Tips for Writing a Research Paper using LaTeX

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Contents

1. Introduction

LaTeX is a very powerful tool for documentation preparation, and is often used by researchers to prepare a manuscript for reviewing and publication. However, some new graduate students might not have experience in using LaTeXand thus have a difficult time in prepare their first paper.

In this article, we will first provide some tips for paper writing. Then, we will showcase several working examples for the tables and figures, which have been used in our previous publications. The readers are encouraged to adapt those tables and figures to their purposes to save time when preparing their first papers.

2. Tips for the Writing

In this section, we point out some common mistakes in paper writing and give some suggestions for editing LaTeX files.

2.1. Some Common Mistakes

- There should be a space before the open parentheses:
  Convolutional neural network(CNN) has been successfully applied on various vision problems. ×
  Convolutional neural network (CNN) has been successfully applied on various vision problems. ✓
- There should be no space before the period and comma punctuation marks:
  Convolutional neural network (CNN) has been successfully applied on various vision problems . ×
  Convolutional neural network (CNN) has been successfully applied on various vision problems. ✓
- There should be a punctuation at the end of the equation:

$$E = mc^2 \quad \times \tag{1}$$

$$E = mc^2. \quad \checkmark \tag{2}$$

- All equations should be numbered:

$$E = mc^2. \quad \times$$

$$E = mc^2. \quad \checkmark \tag{3}$$

- The first character in a sentence should be capitalized:
  how are you? ×
  How are you? ✓
- Double quotation marks should be correctly typed:
  Are you ”okay”? ×
  Are you “okay”? ✓
- There should be a space before the citation:
  A proposes a method B for this problem[1]. ×
  A proposes a method B for this problem [1]. ✓

2.2. Some Suggestions

- Do not include citations in the abstract.
- Define a macro for a word or phrase if it appears frequently (*e.g.*, the method name and the dataset name). The command can be
  “\newcommand{\NetName}{A Great Deep Net}”.
- Use “\ie” command for “*i.e.*” and use “\eg” for “*e.g.*”.
- When referring to a table, always use “Table 1” in the sentence:
  Our results are shown in Tab. 1. ×
  Our results are shown in Table 1. ✓
- The table caption should be at the top of the table.
- When referring to a figure, use “Figure 1” at the beginning of a sentence and “Fig. 1” elsewhere.
  Fig.1 shows our results. ×
  Our results are shown in Fig. 1. ✓
  Figure 1 shows our results. ✓
- The figure caption should be at the bottom of the figure.
- It is better to put the tables and figures at the top of a page.

3. Examples for the Tables

Table 1. A simple table with a header row.

Data	Size	2-Exp	3-Exp	4-Exp	5-Exp	6-Exp	7-Exp
A	1280×720	1	2	3	4	5	4
B	1280×720	1	2	3	4	5	4
Ours	4096×2168	2	3	4	6	5	4

Table 2. A table with multi-column headers.

		$6-9$ frames		$5-7$ frames		$50-200$ frames	
Data	Size	2-Exp	3-Exp	2-Exp	3-Exp	2-Exp	3-Exp
A	1280×720	1	2	3	4	5	4
B	1280×720	1	2	3	4	5	4
Ours	4096×2168	2	3	4	6	5	4

Table 3. A table with line break in the header. Line break is useful if the item name is too long.

		$6-9$ frames			$5-7$ frames		
Data	Size	2-Exp Scenes	2-Exp Scenes	2-Exp Scenes	2-Exp Scenes	2-Exp Scenes	2-Exp Scenes
A	1280×720	1	2	3	4	5	4
B	1280×720	1	2	3	4	5	4
Ours	4096×2168	2	3	4	6	5	4

Table 4. A table with multi-column headers and vertical lines for grouping.

		$6-9$ frames			$5-7$ frames		
Data	Size	2-Exp Scenes	2-Exp Scenes	2-Exp Scenes	2-Exp Scenes	2-Exp Scenes	2-Exp Scenes
A	1280×720	1	2	3	4	5	4
B	1280×720	1	2	3	4	5	4
Ours	4096×2168	2	3	4	6	5	4

Table 5. A table with multi-column headers and bold font highlights.

		$6-9$ frames			$5-7$ frames		
Data	Size	2-Exp Break	2-Exp Break	2-Exp Break	2-Exp Break	2-Exp Break	2-Exp Break
A	1280×720	1	2	3	4	**5**	**7**
B	1280×720	1	2	3	4	**5**	**7**
Ours	4096×2168	**2**	**3**	**4**	**6**	**5**	4

Table 6. A table with parallel lines for grouping and color highlight.

		Synthetic Dataset		Static Data		Dynamicgt Data	
ID	Method	PSNRT	VDP	PSNRT	VDP	PSNRT	VDP
0	ANet	39.25	70.81	40.62	74.51	44.43	77.74
1	BNet	39.69	70.95	37.61	75.30	43.70	78.97
2	ANet + BNet	**40.34**	**71.79**	**41.18**	**76.15**	**45.46**	**79.09**
3	ANet + BNet w/o C	39.72	71.38	40.52	74.79	45.09	78.24
4	ANet + BNet w/o D	40.03	71.66	40.80	76.12	45.17	78.99

Table 7. A table for illustrating the network architecture.

RefineNet					
layer	**k**	**s**	**chns**	**d-f**	**input**
conv1	9	1	8/64	1	Image+m_1+a_1+f_1
conv2	4	2	64/64	2	conv1
conv3	4	2	64/64	4	conv2
conv4	4	2	64/64	8	conv3
ResBlock1	3	1	64/64	8	conv4
ResBlock2	3	1	64/64	8	ResBlock1
ResBlock3	3	1	64/64	8	ResBlock2
ResBlock4	3	1	64/64	8	ResBlock3
ResBlock5	3	1	64/64	8	ResBlock4
deconv1_a	4	2	64/64	4	ResBlock5
deconv2_a	4	2	64/64	2	deconv1_a
deconv3_a	4	2	64/64	1	deconv2_a
a_refined	3	1	65/1	1	deconv3_a+a_1
deconv1_f	4	2	64/64	4	ResBlock5
deconv2_f	4	2	64/64	2	deconv1_f
deconv3_f	4	2	64/64	1	deconv2_f
f_refined	3	1	66/2	1	deconv3_f+f_1

Table 8. A table with images at the left. Images can be useful to illustrate different setups.

(a) (b) (c)

Type	Range	MAE
(a)	144×144	4.21
(b)	37×37	10.90
(c)	22×22	18.72

(d) Normal estimation

Table 9. A two-column table.

	Glass				Object A				Object B				Object C				Average			
	F-EPE	A-MSE	I-MSE	M-IoU	F-EPE	A-MSE	I-MSE	M-IoU	F-EPE	A-MSE	I-MSE	M-IoU	F-EPE	A-MSE	I-MSE	M-IoU	F-EPE	A-MSE	I-MSE	M-IoU
Method A	3.6 / 30.3	1.33	0.48	0.12	6.4 / 53.2	1.54	0.68	0.12	10.3 / 39.2	1.94	1.57	0.24	6.8 / 56.8	2.50	0.85	0.11	6.8 / 44.9	1.83	0.90	0.15
Method B	2.1 / 15.8	0.22	0.14	0.97	3.1 / 23.5	0.31	0.23	0.97	2.0 / 6.7	0.17	0.28	0.99	4.5 / 34.4	0.38	0.33	0.92	2.9 / 20.1	0.27	0.24	0.96
Method C	1.9 / 14.7	0.21	0.14	0.97	2.9 / 21.8	0.30	0.22	0.97	1.9 / 6.6	0.15	0.29	0.99	4.1 / 31.5	0.37	0.32	0.92	2.7 / 18.6	0.26	0.24	0.96

Table 10. A two-column table with remark.

	Glass				Object A				Object B				Object C				Average			
	F-EPE	A-MSE	I-MSE	M-IoU	F-EPE	A-MSE	I-MSE	M-IoU	F-EPE	A-MSE	I-MSE	M-IoU	F-EPE	A-MSE	I-MSE	M-IoU	F-EPE	A-MSE	I-MSE	M-IoU
Method A	3.6 / 30.3	1.33	0.48	0.12	6.4 / 53.2	1.54	0.68	0.12	10.3 / 39.2	1.94	1.57	0.24	6.8 / 56.8	2.50	0.85	0.11	6.8 / 44.9	1.83	0.90	0.15
Method B*	2.1 / 15.8	0.22	0.14	0.97	3.1 / 23.5	0.31	0.23	0.97	2.0 / 6.7	0.17	0.28	0.99	4.5 / 34.4	0.38	0.33	0.92	2.9 / 20.1	0.27	0.24	0.96
Method C	1.9 / 14.7	0.21	0.14	0.97	2.9 / 21.8	0.30	0.22	0.97	1.9 / 6.6	0.15	0.29	0.99	4.1 / 31.5	0.37	0.32	0.92	2.7 / 18.6	0.26	0.24	0.96

* indicates that method B is trained from scratch.

Table 11. A two-column table with color header.

	Glass				Glass with Water				Lens				Complex Shape				Average			
	F-EPE	A-MSE	I-MSE	M-IoU	F-EPE	A-MSE	I-MSE	M-IoU	F-EPE	A-MSE	I-MSE	M-IoU	F-EPE	A-MSE	I-MSE	M-IoU	F-EPE	A-MSE	I-MSE	M-IoU
Method A	3.6 / 30.3	1.33	0.48	0.12	6.4 / 53.2	1.54	0.68	0.12	10.3 / 39.2	1.94	1.57	0.24	6.8 / 56.8	2.50	0.85	0.11	6.8 / 44.9	1.83	0.90	0.15
Method B	2.1 / 15.8	0.22	0.14	0.97	3.1 / 23.5	0.31	0.23	0.97	2.0 / 6.7	0.17	0.28	0.99	4.5 / 34.4	0.38	0.33	0.92	2.9 / 20.1	0.27	0.24	0.96
Method C	1.9 / 14.7	0.21	0.14	0.97	2.9 / 21.8	0.30	0.22	0.97	1.9 / 6.6	0.15	0.29	0.99	4.1 / 31.5	0.37	0.32	0.92	2.7 / 18.6	0.26	0.24	0.96

MSE ($\cdot 10^{-2}$)
↓ better
↑ better

Table 12. A two-column table with two sub-tables. **Red** text indicates the best and **blue** text indicates the second best result, respectively.

(a) Results on dataset A.

	2-Exposure							3-Exposure								
	Low-Exposure		High-Exposure		All-Exposure			Low-Exposure		Middle-Exposure		High-Exposure		All-Exposure		
Method	PSNR	HDR-VDP2	PSNR	HDR-VDP2	PSNR	HDR-VDP2	HDR-VQM	PSNR	HDR-VDP2	PSNR	HDR-VDP2	PSNR	HDR-VDP2	PSNR	HDR-VDP2	HDR-VQM
Method A	**40.00**	73.70	**40.04**	**70.08**	**40.02**	71.89	**76.22**	**39.61**	73.24	**39.67**	**73.24**	**40.01**	67.90	**39.77**	70.37	79.55
Method B	34.54	80.22	39.25	65.96	36.90	73.09	65.33	36.51	77.78	37.45	69.79	39.02	64.57	37.66	70.71	70.13
Method C	39.79	**81.02**	39.96	67.25	39.88	**74.13**	73.84	39.48	**78.13**	38.43	70.08	39.60	**67.94**	39.17	**72.05**	**80.70**
Ours	**41.95**	**81.03**	**40.41**	**71.27**	**41.18**	**76.15**	**78.84**	**40.00**	**78.66**	**39.27**	**73.10**	**39.99**	**69.99**	**39.75**	**73.92**	**82.87**

(b) Results on dataset B.

	2-Exposure							3-Exposure								
	Low-Exposure		High-Exposure		All-Exposure			Low-Exposure		Middle-Exposure		High-Exposure		All-Exposure		
Method	PSNR	HDR-VDP2	PSNR	HDR-VDP2	PSNR	HDR-VDP2	HDR-VQM	PSNR	HDR-VDP2	PSNR	HDR-VDP2	PSNR	HDR-VDP2	PSNR	HDR-VDP2	HDR-VQM
Method A	37.73	74.05	45.71	66.67	41.72	70.36	85.33	37.53	72.03	36.38	65.37	34.73	62.24	36.21	66.55	84.43
Method B	36.41	85.68	**49.89**	**69.90**	43.15	77.79	78.92	36.43	77.74	39.80	**67.88**	**43.03**	**64.74**	39.75	**70.12**	87.93
Method C	**39.94**	**86.77**	49.49	69.04	**44.72**	**77.91**	**87.16**	**38.34**	**78.04**	**41.21**	66.07	42.66	64.01	**40.74**	69.37	**89.36**
Ours	**40.83**	**86.84**	**50.10**	**71.33**	**45.46**	**79.09**	**87.40**	**38.77**	**78.11**	**41.47**	**68.49**	**43.24**	**65.08**	**41.16**	**70.56**	**89.56**

Table 13. A two-column table with \cmidrule for grouping without using vertical lines.

	Dataset A						Dataset B			
	Setup A			Setup B			Setup C		Setup D	
Method	Some Metric A	Some Metric B	Some Metric C	Some Metric A	Some Metric B	Some Metric C	Metric D	Metric E	Metric D	Metric E
Method A	34.54	80.22	39.25	65.96	36.90	73.09	65.33	36.51	77.78	37.45
Method B	34.54	80.22	39.25	65.96	36.90	73.09	65.33	36.51	77.78	37.45
Method C	34.54	80.22	39.25	65.96	36.90	73.09	65.33	36.51	77.78	37.45
Method D	34.54	80.22	39.25	65.96	36.90	73.09	65.33	36.51	77.78	37.45

Table 14. A two-column table with images in the header. Images are useful to visualize each item in the header.

														
	Helmet Side		*Plant*		*Fighting Knight*		*Kneeling Knight*		*Standing Knight*		*Helmet Front*		average	
model	dir.	int.	dir.	int.	dir.	int.	dir.	int.	dir.	int.	dir.	int.	dir.	int.
Method A	25.40	0.576	20.56	0.227	69.50	1.137	46.69	9.805	33.81	1.311	81.60	**0.133**	46.26	2.198
Method B	6.57	0.212	16.06	0.170	15.95	0.214	19.84	0.199	11.60	0.286	11.62	0.248	13.61	0.221
Method C	**5.33**	**0.096**	**10.49**	**0.154**	**13.42**	**0.168**	**14.41**	**0.181**	**5.31**	**0.198**	**6.22**	0.183	**9.20**	**0.163**

Table 15. Two tables placed side by side. Table A (left).

Data	Size	$6-9$ frames 2-Exp	$6-9$ frames 3-Exp	$5-7$ frames 2-Exp	$5-7$ frames 3-Exp	$50-200$ frames 2-Exp	$50-200$ frames 3-Exp
A	1280×720	1	2	3	4	5	4
Ours	4096×2168	2	3	4	6	5	4

Table 16. Two tables placed side by side. Table B (right).

Data	Size	$6-9$ frames 2-Exp Scenes	$6-9$ frames 2-Exp Scenes	$5-7$ frames 2-Exp Scenes	$5-7$ frames 2-Exp Scenes	$5-7$ frames 2-Exp Scenes	$5-7$ frames 2-Exp Scenes
A	1280×720	1	2	3	4	5	4
Ours	4096×2168	2	3	4	6	5	4

Table 17. A table with caption at the right. This is useful for single-column paper (*e.g.*, ECCV), where space are limited.

Data	Size	$6-9$ frames 2-Exp	$6-9$ frames 3-Exp	$5-7$ frames 2-Exp	$5-7$ frames 3-Exp	$50-200$ frames 2-Exp	$50-200$ frames 3-Exp
A	1280×720	1	2	3	4	5	4
Ours	4096×2168	2	3	4	6	5	4

Table 18. A two-column table for illustrating the network architecture.

Encoder					
layer	**k**	**s**	**chns**	**d-f**	**input**
conv1	3	1	3/16	1	Image
conv1b	3	1	16/16	1	conv1
conv2	3	2	16/16	2	conv1b
conv2b	3	1	16/16	2	conv2
conv3	3	2	16/32	4	conv2b
conv3b	3	1	32/32	4	conv3
conv4	3	2	32/64	8	conv3b
conv4b	3	1	64/64	8	conv4
conv5	3	2	64/128	16	conv4b
conv5b	3	1	128/128	16	conv5
conv6	3	2	128/256	32	conv5b
conv6b	3	1	256/256	32	conv6
conv7	3	2	256/256	64	conv6b
conv7b	3	1	256/256	64	conv7

Decoder					
layer	**k**	**s**	**chns**	**d-f**	**input**
conv_up7_m	3	1	256/256	32	conv7b
conv_up7_a	3	1	256/256	32	conv7b
conv_up7_f	3	1	256/256	32	conv7b
conv_up7=conv_up7_m+conv_up7_a+conv_up7_f					
conv_up6_m	3	1	256/128	16	conv_up7+conv6b
conv_up6_a	3	1	256/128	16	conv_up7+conv6b
conv_up6_f	3	1	256/128	16	conv_up7+conv6b
conv_up6=conv_up6_m+conv_up6_a+conv_up6_f					
conv_up5_m	3	1	128/64	8	conv_up6+conv5b
conv_up5_a	3	1	128/64	8	conv_up6+conv5b
conv_up5_f	3	1	128/64	8	conv_up6+conv5b
conv_up5=conv_up5_m+conv_up5_a+conv_up5_f					
m_4	3	1	128/2	8	conv_up5+conv4b
a_4	3	1	128/1	8	conv_up5+conv4b
f_4	3	1	128/2	8	conv_up5+conv4b
conv_up4_m	3	1	128/32	4	conv_up5+conv4b
conv_up4_a	3	1	128/32	4	conv_up5+conv4b
conv_up4_f	3	1	128/32	4	conv_up5+conv4b
conv_up4=conv_up4_m+conv_up4_a+conv_up4_f					
m_3	3	1	69/2	4	conv_up4+conv3b+(m_4$^{\times 2}$+a_4$^{\times 2}$+a_4$^{\times 2}$)
a_3	3	1	69/1	4	conv_up4+conv3b+(m_4$^{\times 2}$+a_4$^{\times 2}$+a_4$^{\times 2}$)
f_3	3	1	69/2	4	conv_up4+conv3b+(m_4$^{\times 2}$+a_4$^{\times 2}$+a_4$^{\times 2}$)
conv_up3_m	3	1	69/16	2	conv_up4+conv3b+(m_4$^{\times 2}$+a_4$^{\times 2}$+a_4$^{\times 2}$)
conv_up3_a	3	1	69/16	2	conv_up4+conv3b+(m_4$^{\times 2}$+a_4$^{\times 2}$+a_4$^{\times 2}$)
conv_up3_f	3	1	69/16	2	conv_up4+conv3b+(m_4$^{\times 2}$+a_4$^{\times 2}$+a_4$^{\times 2}$)
conv_up3=conv_up3_m+conv_up3_a+conv_up3_f					
m_2	3	1	37/2	2	conv_up3+conv2b+(m_3$^{\times 2}$+a_3$^{\times 2}$+a_3$^{\times 2}$)
a_2	3	1	37/1	2	conv_up3+conv2b+(m_3$^{\times 2}$+a_3$^{\times 2}$+a_3$^{\times 2}$)
f_2	3	1	37/2	2	conv_up3+conv2b+(m_3$^{\times 2}$+a_3$^{\times 2}$+a_3$^{\times 2}$)
conv_up2_m	3	1	37/16	1	conv_up3+conv2b+(m_3$^{\times 2}$+a_3$^{\times 2}$+a_3$^{\times 2}$)
conv_up2_a	3	1	37/16	1	conv_up3+conv2b+(m_3$^{\times 2}$+a_3$^{\times 2}$+a_3$^{\times 2}$)
conv_up2_f	3	1	37/16	1	conv_up3+conv2b+(m_3$^{\times 2}$+a_3$^{\times 2}$+a_3$^{\times 2}$)
conv_up2=conv_up2_m+conv_up2_a+conv_up2_f					
m_1	3	1	37/2	1	conv_up2+conv1b+(m_2$^{\times 2}$+a_2$^{\times 2}$+a_2$^{\times 2}$)
a_1	3	1	37/1	1	conv_up2+conv1b+(m_2$^{\times 2}$+a_2$^{\times 2}$+a_2$^{\times 2}$)
f_1	3	1	37/2	1	conv_up2+conv1b+(m_2$^{\times 2}$+a_2$^{\times 2}$+a_2$^{\times 2}$)

4. Examples for the Figures

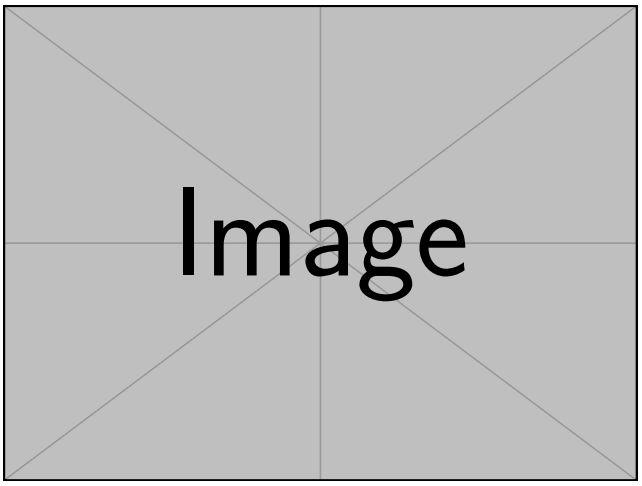


Figure 1. A simple figure.

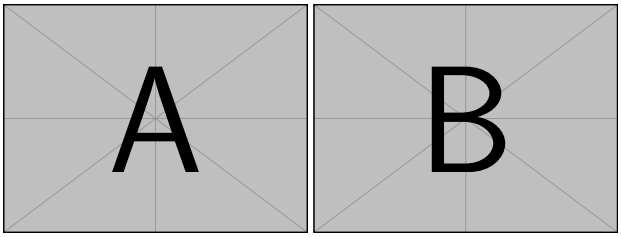


Figure 2. A figure with two images placed side by side.

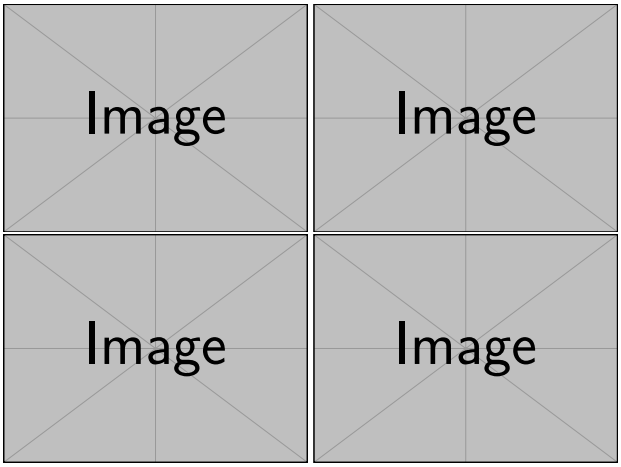


Figure 3. A figure with four images.

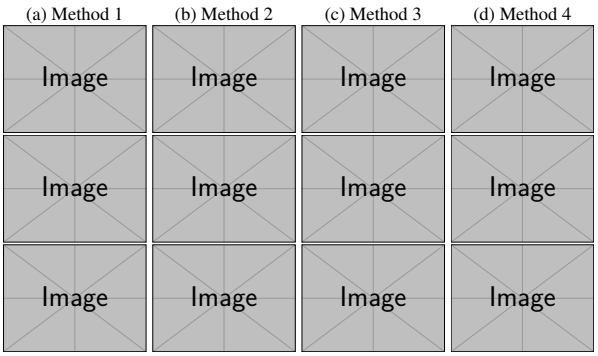


Figure 4. A figure with text header.

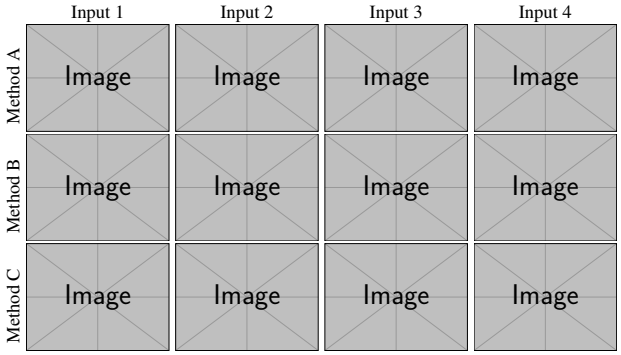


Figure 5. A figure with vertical text for illustration.

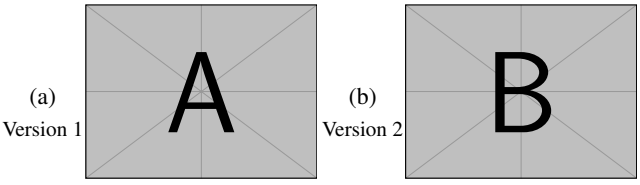
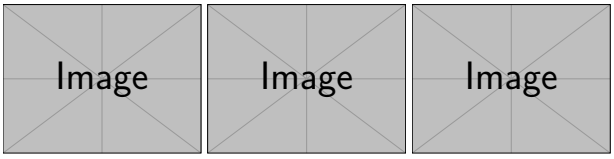
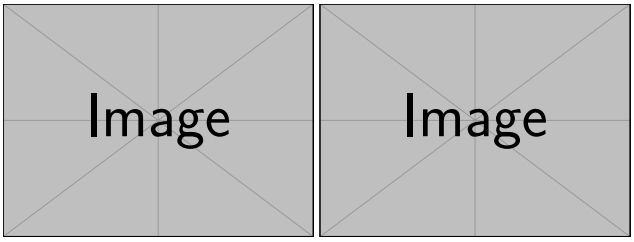


Figure 6. A figure with two sub-figures.



(a) Figure A



(b) Figure B (c) Figure C

Figure 7. A figure with three sub-figures.

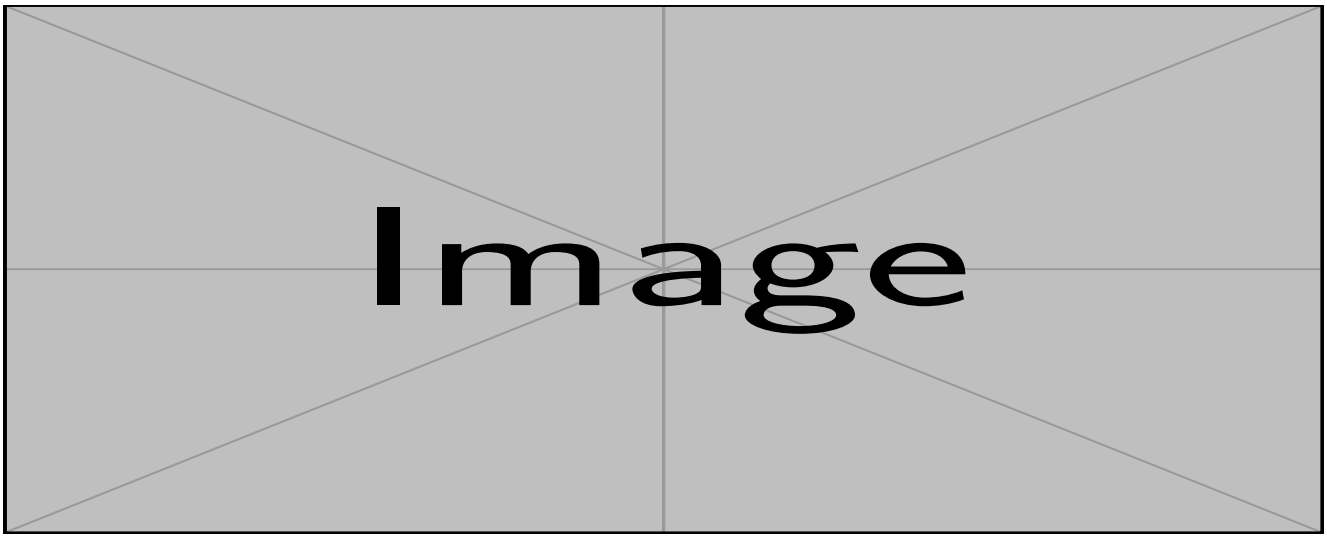


Figure 8. A simple two-column figure.

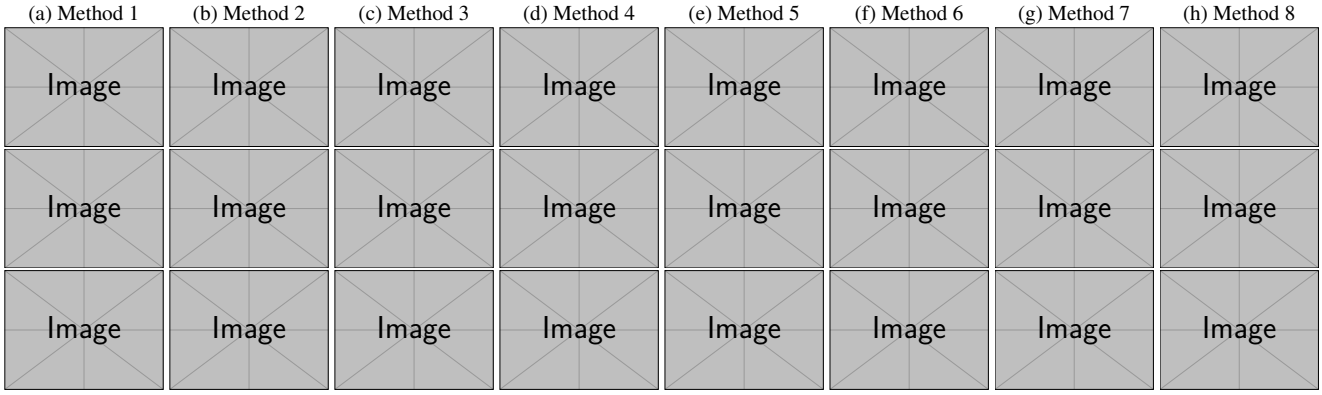


Figure 9. A two-column figure with multiple images and text header.

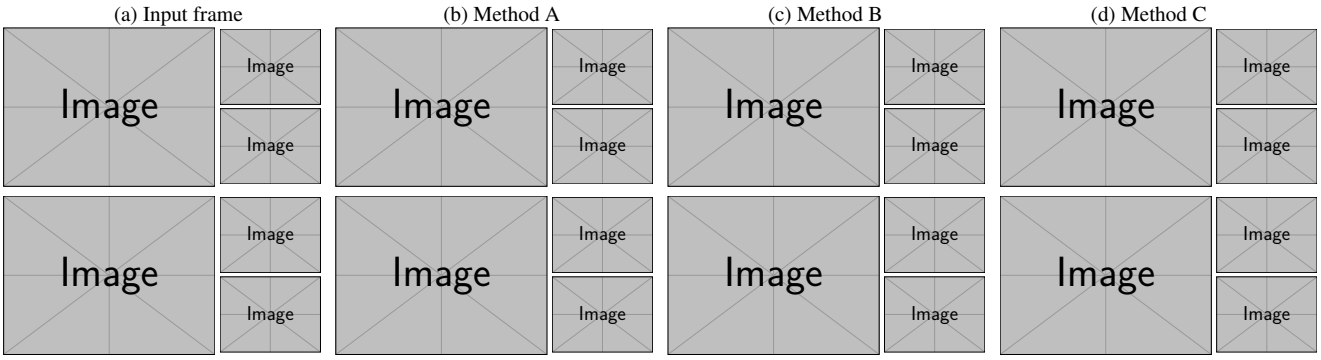
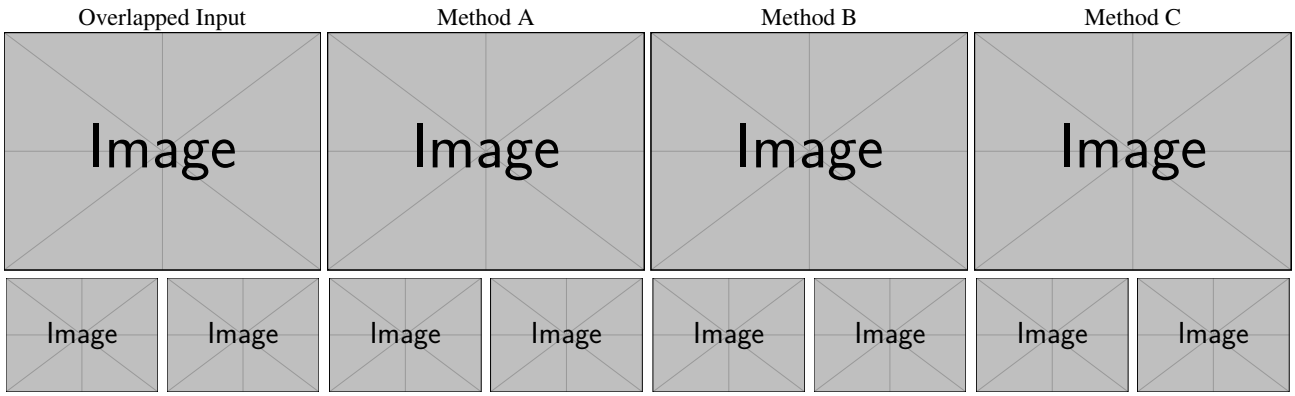
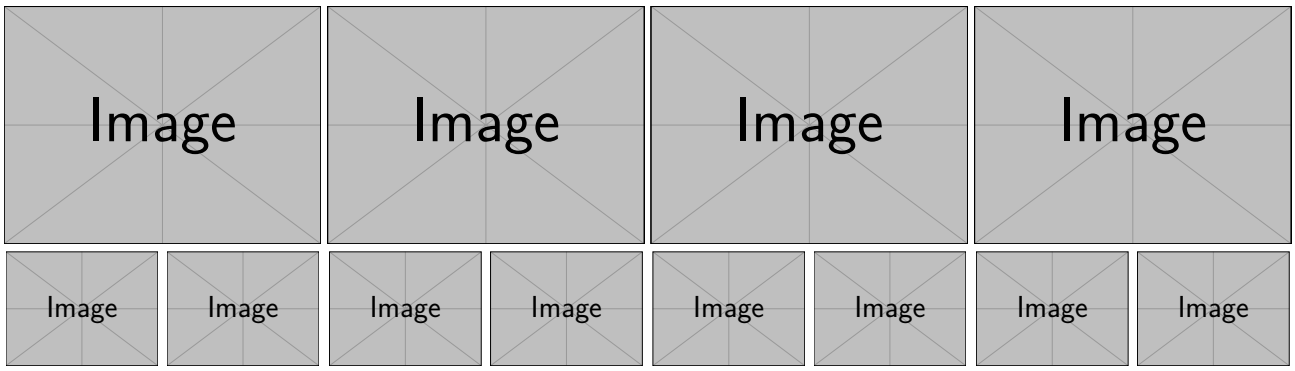


Figure 10. A figure with multiple images, each with two zoom-in patches (horizontal).



(a) Results on data A.



(a) Results on data B.

Figure 11. A figure with two sub-figures. The sub-figure contains multiple images, each with two zoom-in patches (vertical).

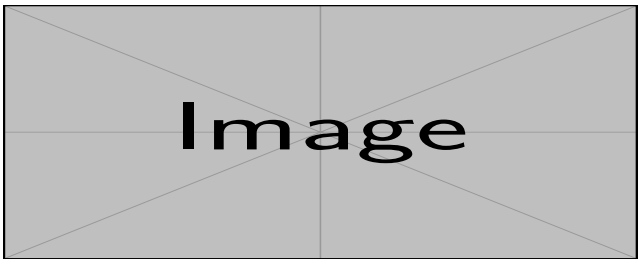


Figure 12. Two figures placed side by side. Figure A (left).

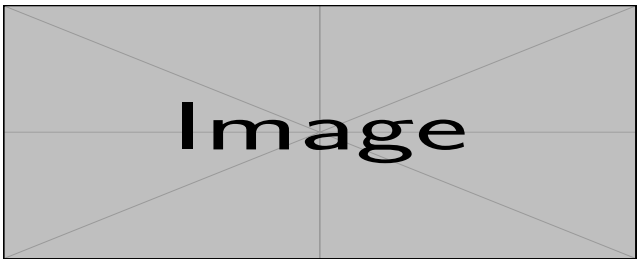
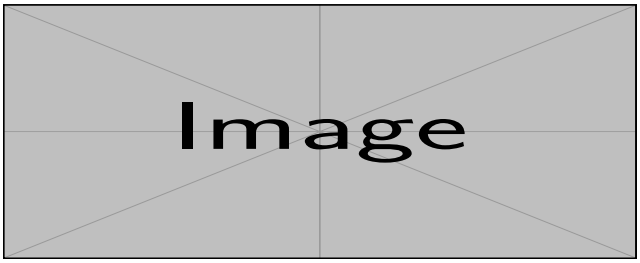


Figure 13. Two figures placed side by side. Figure B (right).

Figure 14. A figure with caption at the right. This is useful for single-column paper (*e.g.*, ECCV) to save space for narrow figures.



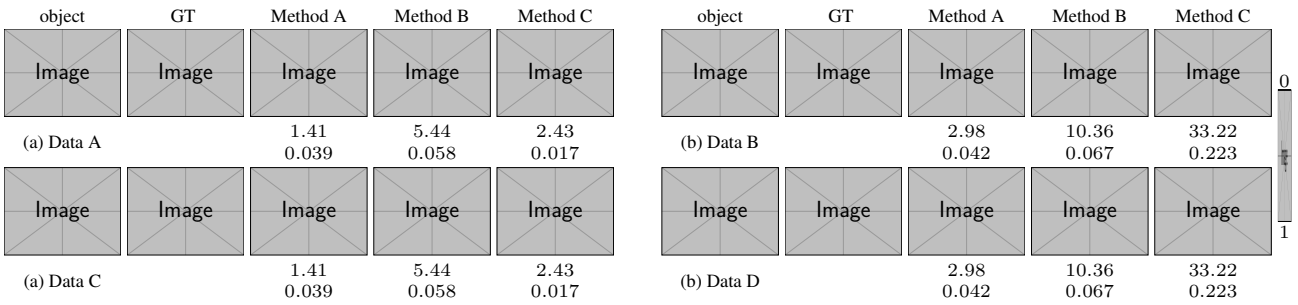


Figure 15. A figure with numerical results and color bar at the right.

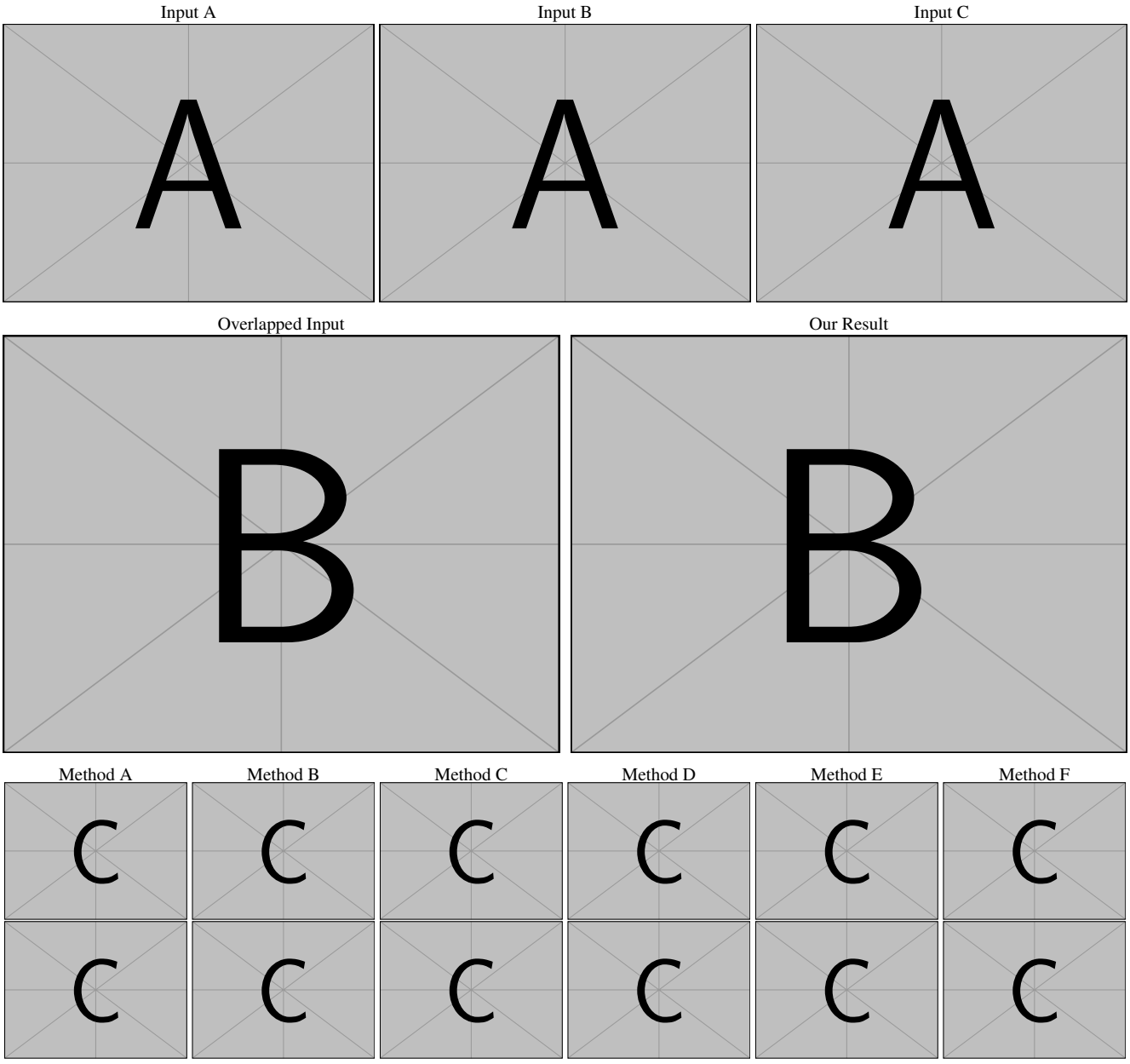


Figure 16. A figure with multi-level images.