视频特性TI（时间信息）和SI（空间信息）的计算工具：TIandSI

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TI（时间信息）和SI（空间信息）计算工具文章列表：

视频特性TI（时间信息）和SI（空间信息）的计算工具：TIandSI

视频特性TI（时间信息）和SI（空间信息）的计算工具：TIandSI-压缩码流版

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做视频评价试验的时候，需要根据一定的条件选择有代表性的视频序列。ITU-R BT.1788建议使用时间信息（TI，Temporal perceptual Information，也可以称时间复杂度）和空间信息（SI，Spatial perceptual Information，也可以称空间复杂度）来衡量视频的特性。

TI，SI概念出处《ITU-R BT.1788 建议书》： http://download.csdn.net/detail/leixiaohua1020/6423425

项目主页

SourceForge： https://sourceforge.net/projects/tiandsi/

Github： https://github.com/leixiaohua1020/TIandSI

开源中国： http://git.oschina.net/leixiaohua1020/TIandSI

TI和SI的概念
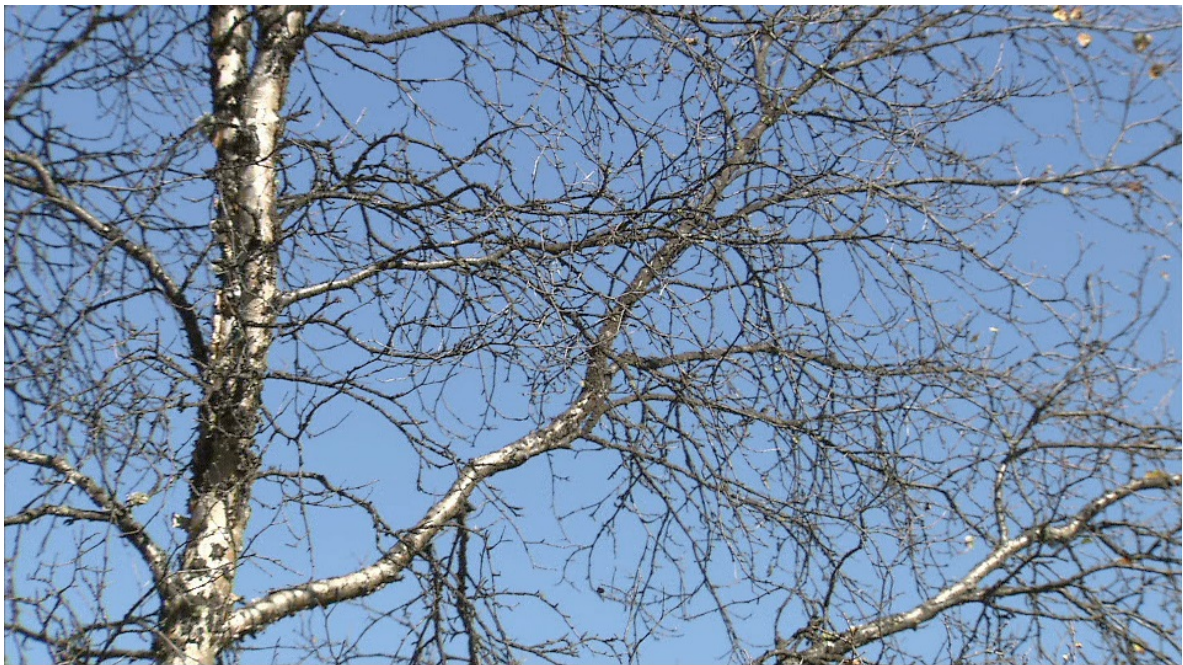
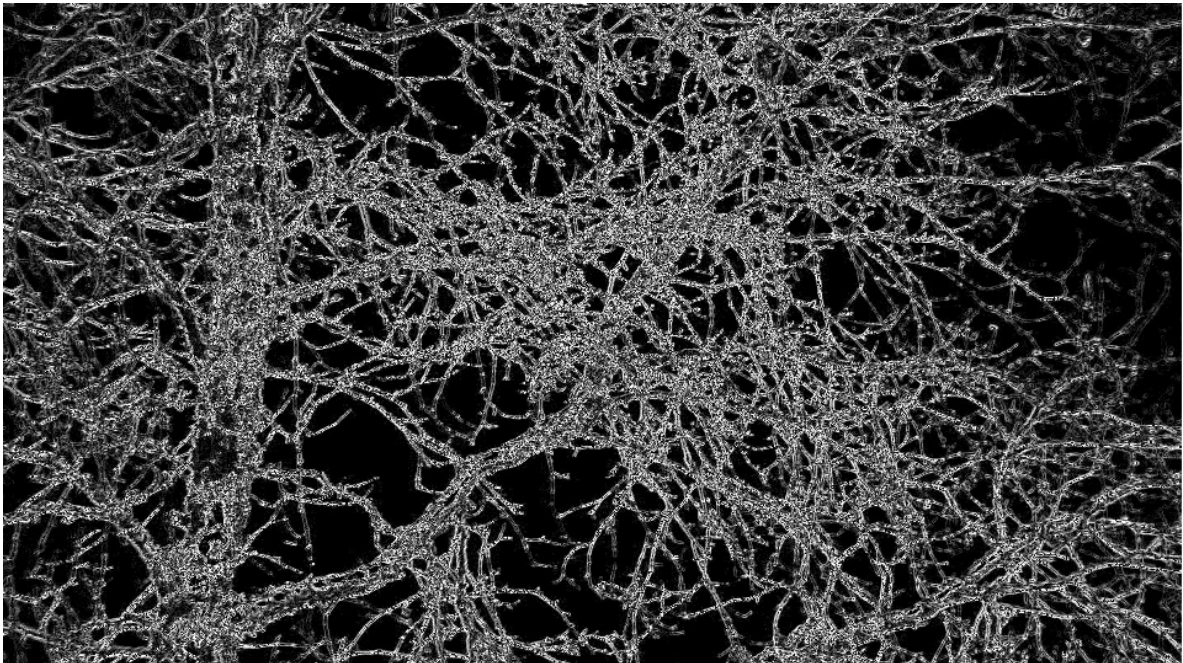SI表征一帧图像的空间细节量。空间上越复杂的场景，SI值越高。

TI表征视频序列的时间变化量。运动程度较高的序列通常会有更高的TI值。

SI计算方法：对第n帧视频进行Sobel滤波，然后对滤波后图像计算标准差。选这些帧中的最大值为SI。

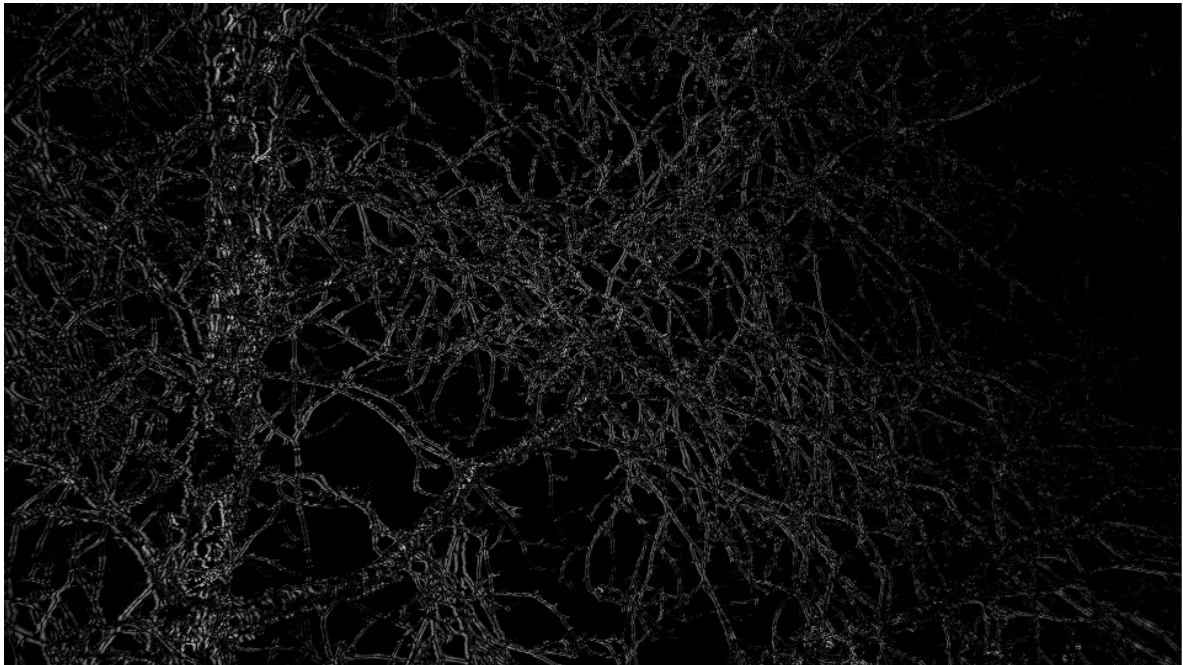TI计算方法：求n与n-1帧图像的帧差，然后对帧差图像计算标准差。选这些帧中的最大值为TI。

以下截图分别显示Sobel滤波和帧差结果：

Sobel滤波后结果（反映空间信息，即空间上的复杂度）：

帧差的结果（反映时间信息，即时间上的复杂度）：

附带我们实验室自己编写的图形界面的计算SI和TI的工具（程序+源代码，工程是vs2010的）：

TIandSI 1.0: http://download.csdn.net/detail/leixiaohua1020/5546783

更新记录（2014.7.28）===

TISIcmd（TISI计算工具-命令行版）

最初的工具是图形界面的，但是发现图形界面也不是特别方便，直接用命令行进行批处理会更方便些，因此拜托师弟把代码抽取出来做了个控制台程序。师弟也很给力，迅速就搞了出来，在这里上传上来。

可以直接使用的exe： http://download.csdn.net/detail/leixiaohua1020/7686483

源代码（VS2010）： http://download.csdn.net/detail/leixiaohua1020/7686489

使用帮助

-i　　输入YUV文件的路径（必填）
-x　　输入YUV文件的宽度（必填）
-y　　输入YUV文件的高度（必填）
-f　　输入YUV文件的像素格式（必填，420或422或444或400）
-h　　打开帮助

示例

命令行工具命令示例如下，计算了一个分辨率为1920x1080，像素为格式YUV420P，路径为D:\test.yuv的YUV格式的文件。

```plain
tisi -i D:\test.yuv -x 1920 -y 1080 -f 420
```

界面截图如下：

帮助菜单

运行时截图

运行完毕后会在测试序列相同的目录下生成*.csv的结果文件。

输出的数据可以使用Excel进行统计，如下示例统计了某个视频序列的TI，SI和视频帧序号之间的关系。SI较高的地方，视频帧画面的空间细节比较多（空间复杂度高）。TI较高的地方，视频帧内容运动比较剧烈（时间复杂度高）。
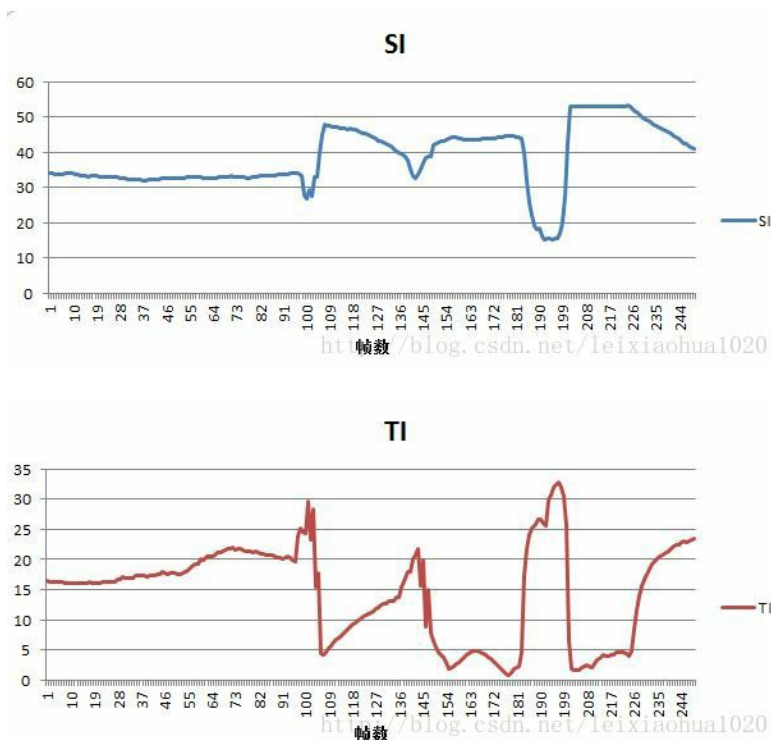
更新记录（2014.8.25）==

TIandSI 2.0（TISI计算工具-图形界面版）

近期一直在研究视频的时间信息（TI）和空间信息（SI）方面的问题。发现老版本计算TISI的图形界面工具不是很方便。于是心血来潮对其进行了大规模的修改。经过一段时间的反复调试，终于将其做成了自己认为方便好用的计算TI和SI的图形界面工具，命名为 TIandSI 2.0。在这里记录上详细的使用方法。

2.0更新记录：

*删除了旧版里的TeeChart，感觉作用不大

*增加了TI和SI计算过程预览窗口，可以查看TI和SI的计算过程。

*增加了计算过程进度条

*支持多种格式的YUV视频输入：YUV420P，YUV422P，YUV444P，Y

*支持批量添加YUV视频

*增加了"结果"对话框，可以直接在程序中查看TI和SI计算结果

*增加了"暂停"，"继续"，"停止"等按钮，可以控制计算的进度

可以直接使用的exe： http://download.csdn.net/detail/leixiaohua1020/7817721

源代码（VS2010）： http://download.csdn.net/detail/leixiaohua1020/7817741

使用帮助

双击"TIandSI.exe"打开程序之后，界面如图所示。分成如下几个部分：

添加视频：添加待处理的YUV视频。包括设置视频的地址，宽，高，像素格式（YUV420P，YUV422P，YUV444P，Y）。

视频列表：列表显示待处理的YUV视频。可以删除和清空其中的条目。

显示：可以图形化显示TI和SI的计算信息，即帧差信息和边缘信息。注意会降低计算的速度。

输出选项："输出TI"，"输出SI"可以将计算结果保存为.csv的文件。可以使用Excel对这种文件进行处理。"输出帧差信息"，"输出边缘信息"可以将帧差信息和边缘信息保存为YUV文件。

进度条：显示计算的进度。

控制按钮：控制计算的开始，暂停，继续，停止等。并可以查看计算结果。
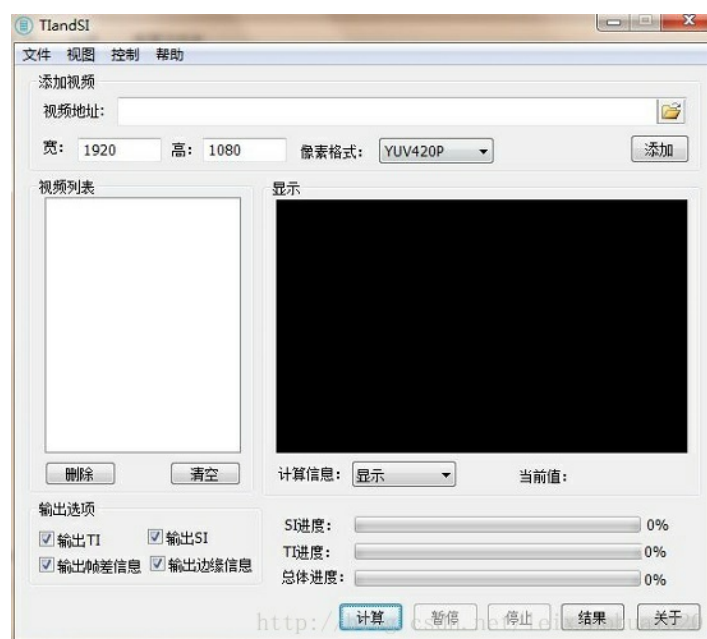
最简单的使用方法分成3步：

1.在"添加视频"栏（圈1）中设置输入视频的文件路径，宽，高，像素格式（支持YUV420P，YUV422P，YUV444P，Y）。设置完成后，单击"添加"。

2.单击"添加"之后，该视频会出现在"视频列表"中（圈2），作为一个待处理的任务。反复前2步可以将所有待计算的视频添加至"视频列表"中。

3.视频添加完毕后，单击"计算"即可等待结果了。
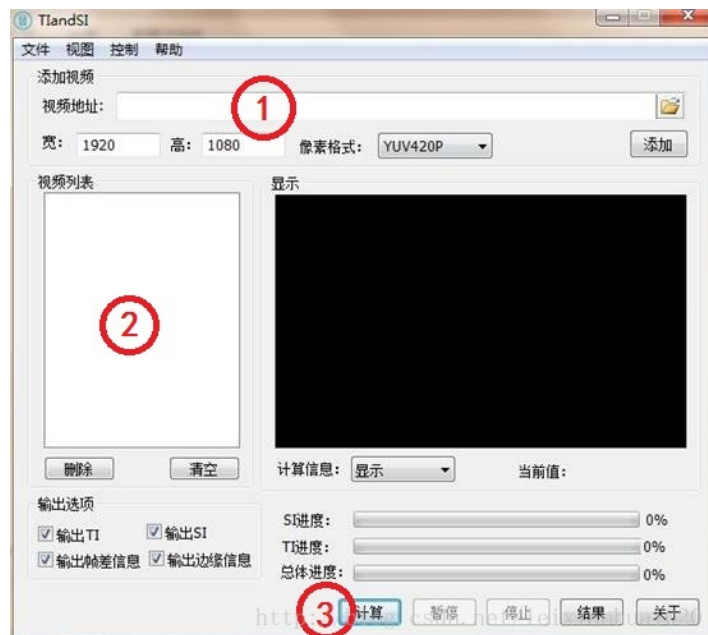
如图所示，单击添加之后，将一个分辨率为640x360，像素格式为YUV420P的YUV视频加入到了"视频列表"中。
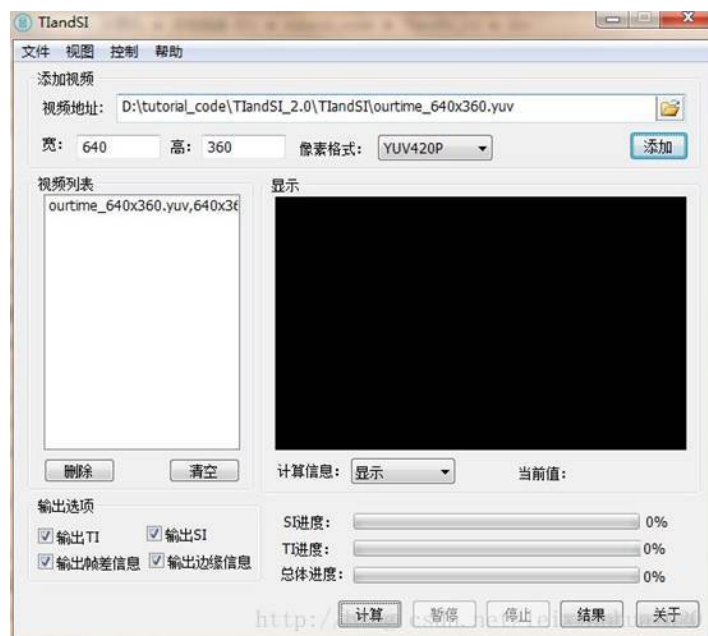
如果感觉一个一个添加视频效率不高，还可以使用"批量添加视频"功能。该功能位于菜单栏的"文件"菜单中。单击"批量添加视频"之后弹出的对话框如下图所示。

单击对话框中的"选择"按钮，弹出"打开文件"对话框，此时按住Shift键就可以选择多个视频了。选择完毕后，每个视频文件的地址会在下面的文本框中列出来。

注：批量添加视频要求1批视频的宽，高，像素格式是一样的。

视频添加完成后，单击"计算"即可开始计算TI和SI。下图是计算过程中的截图。从下图中可以看出，正在计算SI。"显示"框中显示的是当前正在计算的视频帧的边缘信息。显示框的右下方"当前值"处输出了当前帧的计算结果。
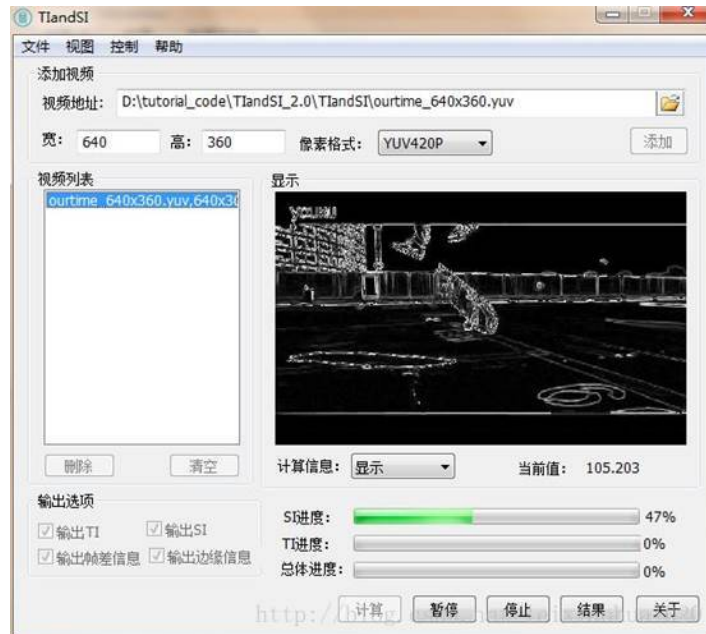
下图是计算TI时候的截图。
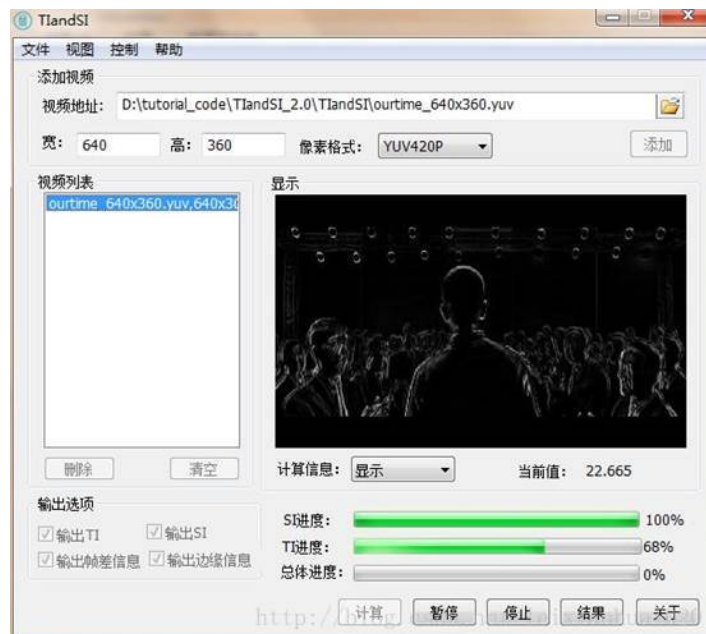
计算过程中，可以单击"暂停"暂时停止计算过程，再次单击则可以继续计算过程。单击"停止"可以中止计算。单击"结果"可以查看计算的结果数值。下图显示了计算结果对话框，左边显示每帧视频SI值，右边显示每帧视频的TI值。每一行代表一帧视频的SI或者TI。

部分实验数据举例

使用本软件测试了"Video Quality Experts Group (VQEG) HDTV video quality subjective test"中的实验视频，记录结果如下。

原视频可以从CDVL网站下载： http://www.cdvl.org

视频序列参数：

分辨率	1920x1080
像素格式	YUV420P
帧率	25
扫描方式	逐行
帧数	250

视频序列截图：

Src01	
Src02	

Src04	
Src05	
Src06	
Src09	
Src11	

Src12	
Src14	

所有视频序列的SI结果图。横坐标为视频帧数（总共是250帧），纵坐标是SI值。
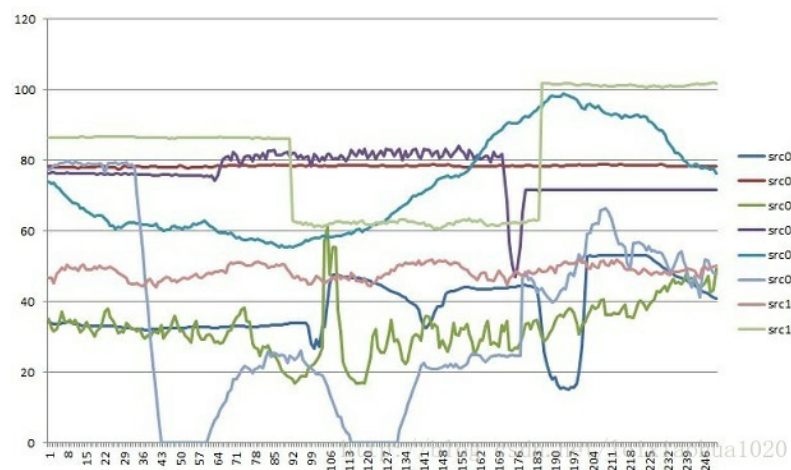
所有视频序列的TI结果图。横坐标为视频帧数（总共是250帧），纵坐标是TI值。注意TI值出现尖峰说明视频镜头出现了切换。
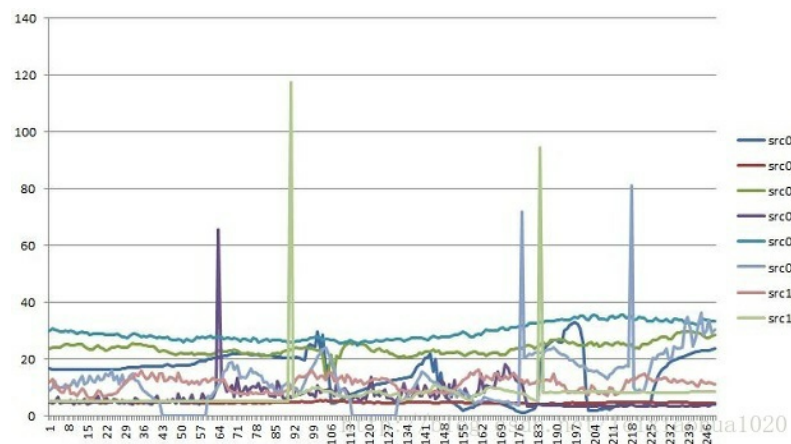
所有视频序列SI-TI均值散点图。这张图每个视频序列取了一个TI和SI的平均值，比前两张图更加简单明了。例如，从图中可以看出src06时间上和空间上都很复杂。src04则是时间上复杂空间上简单。src05则是时间上简单空间上复杂。src09在时间上和空间上都比较简单。
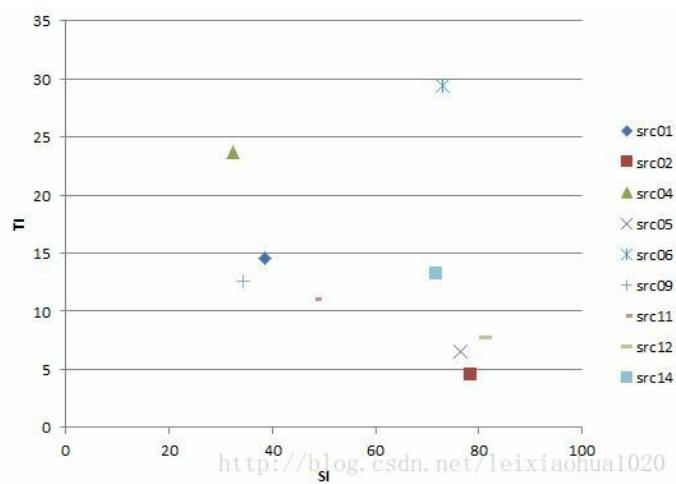
上图数据如下表所示：

	src01	src02	src04	src05	src06
SI	38.5505	78.40265	32.44776	76.53766	72.87351
TI	14.53949	4.552836	23.68147	6.58204	29.40821

	src08	src09	src11	src12	src13	src14
SI	42.63796	34.39115	48.50946	81.30184	63.59276	71.72707
TI	8.927161	12.61171	11.03867	7.705533	24.86191	13.18756

附上述前5个视频序列的实验数据（每1行代表1帧，每个视频序列都是250帧）：

SI

src01	src02	src04	src05	src06
34.11227	78.40614	35.14113	76.43104	73.94827
33.92994	78.23272	32.46861	76.57767	73.33723
33.65194	78.1629	31.50552	76.52155	73.62707
33.61915	78.17674	32.27533	76.29674	72.40288
33.7622	78.10899	34.74414	76.41402	72.02622
33.83794	77.99973	37.05953	76.38589	71.05307
34.04739	77.9866	34.35284	76.34818	70.26144
34.19211	77.99291	34.11067	76.47707	69.5202
34.13154	78.06079	34.88097	76.29524	68.83315
33.98185	78.01164	33.67022	76.28047	67.90329
33.78486	77.90832	34.74694	76.2787	68.02058
33.54384	77.8715	32.77511	76.17498	67.7333
33.29879	77.91121	31.21906	76.28723	66.32894
33.22881	78.06065	32.34597	76.35584	66.39851
33.17196	78.05287	34.38228	76.24612	65.67879
33.07335	78.03114	33.05749	76.35513	65.27417
33.19284	77.91381	31.6397	76.27476	64.60571
33.20013	77.95229	30.31739	76.34165	64.21643

33.21595	78.28729	31.50584	75.89256	64.32289
33.10554	78.23237	32.44746	76.30622	64.54266
33.01283	78.18332	33.5611	76.37514	64.41164
33.00296	78.18473	37.2462	76.14949	63.42708
33.02386	78.14613	38.03481	76.26094	62.64613
33.07961	78.1703	35.76167	76.12755	61.62434
33.05342	78.1022	34.60998	76.12599	61.46109
32.95795	77.91192	33.38902	76.20417	60.72308
32.81222	77.4261	31.19013	76.17433	61.07809
32.68448	77.75583	31.54333	75.90363	61.0433
32.52863	78.22574	31.4918	76.18575	61.50458
32.45192	78.19935	33.96083	76.16817	62.1318
32.36937	78.12192	33.2425	76.06998	62.397
32.36734	78.06795	32.22656	76.21124	62.38018
32.28437	78.27023	32.07715	76.04834	62.27901
32.26981	78.19225	31.61969	76.00959	62.18383
32.24176	78.199	32.12807	75.97332	62.16835
32.11469	78.15431	30.08725	75.8787	61.79934
31.94285	77.99904	29.68721	76.02964	61.8797
31.95817	78.10272	30.37195	75.95126	61.66226
32.10475	78.26478	29.99764	75.95086	61.49309
32.1763	78.36211	31.69354	75.77911	61.52024
32.24437	78.20442	31.32526	75.83146	62.17604
32.27145	78.0071	30.95941	75.82568	61.03366
32.35041	78.10513	33.38965	75.89172	60.73991
32.42971	78.07468	29.72827	75.98071	60.11805
32.52966	78.14928	31.1931	75.88583	60.35702
32.59615	77.97361	31.83573	75.9152	60.47296
32.54194	78.00555	33.69223	75.80357	61.31147
32.55136	77.93044	36.09147	75.92856	61.42054
32.48684	78.1556	34.36769	75.8979	60.8736
32.49245	78.49485	31.76907	75.66569	60.83758
32.52282	78.26384	31.88348	75.85355	60.66355
32.59743	78.05058	30.583	75.68778	61.13639
32.7053	77.89243	29.49337	75.64758	60.92598
32.83405	78.11219	28.58027	75.59411	61.26123
32.90588	78.11082	32.67408	75.78262	62.00879
32.93491	77.92604	34.45097	75.73622	61.69653
32.93086	78.03259	31.00666	75.74019	62.01629
32.81053	78.07468	29.41033	75.66123	62.4899
32.8042	78.19719	29.29216	75.54085	63.06491
32.73641	78.1983	30.5694	75.64723	62.34156

32.7306	78.15722	30.72007	75.47392	61.37846
32.64169	78.11609	30.15533	75.74056	61.35453
32.63112	78.2881	28.56019	74.33997	60.6754
32.57962	78.53934	28.74569	75.57714	59.77678
32.6863	78.46059	28.13907	77.63741	59.39601
32.80583	78.38833	28.51431	80.28611	59.45458
32.90373	78.40146	30.13823	81.07578	59.3615
32.9067	78.53365	31.52189	81.32465	59.21203
32.95157	78.61869	32.06326	80.15913	59.41122
33.05206	78.65588	33.7668	82.40826	58.77387
33.1577	78.55126	35.52477	81.45638	58.00494
33.0792	78.41479	36.18539	79.10319	58.33875
33.0628	78.49392	37.84253	79.01991	57.66805
33.05136	78.61106	38.24368	80.98164	57.34889
32.93827	78.58891	34.63765	81.27795	57.58857
32.84147	78.44535	34.25184	81.35755	57.86286
32.71353	78.32726	28.17646	79.88528	57.69532
32.76181	78.38892	27.01596	81.53223	57.40554
32.92054	78.51122	26.57733	81.54864	57.732
33.09937	78.69056	24.76824	80.53263	57.41301
33.13493	78.59286	27.4111	82.14195	57.0246
33.16457	78.53188	27.13922	80.27877	56.67243
33.21978	78.59166	27.54736	82.59267	56.59151
33.23723	78.73644	25.67457	82.7149	56.75134
33.28236	78.76659	24.79162	82.99586	56.15351
33.27354	78.64391	24.05126	81.46777	56.07602
33.32042	78.50205	22.4447	81.46771	55.55466
33.45312	78.52764	20.73955	81.64381	55.95591
33.60679	78.66727	19.79536	82.12398	55.33223
33.79289	78.64294	18.95607	82.5174	55.30575
33.83416	78.56324	18.69041	81.31218	55.83503
33.87961	78.43662	18.06603	82.13482	55.3565
33.87981	78.42304	16.95048	82.07009	55.73983
33.9248	78.58395	17.6092	80.57227	55.92213
33.97646	78.52959	18.85584	81.40002	56.27867
33.97837	78.53481	18.76593	80.76492	56.68041
34.09871	78.46863	18.99985	80.98699	57.51941
33.19675	78.54839	20.93484	81.28819	57.22927
28.02882	78.69891	21.7012	78.45576	57.84494
26.71881	78.64477	22.43796	81.86501	58.03946
29.27887	78.49986	23.30252	81.26701	57.93372
27.36868	78.38228	24.55473	79.91592	58.11812

32.97354	78.40859	26.9625	81.07868	58.61546
32.8697	78.56362	57.24598	80.06958	58.4774
40.02761	78.46208	61.10412	81.71261	58.1761
45.10398	78.41947	47.6245	81.9259	58.23209
47.70966	78.39263	55.50975	80.47041	58.41763
47.58446	78.46161	55.47406	80.70767	58.60352
47.44399	78.67809	37.79094	80.45638	58.73192
47.25972	78.73662	31.16104	81.49274	58.64983
47.12169	78.68252	22.95823	80.79547	58.87345
47.11864	78.52524	20.72598	79.69849	59.24035
46.95243	78.54256	18.92349	81.089	59.4725
46.78839	78.68113	18.37704	83.0485	59.2882
46.6989	78.63823	17.61378	81.87818	59.66192
46.59333	78.55503	16.824	81.34055	60.44662
46.62379	78.50508	16.9621	83.06819	60.51831
46.53817	78.56458	16.99578	81.82253	59.89743
46.42358	78.69684	16.7539	83.35202	60.22924
46.10175	78.61495	20.58205	80.50521	60.69243
45.71343	78.42557	24.34619	81.6974	61.19256
45.37861	78.25241	30.17377	82.66837	61.65853
45.20905	78.26351	32.24688	80.26473	61.90474
44.9646	78.39716	27.12903	81.51715	62.03537
44.57407	78.48722	25.51579	82.79308	62.35686
44.20646	78.47772	25.61844	81.29697	62.49506
43.69932	78.36662	27.02566	83.23267	63.33324
43.26716	78.36443	31.08224	83.10372	63.69831
43.05801	78.44347	34.83238	83.10535	64.62511
42.69545	78.40757	28.77628	81.2689	65.31538
42.32701	78.34206	29.38691	82.77293	65.74686
42.10226	78.28522	27.99674	83.16985	66.33594
41.6261	78.32387	23.60907	80.03101	67.10436
41.11799	78.49503	22.34715	82.70216	67.59184
40.39969	78.52351	23.19049	81.02309	68.01438
39.8863	78.45691	27.64054	81.87075	68.91389
39.57895	78.36786	29.76631	82.95926	69.8435
38.87928	78.46051	30.68437	83.14527	69.87668
37.68755	78.63091	30.17853	81.06912	70.59979
34.99471	78.63075	28.94609	80.58212	70.51547
33.15607	78.60877	34.97078	83.31233	71.06442
32.55887	78.4947	36.07235	82.96365	71.52818
33.65991	78.6245	35.73282	82.83882	71.95561
35.0243	78.78889	32.50937	81.19566	72.44395

36.83454	78.83679	33.52406	82.08138	73.06842
38.54427	78.72632	32.84524	82.66727	74.63975
38.64687	78.58923	27.12408	80.6926	74.76155
38.93083	78.60718	29.06556	81.15141	75.11339
41.95027	78.73454	27.03685	83.3756	75.32791
42.51961	78.76911	25.89408	82.45209	75.61756
42.82058	78.50589	28.50118	81.01213	75.12265
42.98638	78.30922	34.01706	82.02821	75.43879
43.28146	78.31307	30.84781	82.64554	75.78056
43.6462	78.3804	30.35048	84.14512	75.4336
43.95722	78.3559	32.55693	82.87354	75.98047
44.10786	78.15913	32.11484	82.07567	76.41786
44.10365	78.08405	33.65102	80.24197	76.86536
44.09714	78.14391	31.03092	82.89051	77.55612
43.86998	78.31292	28.47085	81.87251	78.8047
43.70614	78.39563	25.05364	80.3652	79.60557
43.58878	78.2433	26.73274	81.4054	80.54318
43.4973	78.18334	29.36751	80.34871	82.09525
43.42374	78.22961	29.09837	80.6931	82.99397
43.56619	78.44045	33.12672	81.12276	83.83356
43.56398	78.42704	34.5912	81.24783	85.59553
43.61348	78.36924	27.82196	79.51898	86.23692
43.67233	78.38029	28.47833	82.45576	87.23966
43.75085	78.4716	28.11817	81.28442	87.56101
43.76688	78.54749	27.30945	80.94734	88.28336
43.792	78.4737	33.36139	81.7415	88.71535
43.81921	78.34133	31.63919	76.45563	89.75965
43.89098	78.23366	34.60786	68.15614	90.58617
43.98184	78.30178	26.39243	56.80912	90.72006
44.07505	78.48584	26.24051	50.54827	90.40402
44.23167	78.45241	26.92233	47.13988	90.57914
44.3838	78.30545	26.59362	49.62349	90.41423
44.5063	78.26623	28.55606	56.1092	91.14282
44.62618	78.39592	30.11525	65.24243	92.0814
44.60201	78.58225	33.6766	71.56178	92.56174
44.442	78.63898	33.98554	71.5537	92.27004
44.29607	78.49344	32.35635	71.56033	92.71992
44.21552	78.35735	34.518	71.56284	93.74671
43.91477	78.3586	34.86731	71.56157	94.27087
40.00321	78.46893	32.8512	71.4728	95.02236
31.81156	78.44199	30.02979	71.56988	95.25915
25.8732	78.35077	28.64832	71.55602	96.17671

22.02207	78.35256	29.50496	71.57383	96.98534
19.26056	78.40635	31.42942	71.53079	97.90682
18.02435	78.59234	32.35577	71.59667	98.42737
18.46469	78.60047	34.60179	71.59451	98.02219
16.43809	78.53535	35.70697	71.59808	97.98795
15.28549	78.43672	36.15747	71.62669	98.10843
15.60751	78.45487	35.59147	71.63047	98.90553
15.48749	78.64029	36.73481	71.58865	98.5175
15.24298	78.67478	38.05702	71.54421	98.19717
15.54929	78.5703	38.01505	71.55292	97.94367
15.63556	78.51176	36.81028	71.61045	97.69254
16.93003	78.66428	33.95501	71.6135	97.14695
20.11533	78.79491	30.87034	71.53191	96.37047
27.38947	78.74038	33.30959	71.57177	94.9446
42.55399	78.72373	34.33661	71.61997	94.70754
52.93893	78.60116	35.5588	71.58454	95.58334
52.95299	78.57579	37.49406	71.63033	96.12968
52.93955	78.728	38.84643	71.59394	95.50817
52.94624	78.75779	38.08481	71.61703	94.87956
52.9558	78.81213	38.48192	71.62013	95.47892
52.96989	78.78933	40.38982	71.64245	94.62189
52.98266	78.83292	40.48685	71.64551	93.72396
52.98901	78.88919	36.23135	71.6491	93.35141
52.99904	78.83013	36.26705	71.64662	93.18731
53.00396	78.66462	36.27551	71.69841	92.79768
52.97312	78.49258	36.96511	71.6736	92.99712
53.00528	78.59309	36.70491	71.6742	93.09188
53.05299	78.76315	36.67922	71.62758	92.84032
53.08595	78.77218	37.91674	71.6553	91.99008
53.10569	78.63183	39.12885	71.60502	92.82492
53.11873	78.49545	35.83159	71.57069	92.66303
53.11622	78.51465	35.64143	71.63725	92.11729
53.11693	78.6426	35.43599	71.55219	92.48013
53.09266	78.68823	37.20842	71.56784	92.68993
53.09273	78.60648	39.707	71.52462	92.80566
53.11144	78.54989	40.36972	71.56809	92.25719
53.12492	78.60137	39.57468	71.59274	92.60694
53.14125	78.73244	37.65987	71.61644	92.15069
52.94426	78.70619	38.94581	71.56572	91.18188
52.26328	78.59056	40.06652	71.51733	90.90163
51.52874	78.52846	40.30486	71.57539	90.25485

50.96685	78.59264	42.85994	71.55312	88.91937
50.38583	78.7757	42.6783	71.55368	88.47917
49.85191	78.79872	43.51489	71.53254	88.51506
49.40686	78.54279	44.50343	71.5272	87.26296
48.97932	78.35553	42.80919	71.61302	85.685
48.45708	78.25446	44.96063	71.61152	84.36877
47.86446	78.36434	46.51823	71.63519	83.23194
47.43541	78.42562	45.35247	71.6418	82.21005
47.1065	78.31783	45.51167	71.64313	82.15845
46.83478	78.29112	44.89963	71.60667	81.1682
46.5132	78.2909	45.89646	71.6151	80.13172
46.03481	78.39895	48.25777	71.60671	79.53881
45.5615	78.49345	46.55856	71.6096	78.71452
45.1687	78.32108	46.66487	71.59156	78.20851
44.64364	78.18878	45.58506	71.55648	78.8624
44.12541	78.28613	44.84831	71.58369	78.87385
43.69613	78.34997	44.52232	71.59129	78.11804
43.03255	78.3243	44.29154	71.58604	77.68216
42.56189	78.26072	45.18401	71.57302	77.90449
42.27986	78.23785	47.30003	71.58276	77.86076
41.80077	78.2888	42.58584	71.60753	77.57997
41.23724	78.43852	43.20559	71.57053	77.76545
40.89035	78.46751	49.40918	71.58868	76.32693

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src01	src02	src04	src05	src06
16.4346	4.854876	23.67565	4.853036	30.07895
16.336	4.852765	23.85904	4.184067	30.46464
16.2876	4.860908	23.94492	4.696161	30.42508
16.25301	4.952977	24.10775	6.410902	29.75141
16.25793	4.742767	24.11188	4.160068	29.71385
16.18544	4.821981	24.69387	4.721159	29.47401
16.16217	4.781013	25.18017	4.548656	29.93687
16.09365	4.813073	25.05393	5.139695	29.54725
16.02452	4.762067	24.89463	5.328558	30.08106
16.01555	4.83356	24.79251	4.072394	29.5964
16.02729	4.565938	25.04163	5.352254	28.70301
16.03693	4.840607	25.14869	4.413699	29.05461
16.01169	4.604475	25.01037	4.508003	29.38734
15.99107	4.605731	24.37147	5.615321	28.98725
16.03212	4.369024	23.50415	3.984185	29.09729

16.13198	4.681246	23.40761	4.163081	28.5931
16.16231	4.552174	23.05094	4.64704	28.73829
16.14231	4.608134	24.14053	5.293671	28.65966
16.07628	4.568195	24.53619	6.766617	28.6924
16.04752	4.287101	24.11617	4.479671	28.61699
16.05922	4.487365	23.76856	4.64454	28.78117
16.16985	4.254987	22.85081	6.352566	28.56161
16.18335	4.647492	23.3715	4.968929	28.46624
16.22783	4.841856	23.88872	4.648597	28.48849
16.24669	5.328704	23.78434	5.720457	28.27702
16.27143	5.300278	24.20948	4.637146	28.63454
16.3447	4.683675	24.46646	4.330137	28.36114
16.59715	5.573736	24.14022	4.849813	27.69356
16.66385	4.530762	23.97219	4.198858	27.63517
17.05659	4.57051	24.01006	4.944315	27.38733
16.98272	4.415952	24.64534	4.16673	27.86837
16.96191	4.835955	25.30059	3.969127	28.79441
16.87775	4.604583	24.92475	6.192251	28.85178
16.9628	4.152794	25.12265	5.368617	28.49077
17.30263	4.69043	25.18206	4.53744	27.81821
17.4104	4.369136	24.77978	4.816576	28.06695
17.35473	4.713391	24.79342	4.658045	27.58472
17.29545	4.938141	24.47029	4.372404	27.95026
17.19346	4.315003	24.39778	4.054456	28.12618
17.22895	4.81462	24.21569	5.383167	27.54554
17.36705	4.50232	23.20367	6.748743	27.45264
17.39905	4.918614	22.34826	4.662574	27.62023
17.4387	4.761128	22.75337	4.513362	27.39139
17.47882	4.676101	22.69776	5.176101	27.43809
17.93012	5.363595	22.60884	4.733319	27.63186
17.80018	4.52473	22.17103	4.747142	26.79935
17.44131	5.346806	21.66439	5.925611	26.42574
17.64656	4.485108	21.38372	4.345754	26.53981
17.72645	5.243551	21.61374	7.579416	26.9577
17.75785	4.800678	21.97741	4.340247	26.58522
17.53731	4.34403	21.7122	6.019715	25.98882
17.53977	4.260069	21.66178	4.342404	27.02807
17.71862	4.38455	21.65414	4.546299	26.65156
17.92692	4.845586	21.95718	7.288264	26.08857
18.20836	4.394526	21.30739	4.134035	26.6178
18.59367	4.4808	21.80687	4.971248	27.54239
19.10351	4.552731	21.77308	3.956753	27.43016

19.18906	4.369278	21.74755	7.503269	27.60597
19.21486	4.263676	21.59694	5.485175	27.16126
20.01762	4.193155	21.49428	4.884045	27.58105
19.9575	4.224722	21.31632	5.80624	28.18
20.40553	4.323102	21.6404	6.702751	27.25401
20.43204	4.374086	22.09635	9.097949	27.49447
20.51125	4.415724	22.68922	65.4071	27.78208
20.75653	4.393436	22.93476	12.87009	27.62406
21.11625	4.431479	22.50741	12.42817	27.02062
21.09602	4.494583	22.5597	8.431763	27.37605
21.26156	4.268094	22.69144	9.088765	27.24031
21.6615	4.336943	22.79401	10.48747	26.80979
21.77773	4.428227	23.1973	6.674089	27.26531
21.80238	4.554108	22.96198	13.21527	26.77478
21.92452	4.649675	22.11164	7.075576	26.28783
21.66635	4.414924	21.61687	8.234591	26.79627
21.72047	4.399043	21.69443	10.17034	27.03463
21.70957	4.742225	21.99197	8.546275	26.51605
21.51864	4.503491	21.64782	9.851012	26.35011
21.32303	4.379184	21.62005	10.05544	27.38558
21.34691	4.352705	21.46112	9.987005	26.92548
21.3646	4.848015	21.64374	11.45271	25.72274
21.16789	4.476853	21.31479	8.397369	26.31074
21.30883	4.319756	20.85485	9.943368	26.71483
21.11623	4.723447	20.99575	9.331749	26.85497
20.8706	4.475708	20.88233	7.057144	26.3739
20.87045	4.493284	21.65783	6.991496	26.69188
20.66464	4.572901	21.73454	6.435292	26.48829
20.64722	4.565903	22.22885	12.03789	26.42303
20.71977	4.565456	21.78469	9.38295	26.44793
20.40559	4.61032	22.42151	6.690069	26.0533
20.2455	4.718253	23.01014	5.207335	26.26662
20.304	4.579127	22.97573	7.41721	25.91592
20.17954	4.576792	23.12314	6.125813	25.66662
20.28407	4.550788	23.75682	7.425339	25.9894
20.45156	4.667014	23.88992	9.449672	26.30839
20.21265	4.710568	23.52956	7.398733	26.30013
19.8446	4.982671	23.53707	7.531616	26.54513
19.66305	4.653668	24.08424	8.141555	26.50515
23.79792	4.741257	24.14851	8.909857	26.72431
25.13356	4.783992	23.48478	7.291225	27.303

24.55328	4.856102	23.55417	7.644104	27.33959
24.32558	4.991766	23.27944	6.644868	27.53164
29.58938	4.943444	22.82335	10.60907	27.55202
23.29125	5.287991	23.33833	7.829834	27.17455
28.32635	5.027031	21.00052	8.677301	26.45384
15.4549	5.242239	13.68637	8.742964	26.97066
17.65481	4.978864	13.78108	9.135463	26.90805
4.481323	5.039562	21.2938	9.219617	26.62468
4.118829	4.985883	14.85858	6.731551	26.57904
4.664699	4.863561	21.13627	10.82697	26.11707
5.20604	4.942122	20.38013	7.632466	25.49164
5.715464	5.061142	22.83661	9.104146	25.5908
6.228725	5.030741	24.83576	9.478375	25.8692
6.721927	4.74884	24.95931	8.340575	25.68054
7.187705	4.953345	25.64209	6.983927	26.40285
7.627119	4.768245	25.25382	5.77029	26.28196
8.072762	4.731955	25.69121	6.827226	25.41773
8.481621	4.650815	25.30639	6.07994	24.81029
8.886425	4.68601	25.04136	4.892207	25.82988
9.279737	4.464976	25.15118	6.606722	26.37222
9.575562	4.643841	24.59327	5.93134	26.04948
9.838899	4.566737	23.50798	10.42296	26.00454
10.15495	4.761097	22.91123	13.51242	25.65523
10.44121	4.485296	22.5457	6.927536	26.31289
10.81367	4.642929	23.04364	8.132379	26.40174
11.04895	4.496974	23.47012	6.822241	26.206
11.24889	4.442561	22.81573	7.899156	26.06462
11.477	4.361214	22.44118	9.072417	26.62971
11.89865	4.396119	22.67306	6.254782	26.93236
12.10128	4.46479	21.72146	6.183346	26.71716
12.36337	4.453112	21.81413	5.705389	26.67911
12.58741	4.457632	20.99464	4.639081	26.78752
12.7334	4.384196	20.53902	6.464703	27.06321
13.01276	4.364563	20.59979	6.914073	26.94174
13.17708	4.445801	20.92888	11.34452	26.24872
13.16756	4.618381	20.17147	8.242126	26.74778
13.67621	4.746426	20.6924	5.226142	27.11583
13.63114	4.683844	20.53772	6.281343	27.44383
15.40014	4.60167	21.14009	7.930066	27.24474
16.88077	4.544683	20.94184	11.23918	27.32852
17.99524	4.592624	22.01706	6.714017	27.23352

18.04453	4.64677	21.69623	7.009475	27.41963
20.15	4.687928	22.38328	10.70967	26.84319
20.78328	4.620436	22.44881	8.362748	26.49001
21.77159	4.539649	22.40009	6.642507	27.42146
15.56722	4.443669	23.11797	8.32567	28.0096
19.84616	4.370474	22.50944	5.700203	27.57788
8.752761	4.379535	22.73409	6.94594	27.47132
15.04248	4.488087	21.87113	12.55607	27.71815
7.72593	4.548433	21.90194	11.27596	27.80103
6.445845	4.5338	22.1122	6.148008	27.5156
5.371794	4.516177	22.10529	11.01205	27.81013
4.684762	4.51715	22.04495	6.490439	28.16133
4.170812	4.589955	22.2553	12.38515	28.32453
3.682924	4.707508	22.41919	6.504932	28.5513
2.968564	4.71129	22.09605	8.542091	28.7926
1.765127	4.591843	21.52344	6.909482	29.38065
2.03775	4.478614	21.04661	9.530502	29.09402
2.316633	4.398054	21.66835	6.735512	28.53684
2.639746	4.457204	22.0369	6.042439	27.77068
2.982546	4.470849	22.39411	6.965409	27.52788
3.398257	4.373038	22.32321	6.798694	28.5575
3.826196	4.394468	21.83298	8.986322	28.71434
4.228157	4.343588	21.92483	14.72625	28.38603
4.571213	4.34018	21.8612	8.029881	29.67196
4.797178	4.365769	21.04423	10.50954	30.4321
4.826605	4.371399	21.58224	10.36184	29.75423
4.76484	4.343413	22.22483	9.866554	29.76173
4.681707	4.436597	22.07774	10.25522	30.05064
4.488346	4.425158	22.23887	15.35579	29.96246
4.180099	4.416647	21.55593	12.48051	30.59658
3.865416	4.3864	21.26381	13.88176	30.88697
3.505896	4.333956	21.41456	17.94745	30.44748
3.114223	4.276679	22.61502	16.58138	30.43087
2.713944	4.361495	23.23407	14.42617	31.14401
2.267749	4.406975	23.38508	14.72463	30.92817
1.819756	4.416688	23.45661	12.59634	31.12029
1.361772	4.369437	23.68063	11.83083	31.4762
1.002546	4.311464	23.49648	11.15881	31.86318
0.799991	4.314465	24.2507	8.046105	31.38868
1.323714	4.231457	24.59213	3.284451	31.60847
1.814443	4.091058	24.8214	3.236255	32.51636
2.115942	4.06501	24.48395	3.28644	32.3448

2.301696	4.080801	23.7701	3.5572	32.34275
4.516263	4.061301	24.50372	3.923043	32.46376
17.26166	4.062726	24.87166	3.8411	32.74006
21.70595	4.074844	25.63952	3.400129	32.86733
24.11887	4.086311	25.24811	3.378674	33.14595
25.11463	4.110612	25.39376	3.466917	33.1549
25.76827	4.143156	26.41948	3.382468	33.41369
26.72531	4.160414	26.52504	3.416674	33.07687
26.69017	4.099909	26.72166	3.392272	33.5225
25.95715	4.104258	26.78475	3.447652	33.54232
25.68533	4.11562	26.60247	3.380615	34.07403
29.87003	4.199548	26.44929	3.278543	33.672
30.76526	4.331681	25.96068	3.277901	33.59352
31.90675	4.439098	25.54199	3.305586	33.44948
32.3806	4.49177	25.6462	3.286813	34.40065
32.85431	4.478189	25.45307	3.268205	34.76349
31.95616	4.407237	24.71902	3.239109	34.20869
30.48603	4.41111	24.58105	3.295889	35.02668
25.60044	4.32193	24.58599	3.269244	34.98357
6.535758	4.250861	24.75396	3.179375	34.10815
1.884214	4.254025	25.4437	3.188052	33.75036
1.671804	4.294128	25.65033	3.232554	35.08093
1.692681	4.412866	24.85671	3.255627	35.63465
1.731734	4.322162	25.27688	3.372434	34.97998
2.085696	4.216899	24.45842	3.569352	34.09039
2.217047	4.312366	24.71326	3.203885	34.06093
2.535404	4.407898	25.32031	3.285922	34.06545
2.290888	4.488315	25.32062	3.180617	33.63551
2.168349	4.615558	25.18408	3.212589	34.70276
2.784539	4.699256	24.88783	3.218778	35.00507
3.319404	4.64131	25.53151	3.188667	34.36319
3.785362	4.673314	25.64061	3.263385	34.73316
4.121521	4.714151	25.16702	3.416986	35.28743
4.044935	4.699172	25.41594	3.351536	35.4067
3.991714	4.738387	24.72207	3.319391	34.32404
4.17099	4.727733	24.84289	3.621615	34.87834
4.228313	4.785574	24.98452	3.952769	35.01844
4.646462	4.774986	23.63329	3.477599	33.79607
4.552958	4.718985	23.84015	3.204277	33.82023
4.642774	4.690155	23.60577	3.190286	34.66378
4.622911	4.589245	25.04671	3.249341	34.5394

4.411876	4.609657	25.16472	3.22785	34.25446
3.907443	4.598738	25.05277	3.310182	33.3994
4.835081	4.546607	26.00718	3.606764	33.31361
8.477765	4.503249	26.6242	3.344867	33.17148
11.68589	4.433472	26.48729	3.125118	34.19465
14.01993	4.37978	26.79613	3.421496	33.47849
15.66884	4.401134	27.54741	3.384796	33.19098
16.69291	4.441397	27.78967	3.641615	33.26058
17.44133	4.482541	27.67475	3.655224	34.01688
18.32611	4.519941	27.0695	3.12735	33.27992
19.1933	4.61387	27.09885	3.349954	32.77832
19.68338	4.71379	28.07422	3.134036	34.0328
20.06189	4.700534	29.29829	3.106524	33.91761
20.42477	4.560066	29.01747	3.169282	33.55602
20.79962	4.504657	29.6342	3.454893	33.53429
21.0972	4.594101	29.67451	3.142861	32.6224
21.34337	4.529839	29.5088	3.366739	32.88681
21.83097	4.486513	29.41759	3.403159	32.41238
22.20684	4.420943	29.49554	3.348938	32.6373
22.37608	4.373166	29.29628	3.163758	32.20461
22.51133	4.370707	29.30993	3.358588	31.89321
22.81944	4.407429	28.81804	3.381771	34.12598
22.97947	4.422386	28.20746	3.403949	34.15139
22.76203	4.376009	27.43574	3.671099	33.49997
22.99609	4.334874	27.29036	3.177278	33.62099
23.29	4.301733	27.973	3.875804	33.24766
23.41146	4.298758	28.46952	4.024596	33.26263

文章标签： 视频序列 TI 时间信息 SI 空间信息

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所属专栏： 视频质量评价