731	0.120865	1.211961	smallDoses
22447	6.116109	0.701523	largeDoses
33564	7.474534	0.505790	largeDoses
48907	8.819454	0.649292	largeDoses
8762	6.802144	0.615284	smallDoses
46696	12.666325	0.931960	largeDoses
36851	8.636180	0.399333	largeDoses
67639	11.730991	1.289833	didntLike
171	8.132449	0.039062	smallDoses
26674	10.296589	1.496144	largeDoses
8739	7.583906	1.005764	smallDoses
66668	9.777806	0.496377	didntLike
68732	8.833546	0.513876	didntLike
69995	4.907899	1.518036	didntLike
82008	8.362736	1.285939	didntLike
25054	9.084726	1.606312	largeDoses
33085	14.164141	0.560970	largeDoses
41379	9.080683	0.989920	largeDoses
39417	6.522767	0.038548	largeDoses
12556	3.690342	0.462281	smallDoses
39432	3.563706	0.242019	didntLike
38010	1.065870	1.141569	didntLike
69306	6.683796	1.456317	didntLike
38000	1.712874	0.243945	didntLike
46321	13.109929	1.280111	largeDoses
66293	11.327910	0.780977	didntLike
22730	4.545711	1.233254	didntLike
5952	3.367889	0.468104	smallDoses
72308	8.326224	0.567347	didntLike
60338	8.978339	1.442034	didntLike
13301	5.655826	1.582159	smallDoses
27884	8.855312	0.570684	largeDoses
11188	6.649568	0.544233	smallDoses
56796	3.966325	0.850410	didntLike
8571	1.924045	1.664782	smallDoses

4914	6.004812	0.280369	smallDoses
10784	0.000000	0.375849	smallDoses
39296	9.923018	0.092192	largeDoses
13113	2.389084	0.119284	smallDoses
70204	13.663189	0.133251	didntLike
46813	11.434976	0.321216	largeDoses
11697	0.358270	1.292858	smallDoses
44183	9.598873	0.223524	largeDoses
2225	6.375275	0.608040	smallDoses
29066	11.580532	0.458401	largeDoses
4245	5.319324	1.598070	smallDoses
34379	4.324031	1.603481	didntLike
44441	2.358370	1.273204	didntLike
2022	0.000000	1.182708	smallDoses
26866	12.824376	0.890411	largeDoses
57070	1.587247	1.456982	didntLike
32932	8.510324	1.520683	largeDoses
51967	10.428884	1.187734	largeDoses
44432	8.346618	0.042318	largeDoses
67066	7.541444	0.809226	didntLike
17262	2.540946	1.583286	smallDoses
79728	9.473047	0.692513	didntLike
14259	0.352284	0.474080	smallDoses
6122	0.000000	0.589826	smallDoses
76879	12.405171	0.567201	didntLike
11426	4.126775	0.871452	smallDoses
2493	0.034087	0.335848	smallDoses
19910	1.177634	0.075106	smallDoses
10939	0.000000	0.479996	smallDoses
17716	0.994909	0.611135	smallDoses
31390	11.053664	1.180117	largeDoses
20375	0.000000	1.679729	smallDoses
26309	2.495011	1.459589	didntLike
33484	11.516831	0.001156	largeDoses
45944	9.213215	0.797743	largeDoses
4249	5.332865	0.109288	smallDoses
6089	0.000000	1.689771	smallDoses
7513	0.000000	1.126053	smallDoses
27862	12.640062	1.690903	largeDoses
39038	2.693142	1.317518	didntLike
19218	3.328969	0.268271	smallDoses
62911	7.193166	1.117456	didntLike
77758	6.615512	1.521012	didntLike
27940	8.000567	0.835341	largeDoses
2194	4.017541	0.512104	smallDoses
37072	13.245859	0.927465	largeDoses
15585	5.970616	0.813624	smallDoses
25577	11.668719	0.886902	largeDoses
8777	4.283237	1.272728	smallDoses

29016	10.742963	0.971401	largeDoses
21910	12.326672	1.592608	largeDoses
12916	0.000000	0.344622	smallDoses
10976	0.000000	0.922846	smallDoses
79065	10.602095	0.573686	didntLike
36759	10.861859	1.155054	largeDoses
50011	1.229094	1.638690	didntLike
1155	0.410392	1.313401	smallDoses
71600	14.552711	0.616162	didntLike
30817	14.178043	0.616313	largeDoses
54559	14.136260	0.362388	didntLike
29764	0.093534	1.207194	didntLike
69100	10.929021	0.403110	didntLike
47324	11.432919	0.825959	largeDoses
73199	9.134527	0.586846	didntLike
44461	5.071432	1.421420	didntLike
45617	11.460254	1.541749	largeDoses
28221	11.620039	1.103553	largeDoses
7091	4.022079	0.207307	smallDoses
6110	3.057842	1.631262	smallDoses
79016	7.782169	0.404385	didntLike
18289	7.981741	0.929789	largeDoses
43679	4.601363	0.268326	didntLike
22075	2.595564	1.115375	didntLike
23535	10.049077	0.391045	largeDoses
25301	3.265444	1.572970	smallDoses
32256	11.780282	1.511014	largeDoses
36951	3.075975	0.286284	didntLike
31290	1.795307	0.194343	didntLike
38953	11.106979	0.202415	largeDoses
35257	5.994413	0.800021	didntLike
25847	9.706062	1.012182	largeDoses
32680	10.582992	0.836025	largeDoses
62018	7.038266	1.458979	didntLike
9074	0.023771	0.015314	smallDoses
33004	12.823982	0.676371	largeDoses
44588	3.617770	0.493483	didntLike
32565	8.346684	0.253317	largeDoses
38563	6.104317	0.099207	didntLike
75668	16.207776	0.584973	didntLike
9069	6.401969	1.691873	smallDoses
53395	2.298696	0.559757	didntLike
28631	7.661515	0.055981	largeDoses
71036	6.353608	1.645301	didntLike
71142	10.442780	0.335870	didntLike
37653	3.834509	1.346121	didntLike
76839	10.998587	0.584555	didntLike
9916	2.695935	1.512111	smallDoses
38889	3.356646	0.324230	didntLike

39075	14.677836	0.793183	largeDoses
48071	1.551934	0.130902	didntLike
7275	2.464739	0.223502	smallDoses
41804	1.533216	1.007481	didntLike
35665	12.473921	0.162910	largeDoses
67956	6.491596	0.032576	didntLike
41892	10.506276	1.510747	largeDoses
38844	4.380388	0.748506	didntLike
74197	13.670988	1.687944	didntLike
14201	8.317599	0.390409	smallDoses
3908	0.000000	0.556245	smallDoses
2459	0.000000	0.290218	smallDoses
32027	10.095799	1.188148	largeDoses
12870	0.860695	1.482632	smallDoses
9880	1.557564	0.711278	smallDoses
72784	10.072779	0.756030	didntLike
17521	0.000000	0.431468	smallDoses
50283	7.140817	0.883813	largeDoses
33536	11.384548	1.438307	largeDoses
9452	3.214568	1.083536	smallDoses
37457	11.720655	0.301636	largeDoses
17724	6.374475	1.475925	largeDoses
43869	5.749684	0.198875	largeDoses
264	3.871808	0.552602	smallDoses
25736	8.336309	0.636238	largeDoses
39584	9.710442	1.503735	largeDoses
31246	1.532611	1.433898	didntLike
49567	9.785785	0.984614	largeDoses
7052	2.633627	1.097866	smallDoses
35493	9.238935	0.494701	largeDoses
10986	1.205656	1.398803	smallDoses
49508	3.124909	1.670121	didntLike
5734	7.935489	1.585044	smallDoses
65479	12.746636	1.560352	didntLike
77268	10.732563	0.545321	didntLike
28490	3.977403	0.766103	didntLike
13546	4.194426	0.450663	smallDoses
37166	9.610286	0.142912	largeDoses
16381	4.797555	1.260455	smallDoses
10848	1.615279	0.093002	smallDoses
35405	4.614771	1.027105	didntLike
15917	0.000000	1.369726	smallDoses
6131	0.608457	0.512220	smallDoses
67432	6.558239	0.667579	didntLike
30354	12.315116	0.197068	largeDoses
69696	7.014973	1.494616	didntLike
33481	8.822304	1.194177	largeDoses
43075	10.086796	0.570455	largeDoses
38343	7.241614	1.661627	largeDoses

14318	4.602395	1.511768	smallDoses
5367	7.434921	0.079792	smallDoses
37894	10.467570	1.595418	largeDoses
36172	9.948127	0.003663	largeDoses
40123	2.478529	1.568987	didntLike
10976	5.938545	0.878540	smallDoses
12705	0.000000	0.948004	smallDoses
12495	5.559181	1.357926	smallDoses
35681	9.776654	0.535966	largeDoses
46202	3.092056	0.490906	didntLike
11505	0.000000	1.623311	smallDoses
22834	4.459495	0.538867	didntLike
49901	8.334306	1.646600	largeDoses
71932	11.226654	0.384686	didntLike
13279	3.904737	1.597294	smallDoses
49112	7.038205	1.211329	largeDoses
77129	9.836120	1.054340	didntLike
37447	1.990976	0.378081	didntLike
62397	9.005302	0.485385	didntLike
0	1.772510	1.039873	smallDoses
15476	0.458674	0.819560	smallDoses
40625	10.003919	0.231658	largeDoses
36706	0.520807	1.476008	didntLike
28580	10.678214	1.431837	largeDoses
25862	4.425992	1.363842	didntLike
63488	12.035355	0.831222	didntLike
33944	10.606732	1.253858	largeDoses
30099	1.568653	0.684264	didntLike
13725	2.545434	0.024271	smallDoses
36768	10.264062	0.982593	largeDoses
64656	9.866276	0.685218	didntLike
14927	0.142704	0.057455	smallDoses
43231	9.853270	1.521432	largeDoses
66087	6.596604	1.653574	didntLike
19806	2.602287	1.321481	smallDoses
41081	10.411776	0.664168	largeDoses
10277	7.083449	0.622589	smallDoses
7014	2.080068	1.254441	smallDoses
17275	0.522844	1.622458	smallDoses
31600	10.362000	1.544827	largeDoses
59956	3.412967	1.035410	didntLike
42181	6.796548	1.112153	largeDoses
51743	4.092035	0.075804	didntLike
5194	2.763811	1.564325	smallDoses
30832	12.547439	1.402443	largeDoses
7976	5.708052	1.596152	smallDoses
14602	4.558025	0.375806	smallDoses
41571	11.642307	0.438553	largeDoses
55028	3.222443	0.121399	didntLike



5837	4.736156	0.029871	smallDoses
39808	10.839526	0.836323	largeDoses
20944	4.194791	0.235483	smallDoses
22146	14.936259	0.888582	largeDoses
42169	3.310699	1.521855	didntLike
7010	2.971931	0.034321	smallDoses
3807	9.261667	0.537807	smallDoses
29241	7.791833	1.111416	largeDoses
52696	1.480470	1.028750	didntLike
42545	3.677287	0.244167	didntLike
24437	2.202967	1.370399	didntLike
16037	5.796735	0.935893	smallDoses
8493	3.063333	0.144089	smallDoses
68080	11.233094	0.492487	didntLike
59016	1.965570	0.005697	didntLike
11810	8.616719	0.137419	smallDoses
68630	6.609989	1.083505	didntLike
7629	1.712639	1.086297	smallDoses
71992	10.117445	1.299319	didntLike
13398	0.000000	1.104178	smallDoses
26241	9.824777	1.346821	largeDoses
11160	1.653089	0.980949	smallDoses
76701	18.178822	1.473671	didntLike
32174	6.781126	0.885340	largeDoses
45043	8.206750	1.549223	largeDoses
42173	10.081853	1.376745	largeDoses
69801	6.288742	0.112799	didntLike
41737	3.695937	1.543589	didntLike
46979	6.726151	1.069380	largeDoses
79267	12.969999	1.568223	didntLike
4615	2.661390	1.531933	smallDoses
32907	7.072764	1.117386	largeDoses
37444	9.123366	1.318988	largeDoses
569	3.743946	1.039546	smallDoses
8723	2.341300	0.219361	smallDoses
6024	0.541913	0.592348	smallDoses
52252	2.310828	1.436753	didntLike
8358	6.226597	1.427316	smallDoses
26166	7.277876	0.489252	largeDoses
18471	0.000000	0.389459	smallDoses
3386	7.218221	1.098828	smallDoses
41544	8.777129	1.111464	largeDoses
10480	2.813428	0.819419	smallDoses
5894	2.268766	1.412130	smallDoses
7273	6.283627	0.571292	smallDoses
22272	7.520081	1.626868	largeDoses
31369	11.739225	0.027138	largeDoses
10708	3.746883	0.877350	smallDoses
69364	12.089835	0.521631	didntLike

37760	12.310404	0.259339	largeDoses
13004	0.000000	0.671355	smallDoses
37885	2.728800	0.331502	didntLike
52555	10.814342	0.607652	largeDoses
38997	12.170268	0.844205	largeDoses
69698	6.698371	0.240084	didntLike
11783	3.632672	1.643479	smallDoses
47636	10.059991	0.892361	largeDoses
15744	1.887674	0.756162	smallDoses
69058	8.229125	0.195886	didntLike
33057	7.817082	0.476102	largeDoses
28681	12.277230	0.076805	largeDoses
34042	10.055337	1.115778	largeDoses
29928	3.596002	1.485952	didntLike
9734	2.755530	1.420655	smallDoses
7344	7.780991	0.513048	smallDoses
7387	0.093705	0.391834	smallDoses
33957	8.481567	0.520078	largeDoses
9936	3.865584	0.110062	smallDoses
36094	9.683709	0.779984	largeDoses
39835	10.617255	1.359970	largeDoses
64486	7.203216	1.624762	didntLike
0	7.601414	1.215605	smallDoses
39539	1.386107	1.417070	didntLike
66972	9.129253	0.594089	didntLike
15029	1.363447	0.620841	smallDoses
44909	3.181399	0.359329	didntLike
38183	13.365414	0.217011	largeDoses
37372	4.207717	1.289767	didntLike
0	4.088395	0.870075	smallDoses
17786	3.327371	1.142505	smallDoses
39055	1.303323	1.235650	didntLike
37045	7.999279	1.581763	largeDoses
6435	2.217488	0.864536	smallDoses
72265	7.751808	0.192451	didntLike
28152	14.149305	1.591532	largeDoses
25931	8.765721	0.152808	largeDoses
7538	3.408996	0.184896	smallDoses
1315	1.251021	0.112340	smallDoses
12292	6.160619	1.537165	smallDoses
49248	1.034538	1.585162	didntLike
9025	0.000000	1.034635	smallDoses
13438	2.355051	0.542603	smallDoses
69683	6.614543	0.153771	didntLike
25374	10.245062	1.450903	largeDoses
55264	3.467074	1.231019	didntLike
38324	7.487678	1.572293	largeDoses
69643	4.624115	1.185192	didntLike
44058	8.995957	1.436479	largeDoses

41316	11.564476	0.007195	largeDoses
29119	3.440948	0.078331	didntLike
51656	1.673603	0.732746	didntLike
3030	4.719341	0.699755	smallDoses
35695	10.304798	1.576488	largeDoses
1537	2.086915	1.199312	smallDoses
9083	6.338220	1.131305	smallDoses
47744	8.254926	0.710694	largeDoses
71372	16.067108	0.974142	didntLike
37980	1.723201	0.310488	didntLike
42385	3.785045	0.876904	didntLike
22687	2.557561	0.123738	didntLike
39512	9.852220	1.095171	largeDoses
11885	3.679147	1.557205	smallDoses
4944	9.789681	0.852971	smallDoses
73230	14.958998	0.526707	didntLike
17585	11.182148	1.288459	largeDoses
68737	7.528533	1.657487	didntLike
13818	5.253802	1.378603	smallDoses
31662	13.946752	1.426657	largeDoses
86686	15.557263	1.430029	didntLike
43214	12.483550	0.688513	largeDoses
24091	2.317302	1.411137	didntLike
52544	10.069724	0.766119	largeDoses
61861	5.792231	1.615483	didntLike
47903	4.138435	0.475994	didntLike
37190	12.929517	0.304378	largeDoses
6013	9.378238	0.307392	smallDoses
27223	8.361362	1.643204	largeDoses
69027	7.939406	1.325042	didntLike
78642	10.735384	0.705788	didntLike
30254	11.592723	0.286188	largeDoses
21704	10.098356	0.704748	largeDoses
34985	9.299025	0.545337	largeDoses
31316	11.158297	0.218067	largeDoses
76368	16.143900	0.558388	didntLike
27953	10.971700	1.221787	largeDoses
152	0.000000	0.681478	smallDoses
9146	3.178961	1.292692	smallDoses
75346	17.625350	0.339926	didntLike
26376	1.995833	0.267826	didntLike
35255	10.640467	0.416181	largeDoses
19198	9.628339	0.985462	largeDoses
12518	4.662664	0.495403	smallDoses
25453	5.754047	1.382742	smallDoses
12530	0.000000	0.037146	smallDoses
62230	9.334332	0.198118	didntLike
9517	3.846162	0.619968	smallDoses
71161	10.685084	0.678179	didntLike

1593	4.752134	0.359205	smallDoses
33794	0.697630	0.966786	didntLike
39710	10.365836	0.505898	largeDoses
16941	0.461478	0.352865	smallDoses
69209	11.339537	1.068740	didntLike
4446	5.420280	0.127310	smallDoses
9347	3.469955	1.619947	smallDoses
55635	8.517067	0.994858	largeDoses
65889	8.306512	0.413690	didntLike
10753	2.628690	0.444320	smallDoses
7055	0.000000	0.802985	smallDoses
7905	0.000000	1.170397	smallDoses
53447	7.298767	1.582346	largeDoses
9194	7.331319	1.277988	smallDoses
61914	9.392269	0.151617	didntLike
15630	5.541201	1.180596	smallDoses
79194	15.149460	0.537540	didntLike
12268	5.515189	0.250562	smallDoses
33682	7.728898	0.920494	largeDoses
26080	11.318785	1.510979	largeDoses
19119	3.574709	1.531514	smallDoses
30902	7.350965	0.026332	largeDoses
63039	7.122363	1.630177	didntLike
51136	1.828412	1.013702	didntLike
35262	10.117989	1.156862	largeDoses
42776	11.309897	0.086291	largeDoses
64191	8.342034	1.388569	didntLike
15436	0.241714	0.715577	smallDoses
14402	10.482619	1.694972	smallDoses
6341	9.289510	1.428879	smallDoses
14113	4.269419	0.134181	smallDoses
6390	0.000000	0.189456	smallDoses
8794	0.817119	0.143668	smallDoses
43432	1.508394	0.652651	didntLike
38334	9.359918	0.052262	largeDoses
34068	10.052333	0.550423	largeDoses
30819	11.111660	0.989159	largeDoses
22239	11.265971	0.724054	largeDoses
28725	10.383830	0.254836	largeDoses
57071	3.878569	1.377983	didntLike
72420	13.679237	0.025346	didntLike
28294	10.526846	0.781569	largeDoses
9896	0.000000	0.924198	smallDoses
65821	4.106727	1.085669	didntLike
7645	8.118856	1.470686	smallDoses
71289	7.796874	0.052336	didntLike
5128	2.789669	1.093070	smallDoses
13711	6.226962	0.287251	smallDoses
22240	10.169548	1.660104	largeDoses

15092	0.000000	1.370549	smallDoses
5017	7.513353	0.137348	smallDoses
10141	8.240793	0.099735	smallDoses
35570	14.612797	1.247390	largeDoses
46893	3.562976	0.445386	didntLike
8178	3.230482	1.331698	smallDoses
55783	3.612548	1.551911	didntLike
1148	0.000000	0.332365	smallDoses
10062	3.931299	0.487577	smallDoses
74124	14.752342	1.155160	didntLike
66603	10.261887	1.628085	didntLike
11893	2.787266	1.570402	smallDoses
50908	15.112319	1.324132	largeDoses
39891	5.184553	0.223382	largeDoses
65915	3.868359	0.128078	didntLike
65678	3.507965	0.028904	didntLike
62996	11.019254	0.427554	didntLike
36851	3.812387	0.655245	didntLike
36669	11.056784	0.378725	largeDoses
38876	8.826880	1.002328	largeDoses
26878	11.173861	1.478244	largeDoses
46246	11.506465	0.421993	largeDoses
12761	7.798138	0.147917	largeDoses
35282	10.155081	1.370039	largeDoses
68306	10.645275	0.693453	didntLike
31262	9.663200	1.521541	largeDoses
34754	10.790404	1.312679	largeDoses
13408	2.810534	0.219962	smallDoses
30365	9.825999	1.388500	largeDoses
10709	1.421316	0.677603	smallDoses
24332	11.123219	0.809107	largeDoses
45517	13.402206	0.661524	largeDoses
6178	1.212255	0.836807	smallDoses
10639	1.568446	1.297469	smallDoses
29613	3.343473	1.312266	didntLike
22392	5.400155	0.193494	didntLike
51126	3.818754	0.590905	didntLike
53644	7.973845	0.307364	largeDoses
51417	9.078824	0.734876	largeDoses
24859	0.153467	0.766619	didntLike
61732	8.325167	0.028479	didntLike
71128	7.092089	1.216733	didntLike
27276	5.192485	1.094409	largeDoses
30453	10.340791	1.087721	largeDoses
18670	2.077169	1.019775	smallDoses
70600	10.151966	0.993105	didntLike
12683	0.046826	0.809614	smallDoses
81597	11.221874	1.395015	didntLike
69959	14.497963	1.019254	didntLike

8124	3.554508	0.533462	smallDoses
18867	3.522673	0.086725	smallDoses
80886	14.531655	0.380172	didntLike
55895	3.027528	0.885457	didntLike
31587	1.845967	0.488985	didntLike
10591	10.226164	0.804403	largeDoses
70096	10.965926	1.212328	didntLike
53151	2.129921	1.477378	didntLike
11992	0.000000	1.606849	smallDoses
33114	9.489005	0.827814	largeDoses
7413	0.000000	1.020797	smallDoses
10583	0.000000	1.270167	smallDoses
58668	6.556676	0.055183	didntLike
35018	9.959588	0.060020	largeDoses
70843	7.436056	1.479856	didntLike
14011	0.404888	0.459517	smallDoses
35015	9.952942	1.650279	largeDoses
70839	15.600252	0.021935	didntLike
3024	2.723846	0.387455	smallDoses
5526	0.513866	1.323448	smallDoses
5113	0.000000	0.861859	smallDoses
20851	7.280602	1.438470	smallDoses
40999	9.161978	1.110180	largeDoses
15823	0.991725	0.730979	smallDoses
35432	7.398380	0.684218	largeDoses
53711	12.149747	1.389088	largeDoses
64371	9.149678	0.874905	didntLike
9289	9.666576	1.370330	smallDoses
60613	3.620110	0.287767	didntLike
18338	5.238800	1.253646	smallDoses
22845	14.715782	1.503758	largeDoses
74676	14.445740	1.211160	didntLike
34143	13.609528	0.364240	largeDoses
14153	3.141585	0.424280	smallDoses
9327	0.000000	0.120947	smallDoses
18991	0.454750	1.033280	smallDoses
9193	0.510310	0.016395	smallDoses
2285	3.864171	0.616349	smallDoses
9493	6.724021	0.563044	smallDoses
2371	4.289375	0.012563	smallDoses
13963	0.000000	1.437030	smallDoses
2299	3.733617	0.698269	smallDoses
5262	2.002589	1.380184	smallDoses
4659	2.502627	0.184223	smallDoses
17582	6.382129	0.876581	smallDoses
27750	8.546741	0.128706	largeDoses
9868	2.694977	0.432818	smallDoses
18333	3.951256	0.333300	smallDoses
3780	9.856183	0.329181	smallDoses

```
18190 2.068962 0.429927 smallDoses
11145 3.410627 0.631838 smallDoses
68846 9.974715 0.669787 didntLike
26575 10.650102 0.866627 largeDoses
48111 9.134528 0.728045 largeDoses
43757 7.882601 1.332446 largeDoses
```

## 4.2 实验目的

根据新的约会对象的三个属性值，约会对象分类

## 4.3 代码实现

[KNN.py](#)

代码：

```
from numpy import *
import operator
from os import listdir

# 读取数据
def file2matrix(filename):
    # 打开文件并读取每一行
    fr = open(filename)
    arrayOfLines = fr.readlines()
    # 得到文件行数
    numberOfLines = len(arrayOfLines)
    # 创建返回的Numpy矩阵
    returnMat = zeros((numberOfLines,3))
    classLabelVector = []
    index = 0
    # 返回数据和标签
    for line in arrayOfLines:
        line = line.strip()
        listFromLine = line.split('\t')
        returnMat[index,:] = listFromLine[0:3]
        classLabelVector.append(listFromLine[-1])
        index += 1
    return returnMat, classLabelVector

# 标准化数据
def autoNorm(dataSet):
    minVals = dataSet.min(0)
    maxVals = dataSet.max(0)
    ranges = maxVals - minVals
    normDataSet = zeros(shape(dataSet))
    m = dataSet.shape[0]
    normDataSet = dataSet - tile(minVals, (m,1))
    normDataSet = normDataSet / tile(ranges, (m,1))
```

```

        return normDataSet, ranges, minVals

# KNN算法
def classify0(inX, dataSet, labels, k):
    dataSetSize = dataSet.shape[0]
    # 计算待求的跟数据集的差
    diffMat = tile(inX, (dataSetSize,1)) - dataSet
    sqDiffMat = diffMat ** 2
    sqDistances = sqDiffMat.sum(axis = 1)
    distances = sqDistances ** 0.5
    # 按递增次序排序
    sortedDistIndices = distances.argsort()
    # 统计前k个里面每个label的数量
    classCount = {}
    for i in range(k):
        voteLabel = labels[sortedDistIndices[i]]
        classCount[voteLabel] = classCount.get(voteLabel,0) + 1
    # 将label数量从大到小排序（用itemgetter方法，按照第二个元素数量的次序对元组进行排序）
    sortedClassCount = sorted(classCount,
                               key = operator.itemgetter(1), reverse = True)
    # 选出最多次的label
    return sortedClassCount[0]

# 约会数据KNN分类主函数
def datingClassTest():
    hoRatio = 0.50
    # 读取数据
    datingDataMat, datingLabels = file2matrix('/Users/xinyuanhe/Desktop/working/2021美
    赛/模型/模型-机器学习-分类-k邻近【hxy】/datingTestSet.txt')
    # 标准化数据
    normMat, ranges, minVals = autoNorm(datingDataMat)
    m = normMat.shape[0]
    numTestVecs = int(m*hoRatio)
    errorCount = 0.0
    # KNN算法
    for i in range(numTestVecs):
        classifierResult = classify0(normMat[i,:], normMat[numTestVecs:m,:],
                                     datingLabels[numTestVecs:m],3)
        print("The classifier came back with: %s, the real answer is: %s" %
              (classifierResult, datingLabels[i]))
        if (classifierResult != datingLabels[i]): errorCount += 1.0
    # 计算错误率，检验KNN分类效果
    print("The total error rate is: %f" %(errorCount/float(numTestVecs)))

datingClassTest()

```

结果：



```

IDLE Shell 3.10.1

The classifier came back with: didntLike, the real answer is: didntLike
The classifier came back with: didntLike, the real answer is: didntLike
The classifier came back with: largeDoses, the real answer is: largeDoses
The classifier came back with: largeDoses, the real answer is: largeDoses
The classifier came back with: smallDoses, the real answer is: smallDoses
The classifier came back with: largeDoses, the real answer is: largeDoses
The classifier came back with: didntLike, the real answer is: largeDoses
The classifier came back with: smallDoses, the real answer is: smallDoses
The classifier came back with: smallDoses, the real answer is: largeDoses
The classifier came back with: largeDoses, the real answer is: largeDoses
The classifier came back with: largeDoses, the real answer is: largeDoses
The classifier came back with: smallDoses, the real answer is: smallDoses
The classifier came back with: largeDoses, the real answer is: largeDoses
The classifier came back with: largeDoses, the real answer is: largeDoses
The classifier came back with: didntLike, the real answer is: didntLike
The classifier came back with: smallDoses, the real answer is: smallDoses
The classifier came back with: largeDoses, the real answer is: largeDoses
The classifier came back with: smallDoses, the real answer is: smallDoses
The classifier came back with: didntLike, the real answer is: didntLike
The classifier came back with: didntLike, the real answer is: didntLike
The classifier came back with: didntLike, the real answer is: didntLike
The classifier came back with: didntLike, the real answer is: didntLike
The classifier came back with: largeDoses, the real answer is: largeDoses
The classifier came back with: largeDoses, the real answer is: largeDoses
The classifier came back with: largeDoses, the real answer is: largeDoses
The classifier came back with: didntLike, the real answer is: largeDoses
The classifier came back with: smallDoses, the real answer is: smallDoses
The classifier came back with: didntLike, the real answer is: didntLike
The classifier came back with: didntLike, the real answer is: didntLike
The classifier came back with: didntLike, the real answer is: didntLike
The classifier came back with: didntLike, the real answer is: didntLike
The classifier came back with: didntLike, the real answer is: didntLike
The classifier came back with: largeDoses, the real answer is: largeDoses
The classifier came back with: didntLike, the real answer is: didntLike
The classifier came back with: smallDoses, the real answer is: didntLike
The classifier came back with: smallDoses, the real answer is: smallDoses
The classifier came back with: didntLike, the real answer is: didntLike
The classifier came back with: didntLike, the real answer is: didntLike
The classifier came back with: smallDoses, the real answer is: smallDoses
The total error rate is: 0.090000
```

## 5. 参考资料

1. [一文搞懂K邻近---知乎](#)
2. 《机器学习实战》P9-P17 [机器学习实战.pdf](#)