1. Additional notes on determining the analytical tasks supported by Dowsing

To enhance the practicality of Dowsing, we collaborate with domain experts to establish the supported analytical task types. Initially, our task list derives from the comprehensive summary of 18 analytical tasks by Shen et al. (refer to Appendix). To align Dowsing's design for visual data exploration with tabular datasets, we exclude the *Spatial*, *Part to Whole*, and *Error Range* tasks, which typically necessitate specialized data types and display formats. Similarly, we omit the *Magnitude* and *Change Over Time* tasks due to their resemblance to the *Comparison* and *Trend* tasks, respectively. Streamlining the algorithm design prompts our endeavor to further narrow down the task set.

Consequently, expert interviews provide a platform for deliberating the prevalence of these tasks in visual data exploration and the potential for task consolidation. During these interviews, E3 proposed merging tasks which focus on data transformation, including *Find Extreme*, *Filter*, *Compute Derived Value*, and *Sort*. As a result, these three tasks merge into a singular "*Transform*" task. E1 supplemented this by highlighting the similarity between the *Characterize Distribution*, *Determine Range*, and *Find Extreme* tasks, suggesting their interchangeability in diverse scenarios. Consequently, we omit the *Characterize Distribution* and *Determine Range* tasks. E2 noted that *Deviation* tasks were infrequently encountered in data exploration due to their reliance on supplementary data processing, leading to their removal as well. Additionally, both E1 and E2 regard *Cluster* and *Find Anomalies* as less common tasks, depending on the dataset's characteristics. Consequently, we group these tasks under the "*Others*" category, to be addressed utilizing general visualization guidelines.

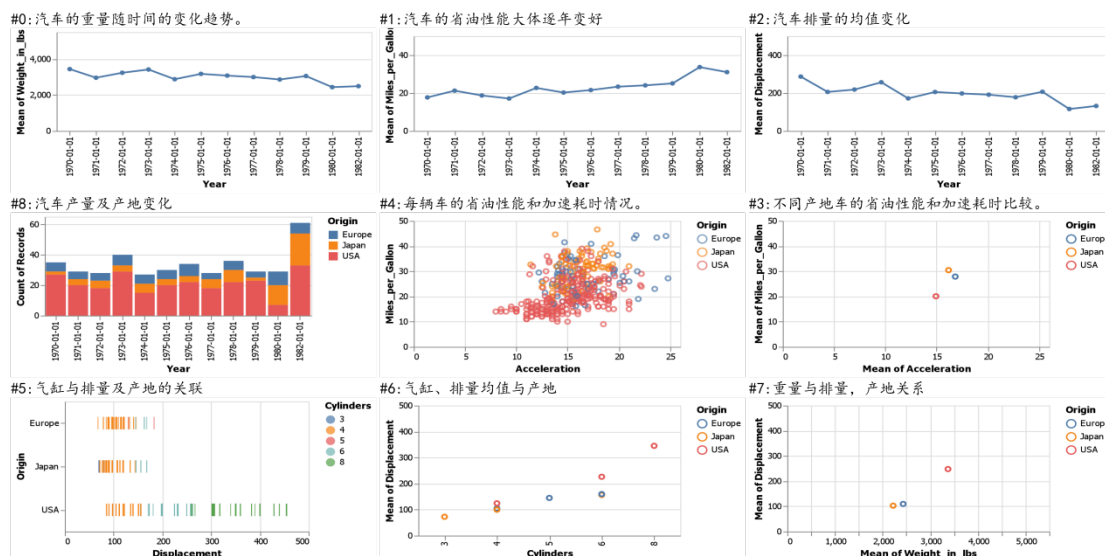# 2. A sample of user-generated visualizations from the workshop

Fig.1. The visualizations generated by user group 5 number 3 for dataset Cars.

Translations of comments written by the user:

    #0: Trend of car weight over time.

    #1: The fuel-efficient performance of cars has generally improved year by year.

    #2: Changes in average car displacement.

    #8: Changes in car production and origin.

    #4: The fuel-efficient performance and acceleration time for each cars.

    #3: Comparison of fuel-efficient performance and acceleration time of cars of different origins.

    #5: The correlation between cylinder, displacement and origin.

    #6: Cylinders, average displacement and origin.

    #7: The correlation between weight, displacement and origin.

Table.1. The recorded user actions

User group	User number	Dataset	Vis number	Time	User action
5	3	cars	0	2021/12/11 下午 4:42:09	user:update:x_encoding:nominal
5	3	cars	0	2021/12/11 下午 4:42:33	user:update:x_encoding:time
5	3	cars	0	2021/12/11 下午 4:43:31	user:update:y_encoding:nominal
5	3	cars	0	2021/12/11 下午 4:44:54	user:update:y_encoding:quantitative
5	3	cars	0	2021/12/11 下午 4:45:17	user:update:category_encoding:nominal
5	3	cars	0	2021/12/11 下午 4:45:27	user:update:category_encoding:None
5	3	cars	0	2021/12/11 下午 4:45:30	user:update:chart_type:line
5	3	cars	0	2021/12/11 下午 4:45:37	user:update:chart_type:bar
5	3	cars	0	2021/12/11 下午 4:45:42	user:update:chart_type:tick
5	3	cars	0	2021/12/11 下午 4:46:17	user:update:aggregate:y_aggregate

Table.1(continued). The recorded user actions

User group	User number	Dataset	Vis number	Time	User action
5	3	cars	0	2021/12/11 下午 4:46:22	user:update:chart_type:line
5	3	cars	1	2021/12/11 下午 4:47:19	user:update:y_encoding:quantitative
5	3	cars	1	2021/12/11 下午 4:47:24	user:update:aggregate:y_aggregate

5	3	cars	2	2021/12/11 下午 4:48:31	user:update:y_encoding:quantitative
5	3	cars	2	2021/12/11 下午 4:48:36	user:update:aggregate:y_aggregate
5	3	cars	3	2021/12/11 下午 4:50:30	user:update:x_encoding:quantitative
5	3	cars	3	2021/12/11 下午 4:51:15	user:update:y_encoding:quantitative
5	3	cars	3	2021/12/11 下午 4:51:32	user:update:x_encoding:quantitative
5	3	cars	3	2021/12/11 下午 4:51:39	user:update:chart_type:point
5	3	cars	3	2021/12/11 下午 4:51:54	user:update:category_encoding:nominal
5	3	cars	3	2021/12/11 下午 4:52:02	user:update:category_encoding:time
5	3	cars	3	2021/12/11 下午 4:52:14	user:update:category_encoding:nominal
5	3	cars	3	2021/12/11 下午 4:52:42	user:specify:summary
5	3	cars	4	2021/12/11 下午 4:54:22	user:update:aggregate:y_aggregate
5	3	cars	4	2021/12/11 下午 4:54:24	user:update:aggregate:x_aggregate
5	3	cars	5	2021/12/11 下午 4:57:10	user:update:x_encoding:nominal
5	3	cars	5	2021/12/11 下午 4:57:13	user:update:y_encoding:quantitative
5	3	cars	5	2021/12/11 下午 4:57:48	user:update:chart_type:None
5	3	cars	5	2021/12/11 下午 4:58:37	user:update:chart_type:line
5	3	cars	5	2021/12/11 下午 4:58:40	user:update:chart_type:point
5	3	cars	5	2021/12/11 下午 4:59:51	user:update:aggregate:y_aggregate
5	3	cars	5	2021/12/11 下午 4:59:59	user:update:aggregate:y_aggregate
5	3	cars	6	2021/12/11 下午 5:02:02	user:update:aggregate:y_aggregate
5	3	cars	7	2021/12/11 下午 5:05:11	user:update:x_encoding:quantitative
5	3	cars	7	2021/12/11 下午 5:05:53	user:update:aggregate:y_aggregate

5	3	cars	7	2021/12/11 下午 5:06:00	user:update:aggregate:y_aggregate
5	3	cars	7	2021/12/11 下午 5:06:03	user:update:aggregate:y_aggregate
5	3	cars	7	2021/12/11 下午 5:06:13	user:update:chart_type:None
5	3	cars	7	2021/12/11 下午 5:06:15	user:update:chart_type:tick
5	3	cars	7	2021/12/11 下午 5:06:22	user:update:chart_type:bar
5	3	cars	7	2021/12/11 下午 5:06:27	user:update:chart_type:tick
5	3	cars	8	2021/12/11 下午 5:07:39	user:update:chart_type:bar
5	3	cars	8	2021/12/11 下午 5:08:10	user:update:y_encoding:nominal
5	3	cars	8	2021/12/11 下午 5:08:16	user:update:x_encoding:quantitative
5	3	cars	8	2021/12/11 下午 5:09:06	user:update:y_encoding:nominal
5	3	cars	8	2021/12/11 下午 5:09:11	user:update:x_encoding:time
5	3	cars	8	2021/12/11 下午 5:09:22	user:update:chart_type:point
5	3	cars	8	2021/12/11 下午 5:09:27	user:update:chart_type:bar
5	3	cars	8	2021/12/11 下午 5:09:37	user:update:y_encoding:quantitative
5	3	cars	8	2021/12/11 下午 5:09:43	user:update:category_encoding:None

Table.1(continued). The recorded user actions

User group	User number	Dataset	Vis number	Time	User action
5	3	cars	8	2021/12/11 下午 5:09:57	user:update:category_encoding:nominal
5	3	cars	8	2021/12/11 下午 5:10:24	user:update:chart_type:point
5	3	cars	8	2021/12/11 下午 5:10:43	user:update:aggregate:y_aggregate
5	3	cars	8	2021/12/11 下午 5:10:50	user:update:chart_type:bar
5	3	cars	8	2021/12/11 下午 5:13:30	user:update:y_encoding:nominal

| 5	3	cars	8	2021/12/11 下午 5:13:36	user:update:aggregate:category_aggregate
5	3	cars	8	2021/12/11 下午 5:13:39	user:update:category_encoding:None
5	3	cars	8	2021/12/11 下午 5:13:42	user:update:aggregate:y_aggregate
5	3	cars	8	2021/12/11 下午 5:13:46	user:update:aggregate:y_aggregate
5	3	cars	8	2021/12/11 下午 5:14:07	user:update:y_encoding:nominal
5	3	cars	8	2021/12/11 下午 5:14:19	user:update:y_encoding:nominal
5	3	cars	8	2021/12/11 下午 5:15:34	user:update:y_encoding:time
5	3	cars	8	2021/12/11 下午 5:15:37	user:update:x_encoding:quantitative
5	3	cars	8	2021/12/11 下午 5:15:45	user:update:category_encoding:nominal
5	3	cars	8	2021/12/11 下午 5:15:51	user:update:x_encoding:time
5	3	cars	8	2021/12/11 下午 5:15:53	user:update:y_encoding:quantitative
5	3	cars	8	2021/12/11 下午 5:16:41	user:update:chart_type:point
5	3	cars	8	2021/12/11 下午 5:16:47	user:update:chart_type:bar

3. Interface of the workshop system
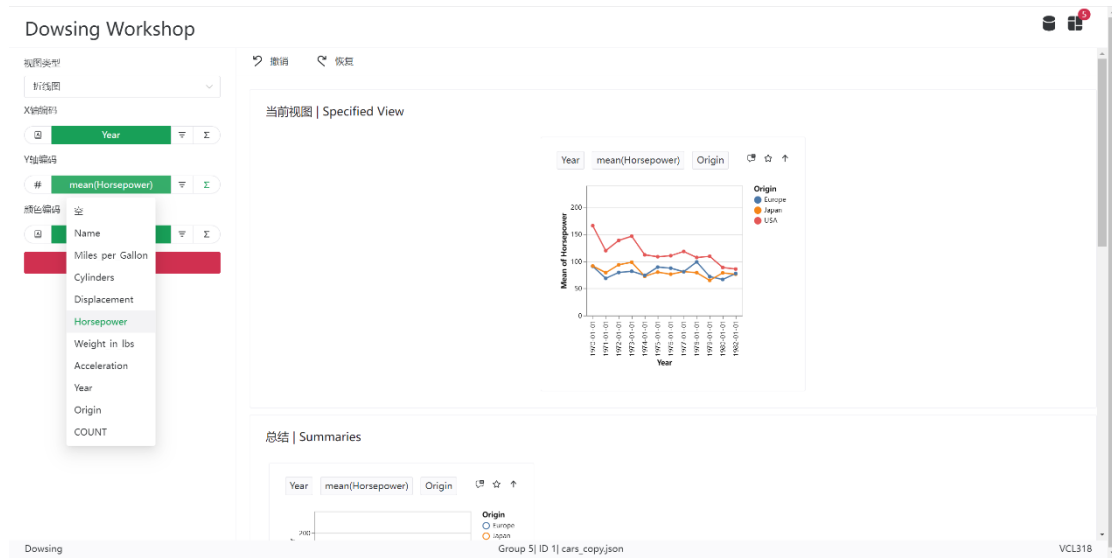
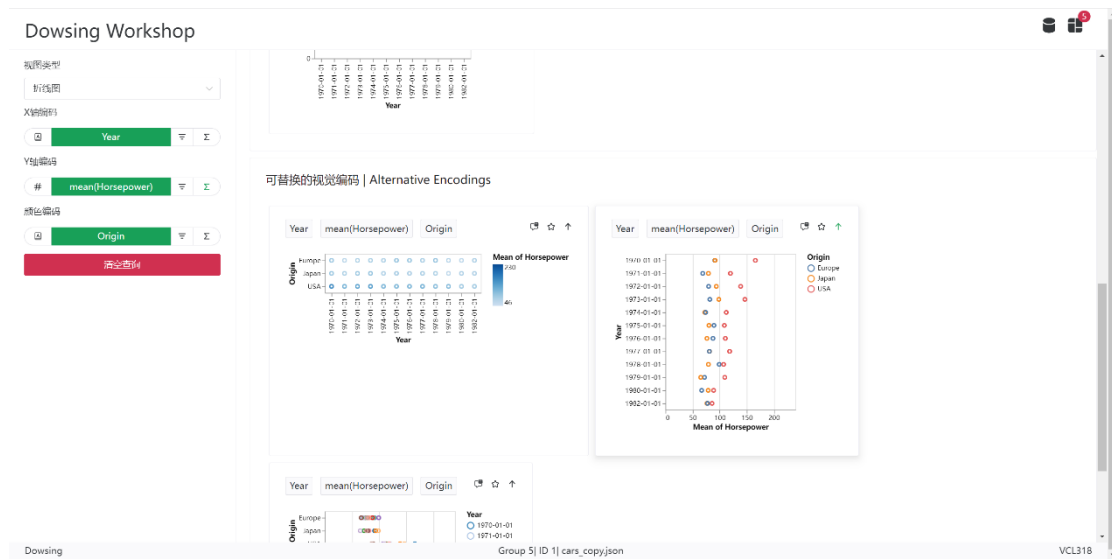Fig.2. Interface of the workshop system: edit control panel

Fig.3. Interface of the workshop system: recommended visualizations
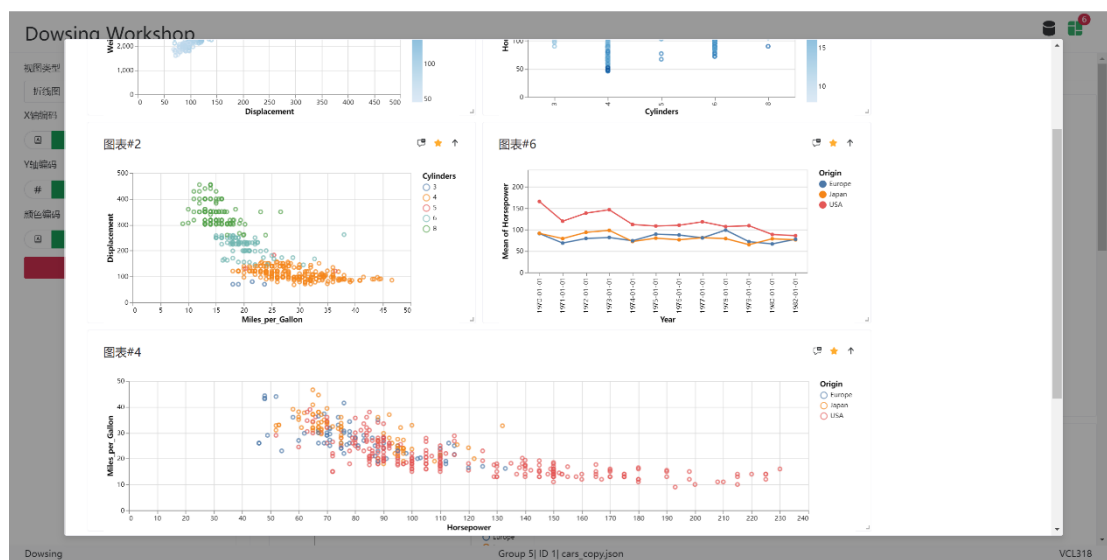
Fig.4. Interface of the workshop system: collected visualizations

4. Parameter analysis of our BI-LSTM model

There are two main hyper-parameter of our BI-LSTM model:

1. hidden_size, the number of features in the hidden state h, which is selected from {15, 30, 45, 60}.

2. num_layers, number of recurrent layers, which is selected from {1, 2, 3, 4}.

As shown in Table.2-3, we performed grid search, according to the best experimental results, hidden_size is set to 45 and num_layers is set to 2.

Table.2. Average AUC values under different parameters

AUC

num_layers	15	30	45	60
1	0.956467	0.968252	0.972589	0.972627
2	0.960211	0.970439	0.972782	0.970616
3	0.959195	0.972285	0.972637	0.970199
4	0.961375	0.968142	0.96739	0.968851

hidden_size

Table.3. Average Accuracy values under different parameters

ACC

num_layers	15	30	45	60
1	0.937281	0.952324	0.956579	0.957913
2	0.939505	0.955435	0.958951	0.957847
3	0.942166	0.95837	0.955877	0.954164
4	0.944769	0.955179	0.954417	0.955624

hidden_size

5. Original experimental results

Table.4. The original experimental results.

		AUC			ACC		
		Fa only	*Fb* only	*F*	*Fa* only	*Fb* only	*F*
Ours	no noise	0.965	0.950	0.973	0.946	0.923	0.959
	5%	0.953	0.934	0.962	0.930	0.906	0.939
	10%	0.931	0.882	0.935	0.904	0.870	0.908
NN	no noise	0.785	0.871	0.900	0.818	0.845	0.902
	5%	0.777	0.827	0.860	0.803	0.809	0.844
	10%	0.763	0.787	0.830	0.785	0.792	0.828
DT	no noise	0.817	0.881	0.878	0.885	0.926	0.933
	5%	0.768	0.755	0.758	0.856	0.835	0.844
	10%	0.755	0.703	0.687	0.836	0.795	0.790
KNN	no noise	0.669	0.844	0.845	0.807	0.909	0.908
	5%	0.669	0.807	0.814	0.804	0.873	0.880
	10%	0.675	0.774	0.792	0.807	0.863	0.876
MLP	no noise	0.821	0.898	0.875	0.892	0.938	0.933
	5%	0.805	0.827	0.845	0.879	0.886	0.909
	10%	0.788	0.743	0.802	0.869	0.839	0.878
RF	no noise	0.823	0.891	0.883	0.907	0.943	0.953
	5%	0.799	0.799	0.816	0.897	0.902	0.921
	10%	0.791	0.756	0.775	0.889	0.874	0.891

6. The questionnaire for user study

参与者背景调查问卷

一、 请填写您的基本信息
Please enter your basic information

编号/ID _____ 年龄/Age _____

性别/Gender _____ 专业/Major _____

联系方式/Tel _____

二、 请回答以下问题
Please answer the following questions

1. 您具有怎样的可视化**开发**经验？
   What kind of visual development experience do you have?

从未有过/ Never	1 年以内/ Less than 1 year	1-3 年/ 1-3 years	3 年以上/ More than 3 years

2. 您具有怎样的可视化**使用**经验？
   What kind of visualization experience do you have?

从未有过/ Never	1 年以内/ Less than 1 year	1-3 年/ 1-3 years	3 年以上/ More than 3 years

3. 您当前是否身体不适？
   Are you currently not feeling well?

是/Yes	否/No

Survey 1

一、 第一部分（请在数字或 NA 下打 √）
Part I (Please tick √ under the numbers or NA)

1. 它易于使用
   It is easy to use

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

2. 它需要尽可能少的步骤来完成我想要做的事情
   It requires the fewest steps possible to accomplish what I want to do with it

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

3. 使用它是毫不费力的
   Using it is effortless

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

4. 我在使用时没有注意到任何不一致之处
   I don't notice any inconsistencies as I use it

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

5. 我可以很快很容易地从错误中恢复过来
   I can recover from mistakes quickly and easily

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

6. 我每次都能成功地使用它
   I can use it successfully every time

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

二、 第二部分（请在数字或 NA 下打 ✓）
Part II (Please tick ✓ under the numbers or NA)

1. 我能很快学会使用它
   I learned to use it quickly

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

2. 我很容易记住它的使用方法
   I easily remember how to use it

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

3. 它学起来很容易
   It is easy to learn to use it

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

4. 我能很快地熟练使用它
   I quickly became skillful with it

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

三、 第三部分（请在对应答案下打 √）
Part III (Please tick √ under the corresponding answer)

1. 您当前是否身体不适？
   Are you currently not feeling well?

是/Yes	否/No

Survey 2

一、 第一部分（请在数字或 NA 下打 √）
Part I (Please tick √ under the numbers or NA)

1. 它帮助我变得更有效率
   It helps me be more effective

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

2. 它很有用
   It is useful

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

3. 他更称手地能让我完成工作
   It gives me more control over the activities in my life

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

4. 它使我想做的事情更容易完成
   It makes the things I want to accomplish easier to get done

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

5. 使用它能节约我的时间

It saves me time when I use it

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

6. 它满足了我的需要
   It meets my needs

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

7. 它做了我期望它能做的一切
   It does everything I would expect it to do

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

二、第二部分（请在数字或 NA 下打 ✓）
Part II (Please tick ✓ under the numbers or NA)

1. 它易于使用
   It is easy to use

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

2. 它需要尽可能少的步骤来完成我想要做的事情
   It requires the fewest steps possible to accomplish what I want to do with it

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

3. 使用它是毫不费力的
   Using it is effortless

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

4. 我在使用时没有注意到任何不一致之处
   I don't notice any inconsistencies as I use it

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

5. 我可以很快很容易地从错误中恢复过来
   I can recover from mistakes quickly and easily

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

6. 我每次都能成功地使用它

I can use it successfully every time

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

三、第三部分（请在数字或 NA 下打√）

Part III (Please tick √ under the numbers or NA)

1. 我很快就学会了使用它

I learned to use it quickly

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

2. 我很容易记住如何使用它

I easily remember how to use it

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

3．它学起来很容易

It is easy to learn to use it

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

4. 我很快地熟练使用了它

I quickly became skillful with it

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

四、第四部分（请在数字或 NA 下打√）

Part IV (Please tick √ under the numbers or NA)

1. 我对它很满意

I am satisfied with it

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

2. 我会把它推荐给朋友

I would recommend it to a friend

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

3．它使用起来很有趣
  It is fun to use

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

五、第五部分（请在对应答案下打√）

Part V (Please tick √ under the corresponding answer)

1. 您当前是否身体不适？
  Are you currently not feeling well?

是/Yes	否/No

Survey 3

一、 第一部分（请在数字或 NA 下打√）

Part I (Please tick √ under the numbers or NA)

1. 它帮助我变得更有效率
  It helps me be more effective

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

2. 它很有用
  It is useful

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

3. 他更称手地能让我完成工作
  It gives me more control over the activities in my life

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

4. 它使我想做的事情更容易完成
  It makes the things I want to accomplish easier to get done

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

5. 使用它能节约我的时间
  It saves me time when I use it

强烈反对	1	2	3	4	5	6	7	强烈同意	NA

strongly disagree							strongly agree	

6. 它满足了我的需要

It meets my needs

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

7. 它做了我期望它能做的一切

It does everything I would expect it to do

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

二、第二部分（请在数字或 NA 下打 √）

Part II (Please tick √ under the numbers or NA)

1. 它易于使用

It is easy to use

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

2. 它需要尽可能少的步骤来完成我想要做的事情

It requires the fewest steps possible to accomplish what I want to do with it

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

3. 使用它是毫不费力的

Using it is effortless

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

4. 我在使用时没有注意到任何不一致之处

I don't notice any inconsistencies as I use it

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

5. 我可以很快很容易地从错误中恢复过来

I can recover from mistakes quickly and easily

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

6. 我每次都能成功地使用它

I can use it successfully every time

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

三、第三部分（请在数字或 NA 下打 √）
Part III（Please tick √ under the numbers or NA）

1. 我很快就学会了使用它
   I learned to use it quickly

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

2. 我很容易记住如何使用它
   I easily remember how to use it

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

3. 它学起来很容易
   It is easy to learn to use it

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

4. 我很快地熟练使用了它
   I quickly became skillful with it

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

四、第四部分（请在数字或 NA 下打 √）
Part IV（Please tick √ under the numbers or NA）

1. 我对它很满意
   I am satisfied with it

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

2. 我会把它推荐给朋友
   I would recommend it to a friend

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

3. 它使用起来很有趣

It is fun to use

强烈反对 strongly disagree	1	2	3	4	5	6	7	强烈同意 strongly agree	NA

感谢您的参与！

Thank you for your participation!

7. **Original results of the questionnaire**

Table.5. The original results of the user study questionnaire

User / Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	average	standard deviation
Part 1																	
1	6	6	6	7	6	5	7	6	5	7	7	6	6	6	6	6.133	0.687
2	6	5	7	7	7	5	7	6	5	7	7	6	6	6	6	6.200	0.722
3	6	6	6	7	6	5	6	6	4	7	7	6	6	6	5	5.933	0.862
4	6	6	7	7	5	6	6	6	6	7	7	6	5	6	5	6.067	0.707
5	6	6	7	7	6	6	6	6	5	7	7	6	6	7	NA	6.286	0.617
6	5	6	7	7	6	5	7	6	5	6	7	7	6	6	5	6.067	0.759
7	5	5	5	6	5	3	7	6	3	5	5	5	5	5	4	4.933	1.115
Part 2																	
1	7	6	7	6	6	5	5	6	5	7	7	7	6	6	6	6.133	0.707
2	6	6	7	7	6	5	7	6	4	6	7	4	6	5	5	5.800	1.027
3	5	5	6	7	7	5	6	6	5	6	7	6	5	6	5	5.800	0.759
4	6	7	7	4	7	2	6	6	6	6	6	6	7	6	5	5.800	1.320
5	6	NA	7	6	6	5	7	6	5	6	7	6	6	5	6	6.000	0.640
6	6	5	6	7	5	4	5	6	4	6	7	4	5	4	5	5.267	1.067
Part 3																	
1	7	5	7	7	7	5	7	7	5	6	7	7	5	7	7	6.400	0.862
2	7	6	7	7	7	4	6	7	6	6	6	6	6	7	7	6.333	0.829
3	7	6	7	7	7	5	7	7	5	7	7	6	5	6	7	6.400	0.850
4	7	5	7	7	7	4	5	7	5	6	6	6	5	7	6	6.000	0.954

Table.5(continued). The original results of the user study questionnaire

User / Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	average	standard deviation
Part 4																	
1	6	6	7	7	6	6	6	7	6	6	6	6	6	6	5	6.133	0.493
2	6	6	6	7	6	5	6	6	6	7	7	7	6	6	6	6.200	0.595
3	6	7	5	7	7	5	7	7	6	7	6	6	6	7	6	6.333	0.640

8. Comments of the user study

Question 1: How do you use the system?
Question 2: Do you have any problems in using the system?
Question 3: How is the interface designed?
Question 4: Any suggestions for improvement?

User 1:
Answer 1: Find some interesting attributes in the data set, guess the correlation and trend between some attributes, and then look at the generated charts; occasionally use the chart recommendation function.
Answer 2: The left side of the recommended chart is all about "count"; when exploring the relationship between aircraft movement size, speed, and degree of damage, the recommended chart still cannot clearly reflect the relationship.
Answer 3: The interface is pretty good.
Answer 4: Add one-click x and y axis swap function instead of manual adjustment; introduce the meaning of tasks to those who participated in the survey, otherwise it will be troublesome; preset some tasks for users; form new graphs based on historical charts.

User 2:
Answer 1: No answer.
Answer 2: When you focus on your own exploration, it's easy to ignore the recommended charts; the recommended charts are similar each time (either all scatter plots, or very similar); there is an interactive function that is basically not used in the process; (something) The dragging experience is not very smooth, and sometimes I forget to do it.
Answer 3: The interaction of the interface is good; there is no interaction prompt, so some functions are unknown or easy to be forgotten.
Answer 4: I hope the recommendation is of various types; because it is not obvious on the charts, sometimes I don't know what task I am performing;

User 3:
Answer 1: Select the dataset first, then query the data you interested and what you want to know.
Answer 2: It's better to be multilingual.
Answer 3: The interface design is relatively easy to use.
Answer 4: Add several languages for different people to use.

User 4:
Answer 1: First clarify what I want to do, then select the data on the x and y axes, and then observe. After doing one or two, the system will recommend a few charts. I will take a look and find some recommended charts that are attractive to me.
Answer 2: There are some bugs in the system, sometimes "+" does not respond, and the x and y axes will be stuck at the beginning, and the response time will take about a few seconds; in terms of

the quality of the recommendation, it can generally reflect my needs, and the prediction of the task and my thoughts are also Consistent, without taking into account my habit of setting the x and y axes; recommended charts enrich the types of tasks.

Answer 3: The interface is quite easy to use, no discomfort.

Answer 4: I hope to be able to zoom in and out by ctrl+wheel, (this) is not very easy to trigger, and I can't find it; there are too many types of field values in the dataset movie, such as publishers, click on each is too troublesome, I hope to optimize it.

User 5:

Answer 1: I first base on the data provided, then think what my purpose is, and then build a chart to achieve the purpose;

Answer 2: some x and y axes in the recommended chart are not selected by me; It will be better if the "+" sign can be changed to directly click on the map; sometimes the system is slow and delayed.

Answer 3: The interface is quite clear, I don't think there is an obvious problem.

Answer 4: I don't know how does the system predict it. I often see that "COMPARE" appears the most. When making a table, the red line (compare) is often higher; the line chart is rarely used, and there are problems with the line; (These two function keys) are less likely to be used deliberately, and they are not very helpful to me; it recommends "COMPARE" no matter what table I create, which make me feel inaccurate.

User 6:

Answer 1: Find out the task you want to analyze, and then use the system to analyze the task. When you are confused, go to the recommendation system, find some interesting ones, and carry out the next analysis; about the task awareness function, when I don't know what tasks to achieve, It offers advice.

Answer 2: The chart just now has the same attributes, but shows different results; it's better to add a sort function.

Answer 3: Interface design is quite good, the utilization of space is quite high.

Answer 4: it would be better if natural language processing is added, for example, if I say my needs, it can recommend corresponding things.

User 7:

Answer 1: First look at the provided thing, figure out the fields and exploration tasks I am interested in. My tasks are all correlation or trend, in the process, look at what dosed the dataset look like. The second step is to add the view directly, I will first add x, y and color axes, think about the three dimensions, try them one by one, and see which one. After that, I will see if it meets my expectations, if it does, it will be ok, if not, I will go to the recommendation, the latter situation is more for common. Another way is that I have finished exploring, and I want to see if there is anything I missed, then I will also look at the suggestions.

Answer 2: The design of suggestion is not necessary and can be put away; (here) will make me feel that (these three) will jointly affect the "setting" of this model, I don't know what the meaning of it is.

Answer 3: I think the interface design is quite good. I prefer the design of historical recovery and

the ability to adjust the interface by myself.

Answer 4: Optimizing the recommendation model, for example, I know almost a certain task, I want to see other, but the model has been recommended before. Dowsing has its own advantages with the visual analysis system in the industry.

User 8:

Answer 1: First of all, you must have a purpose, to select the corresponding x and y axes, observe the view, and see if it can meet my needs. If not, go to the recommended things and change your settings.

Answer 2: The system is slightly stuck; there are some small bugs; I don't know how the "count of records" in the recommendation can help me.

Answer 3: The interface design is simple and easy to use.

Answer 4: Hope to fix the bug; Add some functions, the first is to make a line chart with parallel quantities automatically, and the second is to create two charts that can be overlapped together.

User 9:

Answer 1: First Taking time as the x-axis, watching various suppliers and various types of movies. The second step is to use two discrete quantities as the coordinate axis to make some non-line charts, such as histograms or something; about task recommendations, find inspiration here after making the chart.

Answer 2: (This place) I wanted to see the relationship between its cost and the box office, but at present there is no way to do so; some places will be stuck; newly built places cannot set their own positions; Regarding the recommended function, the front is ok, and some meaningless (this kind) will be recommended later.

Answer 3: It's not bad. It's neat.

Answer 4: Hope to have more operations, such as adding and subtracting field values, finding proportions, etc.

User 10:

Answer 1: First select the dataset, add a chart, select the chart type, and then select the variable. If you don't use the recommendation function, the variable you choose may not be very suitable. After exploring, I can find some charts I need from the recommendation table, it can be useful for complex data, its calculation can be simpler; the frequency of using recommendations and tasks is not very high, because if the task is clear, it will not be used.

Answer 2: Some fields in that dataset cannot be represented by suitable charts, such as comparing the world movie box office and the US box office, only one variable can be selected for one axis;

Answer 3: Simple and beautiful, the interaction is very user-friendly, easy to master.

Answer 4: Hope to optimize the stuck problem; It is expected that multiple related variables can be selected for comparison on the same axis.

User 11:

Answer 1: First clarify the analysis task, define what each visual channel is to encode, and observe my analysis intention. When using recommendation, I will roughly browse whether there are charts

I want to observe or places of interest. If interested, I will I will click on it to view it in detail, but I never make changes to the recommended charts. If I am not satisfied with the recommendation, I will not use it directly; (this thing) I never pay attention to it, it does not help me much.

Answer 2: When I add a chart, I found that the whole charts has not changed, it is not automatically positioned to the bottom. The recommended bar should not be closed, otherwise I will tend to not use it. After I click on (this), my first reaction is to double-click to add, but it can only be added by clicking the "+".

Answer 3: The overall is quite simple, but the snapshots will be superimposed here, which looks uncomfortable. I don't know how to use the changing trend of tasks. It would be better if the view automatically becomes smaller after the analysis.

Answer 4: Refer to the above.

User 12:

Answer 1: First look at the field descriptions of the data to find the fields of interest, and then add charts. Then I want to know the overall trend in time and year. By drawing these three dimensions into charts, I can find some outstanding information. I make less use of tasks and recommendations, and the recommended chart does not have a limited time range to take into account my filtering of discrete values.

Answer 2: There may be inconsistencies, such as artificially swapping the fields of the x and y axes, The chart does not flip the original chart 90 degrees, which is not in line with my expectations.

Answer 3: The interface design is very nice! But I hope that the blank can be automatically topped up.

Answer 4: Optimize the stuck problem.

User 13:

Answer 1: I first conceive of the problem I want to solve, find the relevant data dimensions, and draw it in the system. When I feel lost or don't know how to solve my problem, I go to see recommendations.

Answer 2: Sometimes I feel confused when I want to focus on a data dimension, such as wanting to see a line chart of theatrical movies changing over the years.

Answer 3: The design is beautiful, but some interactions can be optimized, such as automatically marking the newly added view when adding, and scrolling to the corresponding position.

Answer 4: I feel that the horizontal comparison of data is relatively obvious. It seems that the learning cost is relatively high if you want to deeply explore a dimension or type of data.

User 14:

Answer 1: First look at the data set to find the column of interest, then determine the task in mind, then create a new view and select the corresponding column, because the analysis of two columns is not limited to one task, so I will change its color or replace one of the columns to meet different tasks. When a task is almost analyzed, I will select other interesting columns or browse the suggestions of the system. When its prediction model does not understand what I mean, I will adjust its active task, set the things I want to analyze, and then look at the suggestions. At this time, there will be a problem: when I have selected all the tasks, the things it recommends may not be what I

want.

Answer 2: Even after capturing the task I want to compare, it is not activated; task prediction is limited to historical records and lacks diversity recommendations; (there are three columns) I want to see but can't draw (that chart).

Answer 3: The interface design is very good.

Answer 4: The recommended charts are too limited, I hope to improve it. The brush selection function is not used much, it may be used, but the linkage function is easy to be ignored, it should be emphasized at the beginning.

User 15:

Answer 1: I usually look at the charts it recommends after I have this dataset, and then see if there are any that just meet my exploration needs. If there is, I will take it out. If not, I will artificially create the diagrams I need based on the data set and the requirements I am interested in. And when this step is completed, I will go to see if there are any charts I need in the recommendations. When I was working on these two datasets, I didn't pay much attention to this task prediction. I went directly to the recommended results. I didn't choose the task artificially, but went directly to all the recommended results, because the results seemed to be a total of not much.

Answer 2: One is that there are too few charts, and there are only three types of charts in total; first of all, I don't know if there is anything I need in the recommended ones, if there is, I will take it out, if there isn't, I was aimless, and even after spending time, I couldn't find the chart I needed. It just felt that there was a certain randomness. When I went to see the suggestion, I was not sure whether it would definitely give me at least one that satisfies my needs. Sometimes the number of recommendations is too much, can it be simplified, that is, to present the ones with the highest scores, because the average user will only read the first few, and he will not read it one by one in the back, because it would take a lot of time.

Answer 3: There is no problem with the interface design, it is quite simple, and it is relatively quick to get started.

Answer 4: First of all, there should be more types of charts, so as to meet most of the needs of users, because there are currently three types of charts, and in actual data analysis, scatter charts are not particularly used, but pie charts, column charts, bar charts, line charts are most conventional graphics, you don't even have the most basic pie charts, I think these can be added. Then there are the recommended results, when the number is large, only the best top3 can be given.

9. Ethic declaration

All participants were fully informed and signed the following ethic declaration.

INFORMED CONSENT FORM
知情同意书

*Title of Research Project: Dowsing User Study
项目名称： Dowsing 用户研究

*Researcher(s): ***
研究人员： ***

Please initial box

1. I confirm that I have read and have understood the information sheet dated *** for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

   本人确认已于***阅读并了解了该项目相关研究信息，并已从项目负责人处得到考虑、提问的机会，且得到满意答复。

2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my rights being affected.

   本人知晓对该项目的参与为自愿，且可以随时退出，无需任何理由，同时权利不会受任何影响。

3. I understand that I can at any time ask for access to the information I provide and I can also request the destruction of that information if I wish.

   本人知晓可随时要求获取或销毁所提供的个人信息。

4. I agree to take part in the above study.

   本人同意参加此项研究。

_____   _____   _____

Participant Name   Date   Signature

参与者   日期   签名

_____   _____   _____

Name of Person taking consent   Date   Signature

知情同意书提供者   日期   签名

_____   _____   _____

Researcher   Date   Signature

研究人员　　　　　　　　　　　　日期　　　　签名

*The contact details of lead Researcher (Principal Investigator) are:
项目负责人的联系方式如下：

***

`Tel:`*******

`Email:` *******

`Address:` *******

Applicant Name: ***   Supervisor (for student research): ***
Research Title: Dowsing User Study
V1 FOR AY ***