

Supplemental material for ‘Efficient Salient Region Detection with Soft Image Abstraction’

Ming-Ming Cheng Jonathan Warrell Wen-Yan Lin Shuai Zheng Vibhav Vineet Nigel Crook
Vision Group, Oxford Brookes University

1. Saliency maps for the entire benchmark

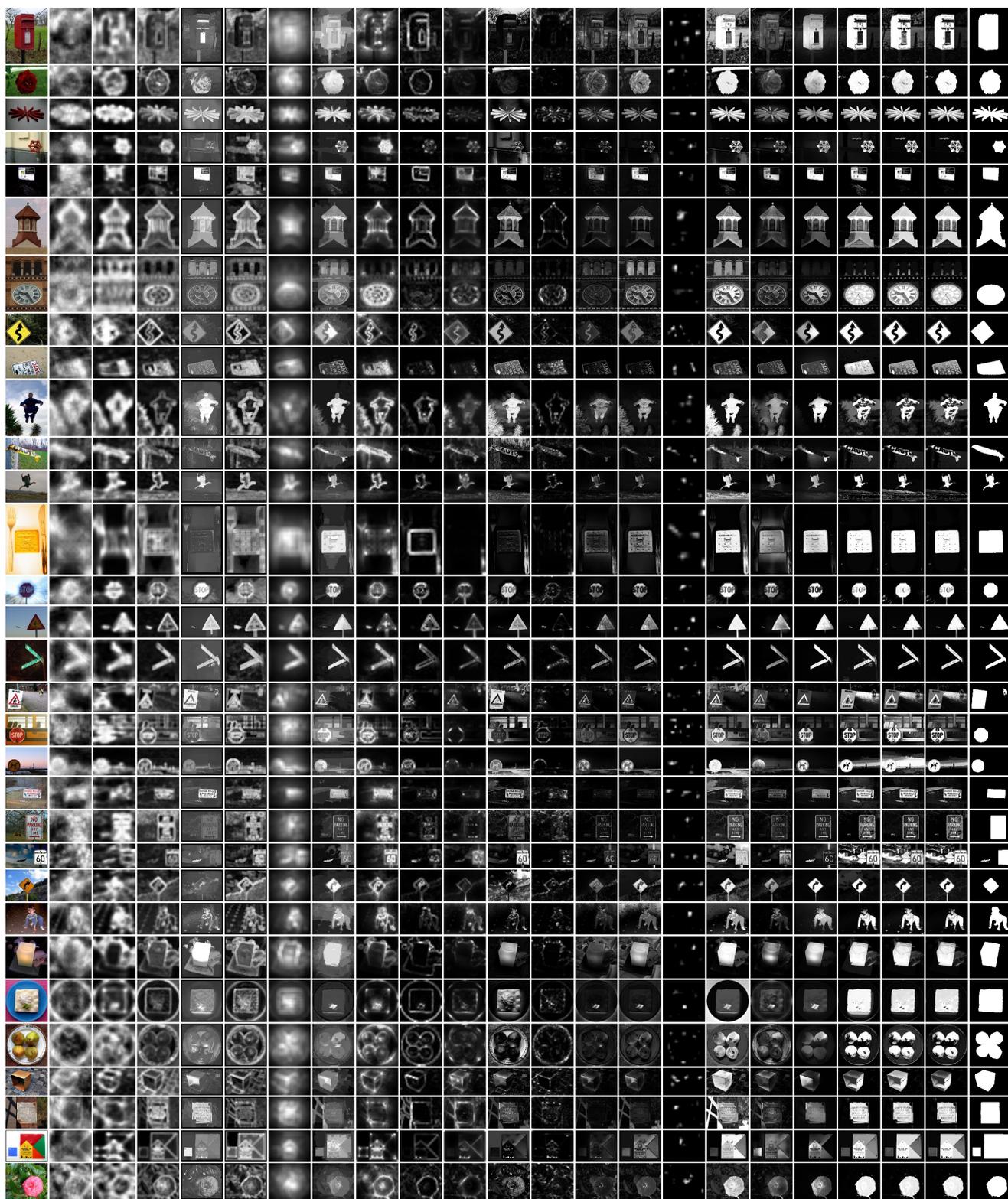
In Figures 1-34, we show saliency maps produced by our method (CSD, GU, and GC) as well as 18 alternative methods – IM[12], SeR[15], SUN[17], SEG[14], AIM[4], SWD[6], RC[5], CA[7], MZ[11], GB[8], LC[16], SR[9], AC[1], FT[2], IT[10], HC[5], MSS[3], and SF[13]. It is clear that our results are generally much closer to the ground-truth compared to results generated by other algorithms, showing the effectiveness of our global component abstraction.

2. Prototype software

We submitted our prototype software as a part of the supplementary materials. To use it, users just need to put jpg images in the ‘Imgs’ folder and then click the ‘run.bat’ in the ‘bin’ folder. The resulting saliency maps will be found in the ‘Sal’ folder. The software is developed in Microsoft Visual Studio 2010 and tested in Windows 7. Notice that writing results to disk C in windows 7 is typically restricted.

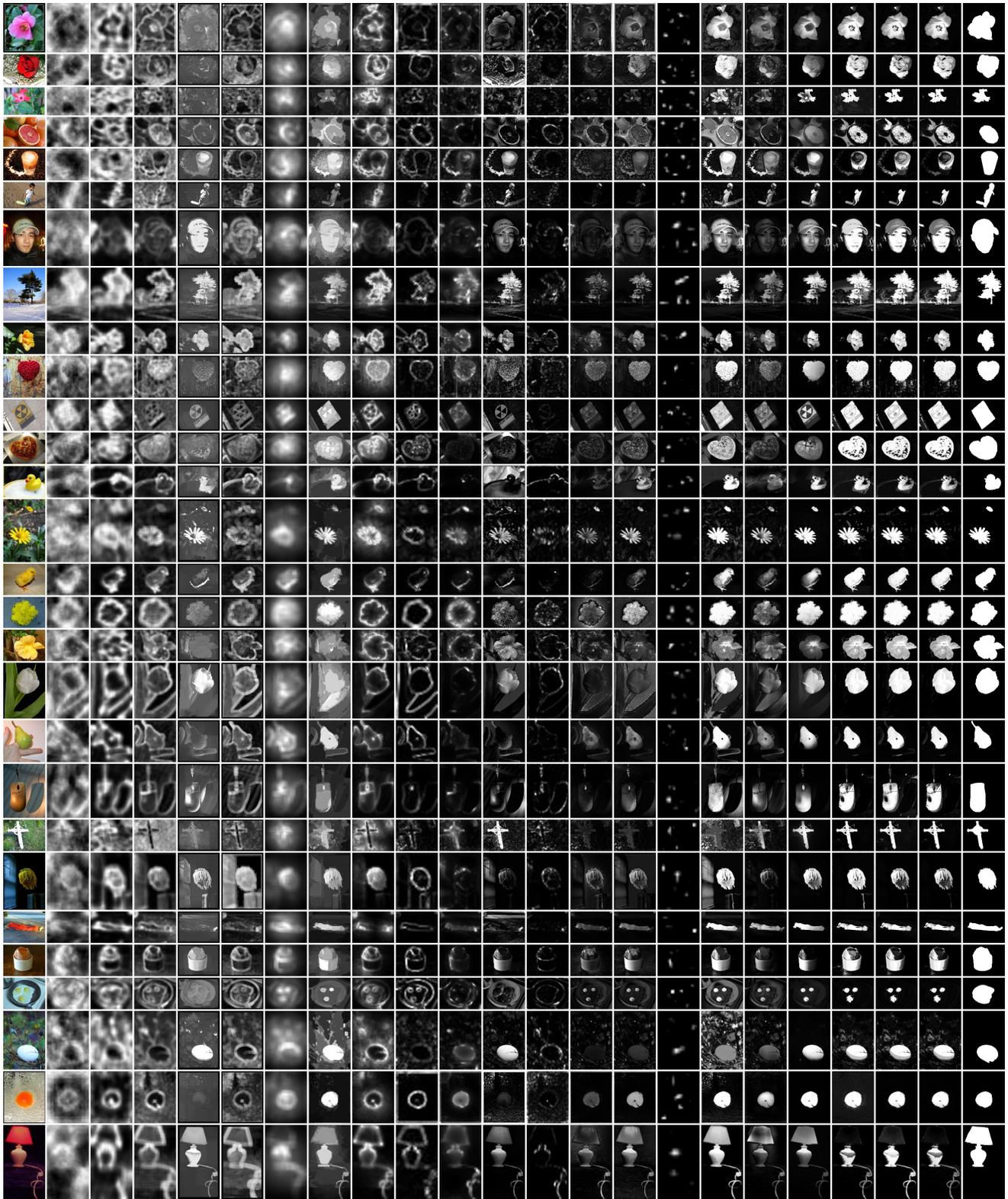
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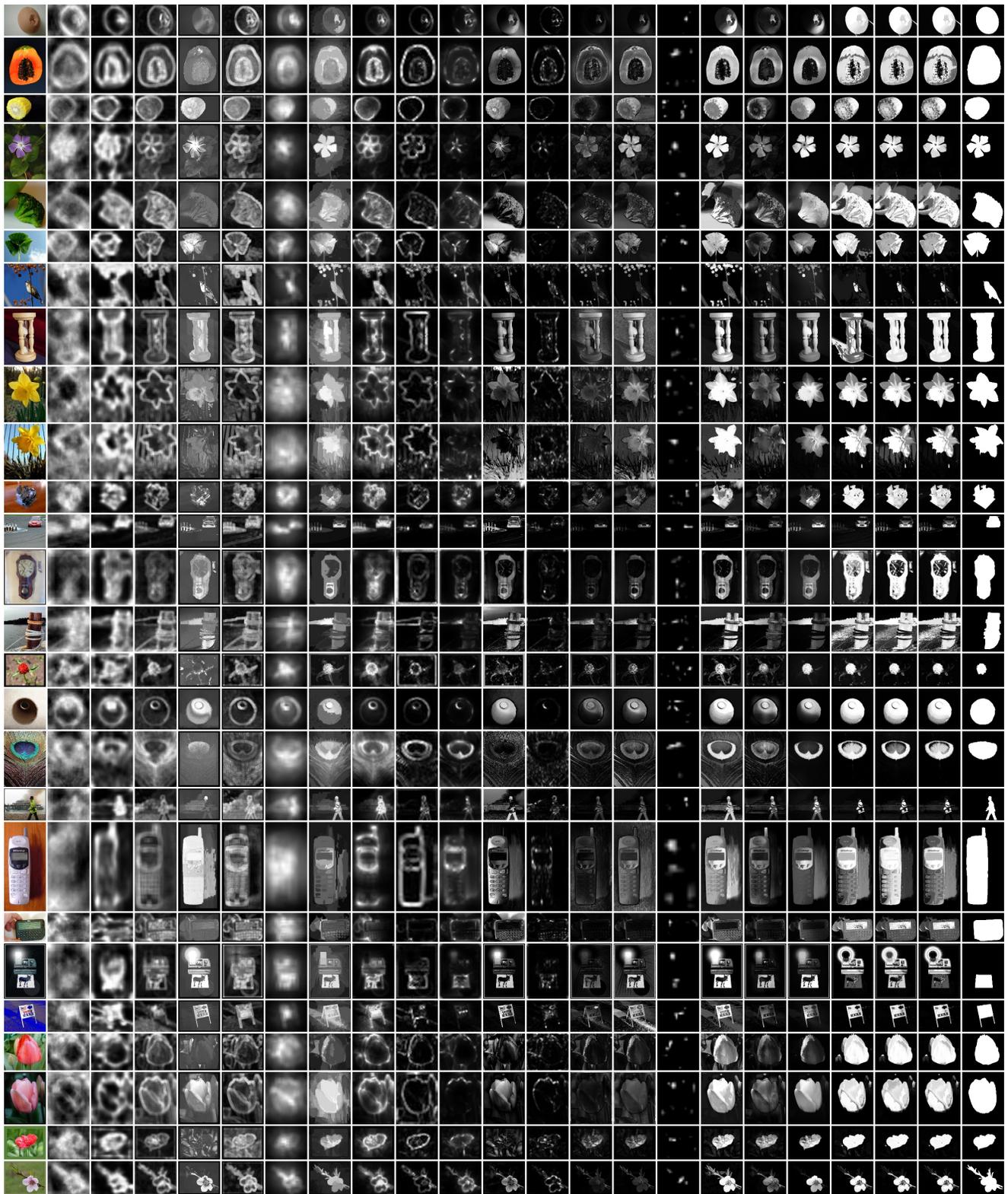
(a) (b) (c) (d) (e) (f) (g) (h) (i) (j) (k) (l) (m) (n) (o) (p) (q) (r) (s) (t) (u) (v) (w)

Figure 1. Comparison of saliency maps generated by our method (t) CSD, (u) GU, (v) GC, with various alternative methods: (b) IM[12], (c) SeR[15], (d) SUN[17], (e) SEG[14], (f) AIM[4], (g) SWD[6], (h) RC[5], (i) CA[7], (j) MZ[11], (k) GB[8], (l) LC[16], (m) SR[9], (n) AC[1], (o) FT[2], (p) IT[10], (q) HC[5], (r) MSS[3], (s) SF[13]. Source image and ground truth are shown in (a) and (w) for reference. Notice that our results (t), (u), (v) are generally better than others.



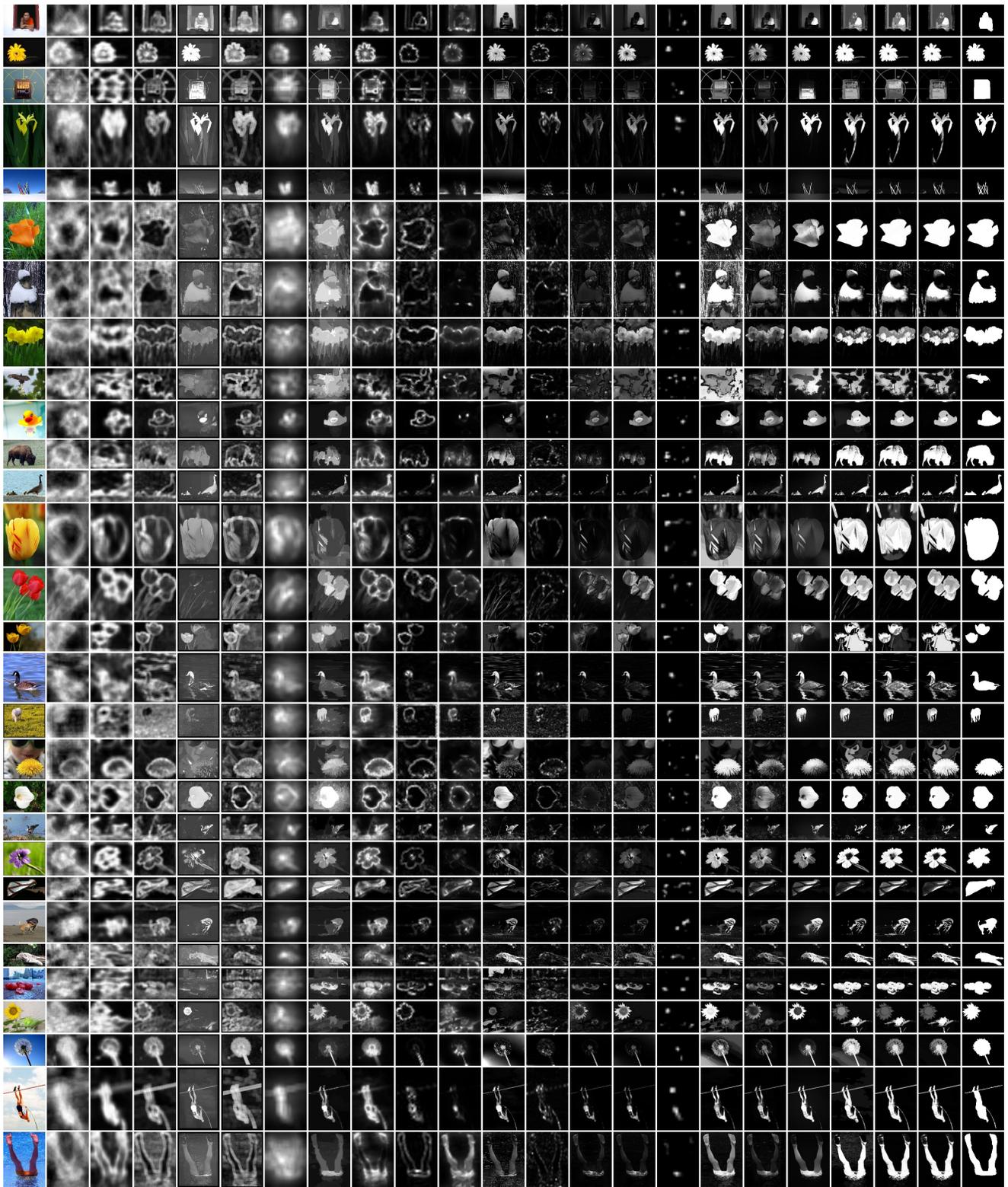
(a) (b) (c) (d) (e) (f) (g) (h) (i) (j) (k) (l) (m) (n) (o) (p) (q) (r) (s) (t) (u) (v) (w)

Figure 2. Comparison of saliency maps generated by our method (t) CSD, (u) GU, (v) GC, with various alternative methods: (b) IM[12], (c) SeR[15], (d) SUN[17], (e) SEG[14], (f) AIM[4], (g) SWD[6], (h) RC[5], (i) CA[7], (j) MZ[11], (k) GB[8], (l) LC[16], (m) SR[9], (n) AC[1], (o) FT[2], (p) IT[10], (q) HC[5], (r) MSS[3], (s) SF[13]. Source image and ground truth are shown in (a) and (w) for reference. Notice that **our results** (t), (u), (v) are generally better than others.



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Figure 3. Comparison of saliency maps generated by our method (t) CSD, (u) GU, (v) GC, with various alternative methods: (b) IM[12], (c) SeR[15], (d) SUN[17], (e) SEG[14], (f) AIM[4], (g) SWD[6], (h) RC[5], (i) CA[7], (j) MZ[11], (k) GB[8], (l) LC[16], (m) SR[9], (n) AC[1], (o) FT[2], (p) IT[10], (q) HC[5], (r) MSS[3], (s) SF[13]. Source image and ground truth are shown in (a) and (w) for reference. Notice that our results (t), (u), (v) are generally better than others.



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Figure 4. Comparison of saliency maps generated by our method (t) CSD, (u) GU, (v) GC, with various alternative methods: (b) IM[12], (c) SeR[15], (d) SUN[17], (e) SEG[14], (f) AIM[4], (g) SWD[6], (h) RC[5], (i) CA[7], (j) MZ[11], (k) GB[8], (l) LC[16], (m) SR[9], (n) AC[1], (o) FT[2], (p) IT[10], (q) HC[5], (r) MSS[3], (s) SF[13]. Source image and ground truth are shown in (a) and (w) for reference. Notice that **our results** (t), (u), (v) are generally better than others.

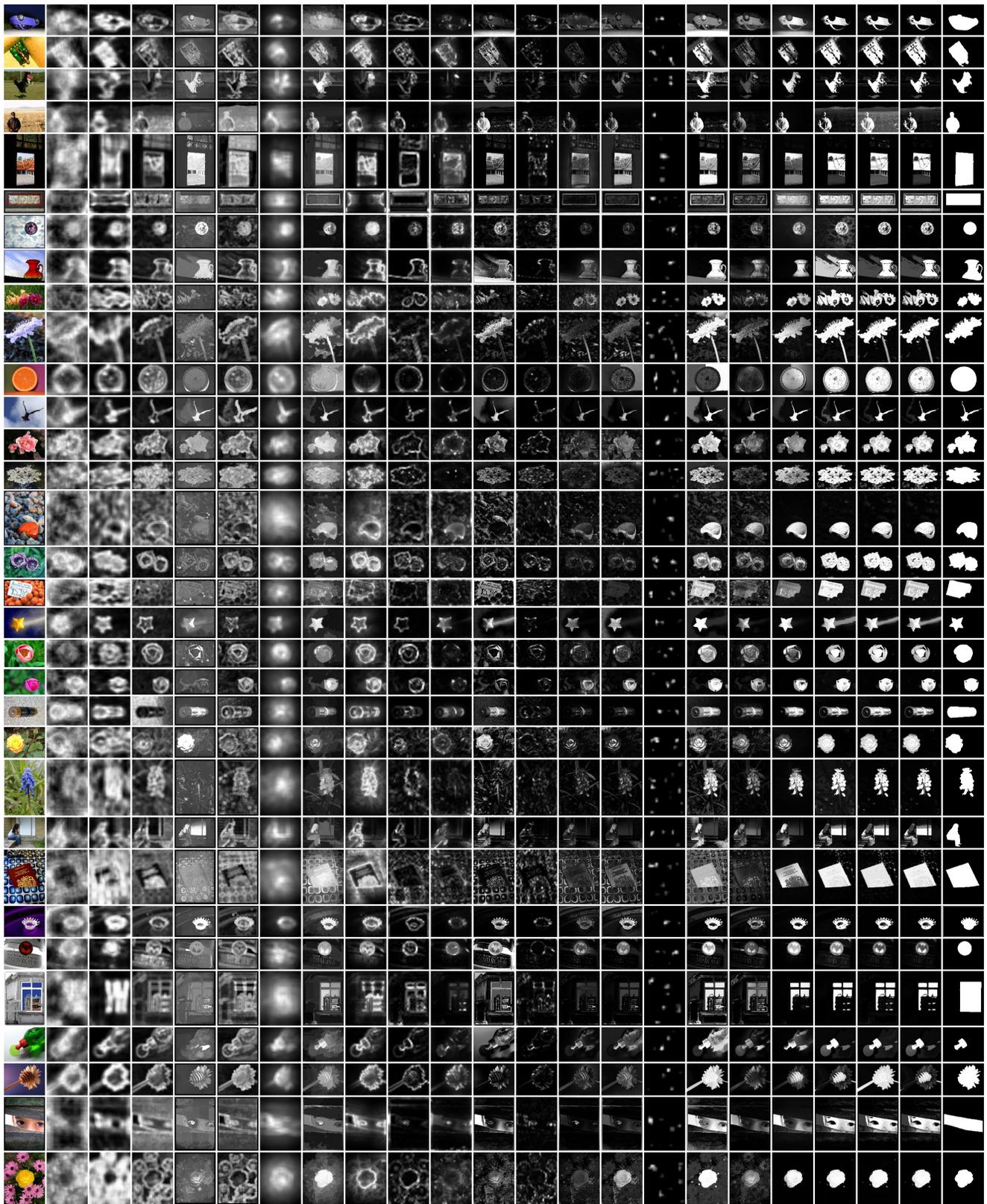


Figure 5. Comparison of saliency maps generated by our method (t) CSD, (u) GU, (v) GC, with various alternative methods: (b) IM[12], (c) SeR[15], (d) SUN[17], (e) SEG[14], (f) AIM[4], (g) SWD[6], (h) RC[5], (i) CA[7], (j) MZ[11], (k) GB[8], (l) LC[16], (m) SR[9], (n) AC[1], (o) FT[2], (p) IT[10], (q) HC[5], (r) MSS[3], (s) SF[13]. Source image and ground truth are shown in (a) and (w) for reference. Notice that our results (t), (u), (v) are generally better than others.

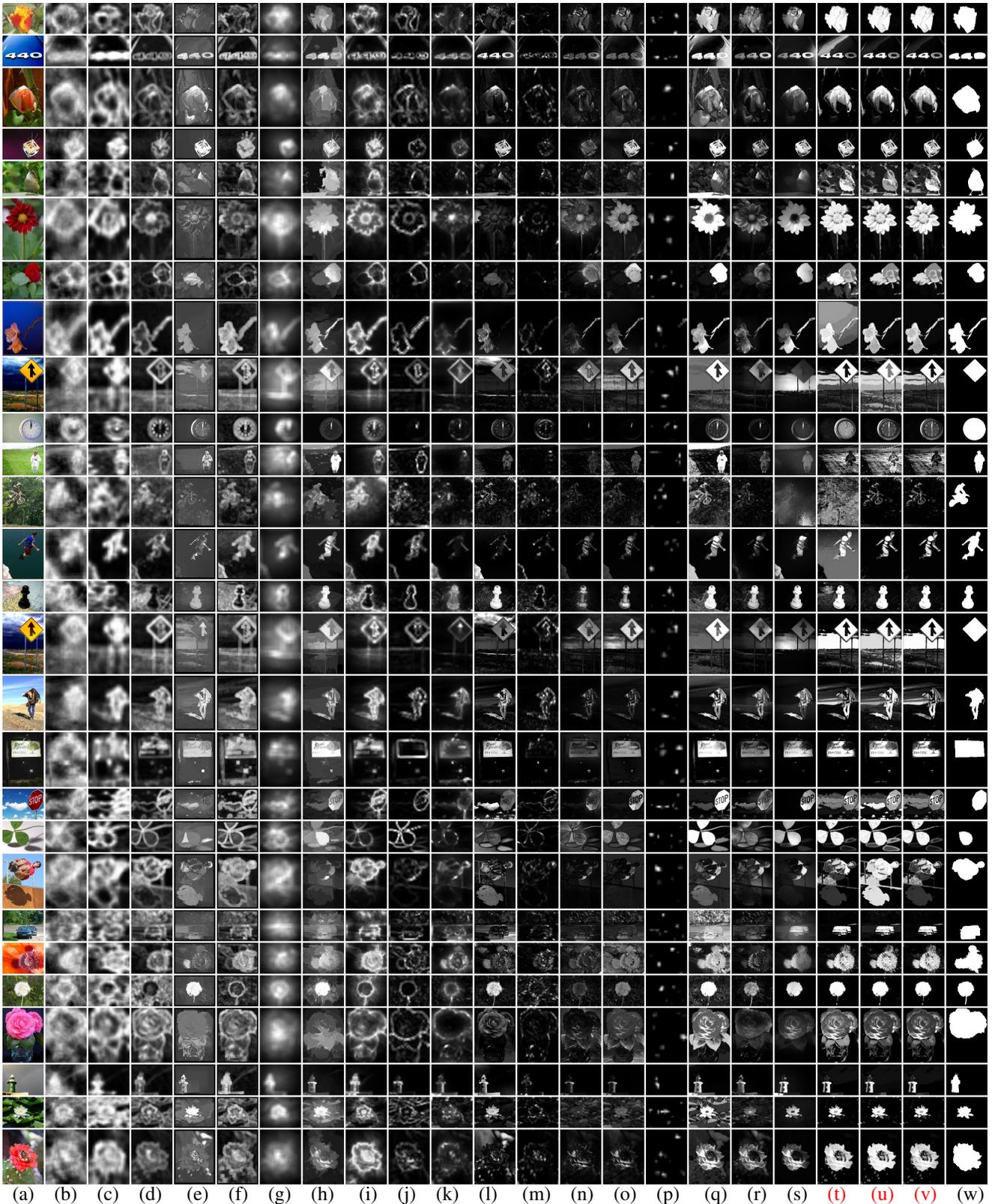


Figure 6. Comparison of saliency maps generated by our method (t) CSD, (u) GU, (v) GC, with various alternative methods: (b) IM[12], (c) SeR[15], (d) SUN[17], (e) SEG[14], (f) AIM[4], (g) SWD[6], (h) RC[5], (i) CA[7], (j) MZ[11], (k) GB[8], (l) LC[16], (m) SR[9], (n) AC[1], (o) FT[2], (p) IT[10], (q) HC[5], (r) MSS[3], (s) SF[13]. Source image and ground truth are shown in (a) and (w) for reference. Notice that our results (t), (u), (v) are generally better than others.

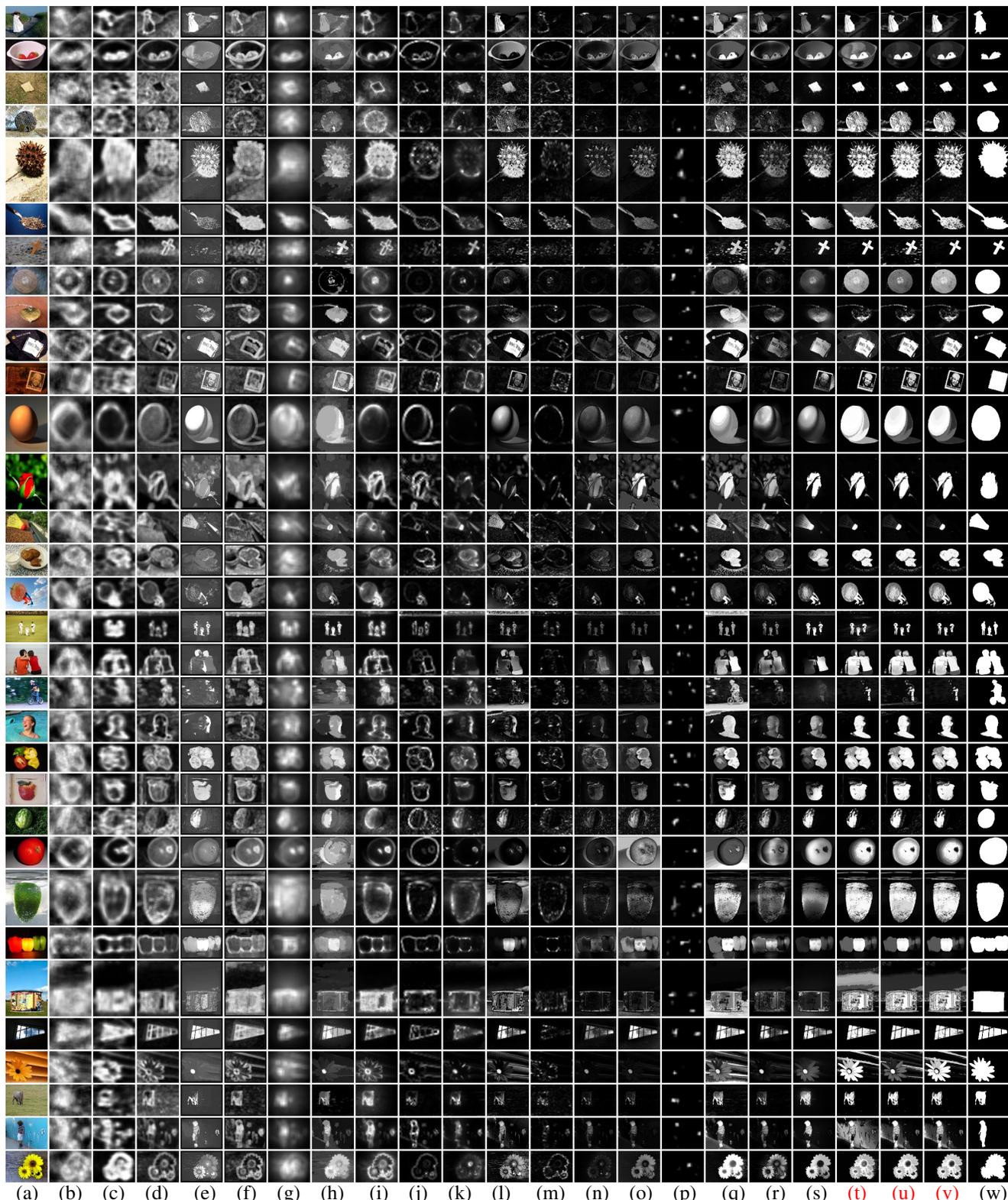


Figure 7. Comparison of saliency maps generated by our method (t) CSD, (u) GU, (v) GC, with various alternative methods: (b) IM[12], (c) SeR[15], (d) SUN[17], (e) SEG[14], (f) AIM[4], (g) SWD[6], (h) RC[5], (i) CA[7], (j) MZ[11], (k) GB[8], (l) LC[16], (m) SR[9], (n) AC[1], (o) FT[2], (p) IT[10], (q) HC[5], (r) MSS[3], (s) SF[13]. Source image and ground truth are shown in (a) and (w) for reference. Notice that our results (t), (u), (v) are generally better than others.

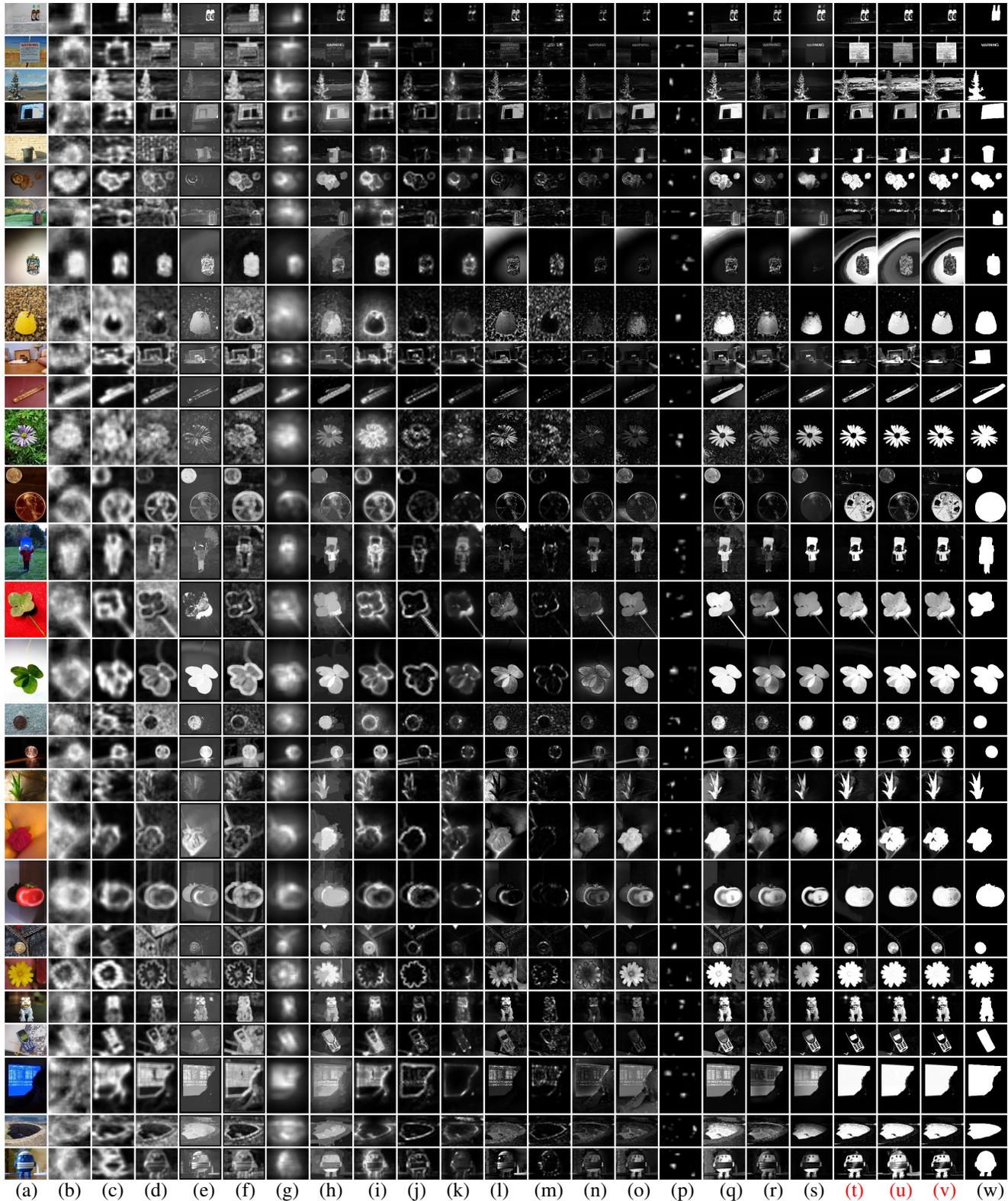
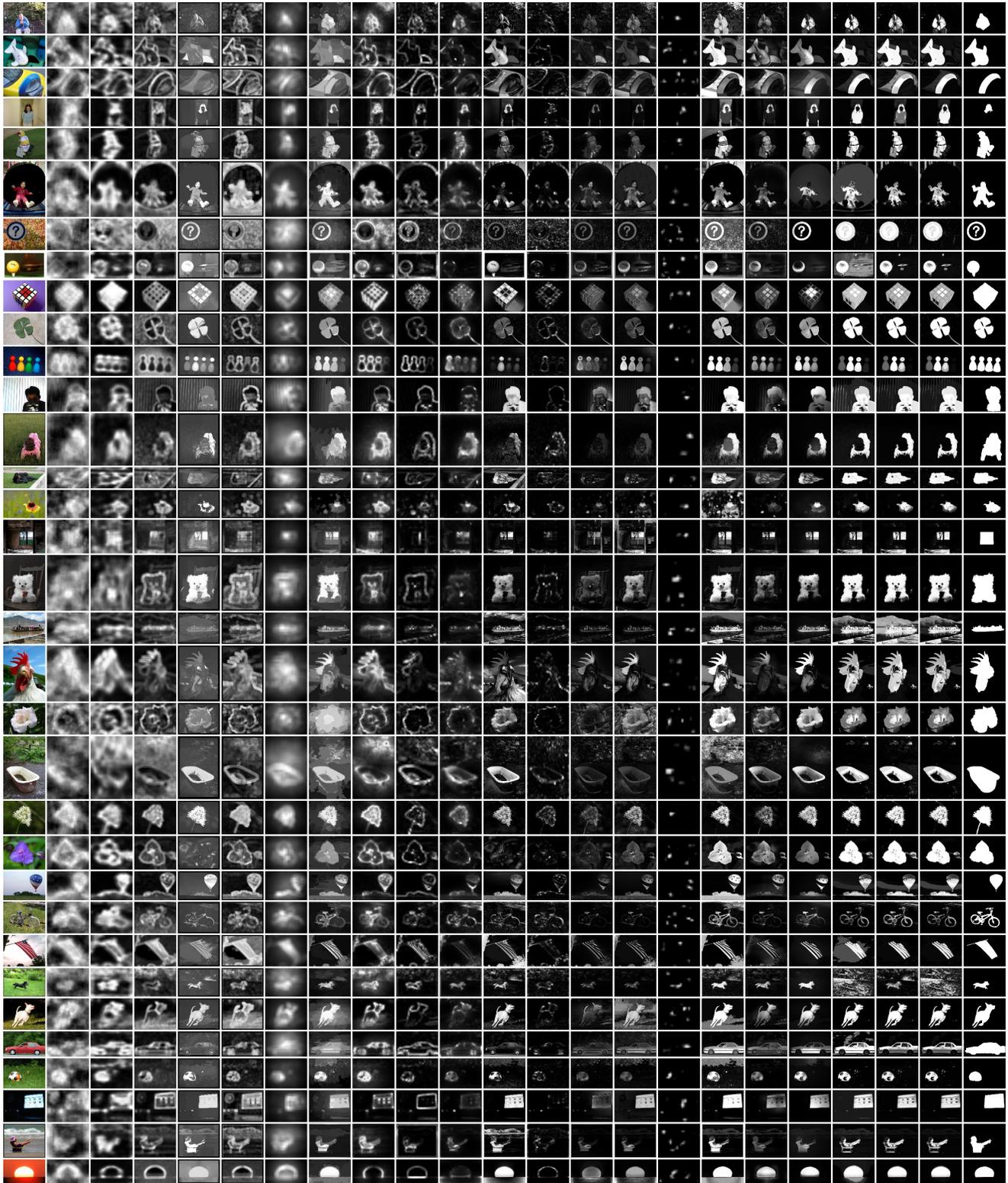


Figure 8. Comparison of saliency maps generated by our method **(t) CSD**, **(u) GU**, **(v) GC**, with various alternative methods: **(b) IM**[12], **(c) SeR**[15], **(d) SUN**[17], **(e) SEG**[14], **(f) AIM**[4], **(g) SWD**[6], **(h) RC**[5], **(i) CA**[7], **(j) MZ**[11], **(k) GB**[8], **(l) LC**[16], **(m) SR**[9], **(n) AC**[1], **(o) FT**[2], **(p) IT**[10], **(q) HC**[5], **(r) MSS**[3], **(s) SF**[13]. Source image and ground truth are shown in (a) and (w) for reference. Notice that **our results (t), (u), (v)** are generally better than others.



(a) (b) (c) (d) (e) (f) (g) (h) (i) (j) (k) (l) (m) (n) (o) (p) (q) (r) (s) (t) (u) (v) (w)

Figure 9. Comparison of saliency maps generated by our method (t) CSD, (u) GU, (v) GC, with various alternative methods: (b) IM[12], (c) SeR[15], (d) SUN[17], (e) SEG[14], (f) AIM[4], (g) SWD[6], (h) RC[5], (i) CA[7], (j) MZ[11], (k) GB[8], (l) LC[16], (m) SR[9], (n) AC[1], (o) FT[2], (p) IT[10], (q) HC[5], (r) MSS[3], (s) SF[13]. Source image and ground truth are shown in (a) and (w) for reference. Notice that our results (t), (u), (v) are generally better than others.

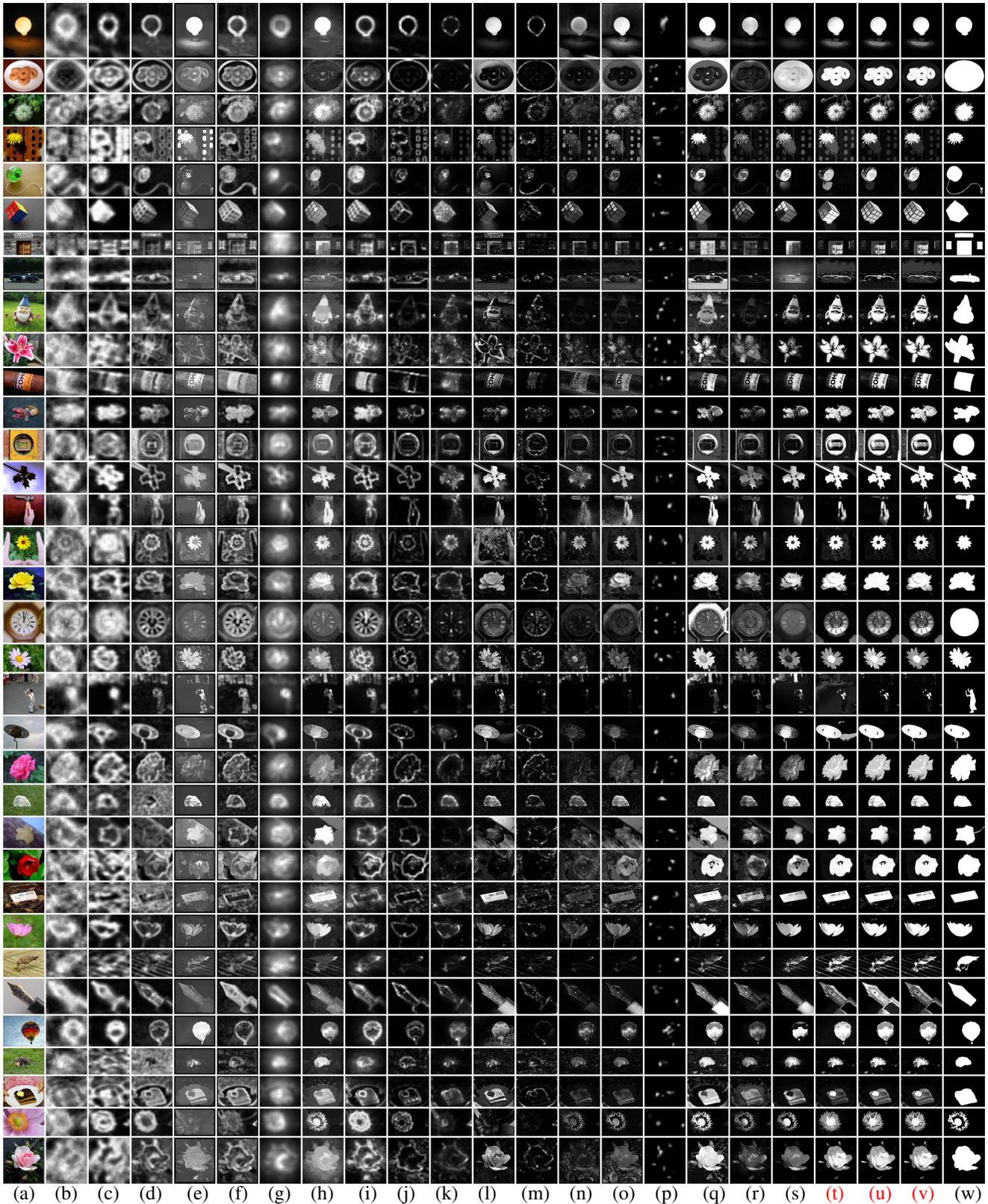


Figure 10. Comparison of saliency maps generated by our method (t) CSD, (u) GU, (v) GC, with various alternative methods: (b) IM[12], (c) SeR[15], (d) SUN[17], (e) SEG[14], (f) AIM[4], (g) SWD[6], (h) RC[5], (i) CA[7], (j) MZ[11], (k) GB[8], (l) LC[16], (m) SR[9], (n) AC[1], (o) FT[2], (p) IT[10], (q) HC[5], (r) MSS[3], (s) SF[13]. Source image and ground truth are shown in (a) and (w) for reference. Notice that our results (t), (u), (v) are generally better than others.

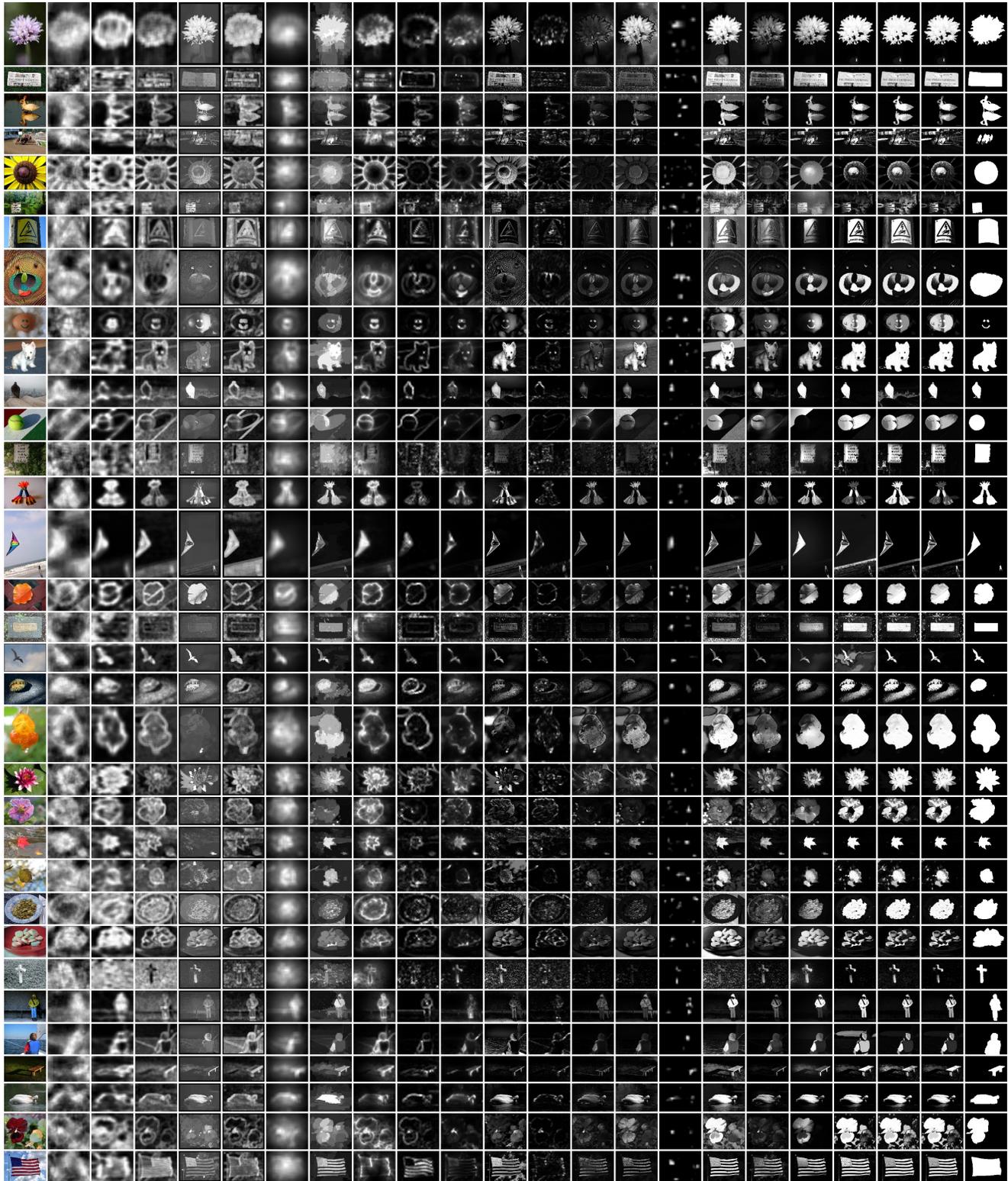
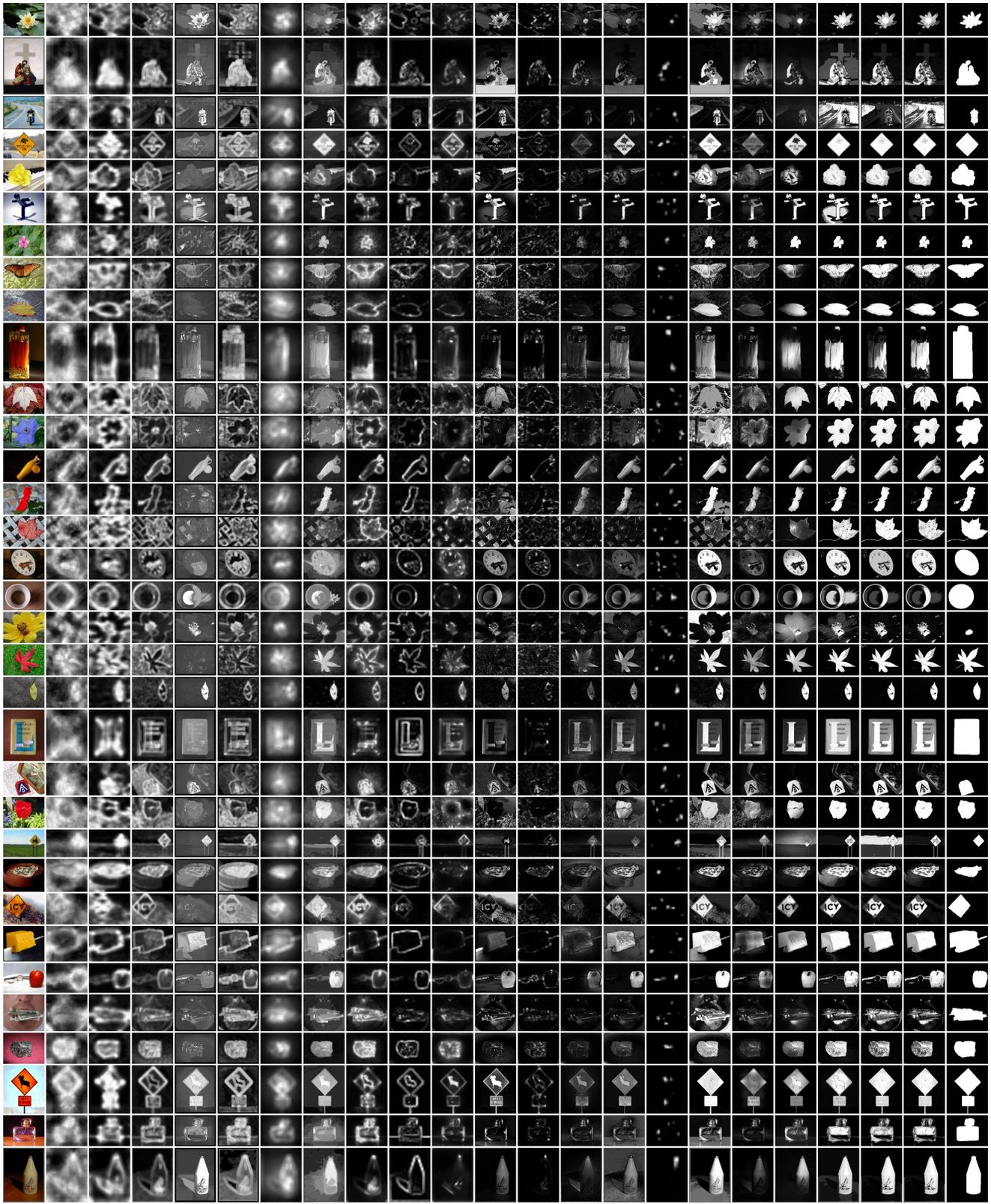


Figure 11. Comparison of saliency maps generated by our method (t) CSD, (u) GU, (v) GC, with various alternative methods: (b) IM[12], (c) SeR[15], (d) SUN[17], (e) SEG[14], (f) AIM[4], (g) SWD[6], (h) RC[5], (i) CA[7], (j) MZ[11], (k) GB[8], (l) LC[16], (m) SR[9], (n) AC[1], (o) FT[2], (p) IT[10], (q) HC[5], (r) MSS[3], (s) SF[13]. Source image and ground truth are shown in (a) and (w) for reference. Notice that **our results** (t), (u), (v) are generally better than others.



(a) (b) (c) (d) (e) (f) (g) (h) (i) (j) (k) (l) (m) (n) (o) (p) (q) (r) (s) (t) (u) (v) (w)

Figure 12. Comparison of saliency maps generated by our method (t) CSD, (u) GU, (v) GC, with various alternative methods: (b) IM[12], (c) SeR[15], (d) SUN[17], (e) SEG[14], (f) AIM[4], (g) SWD[6], (h) RC[5], (i) CA[7], (j) MZ[11], (k) GB[8], (l) LC[16], (m) SR[9], (n) AC[1], (o) FT[2], (p) IT[10], (q) HC[5], (r) MSS[3], (s) SF[13]. Source image and ground truth are shown in (a) and (w) for reference. Notice that our results (t), (u), (v) are generally better than others.

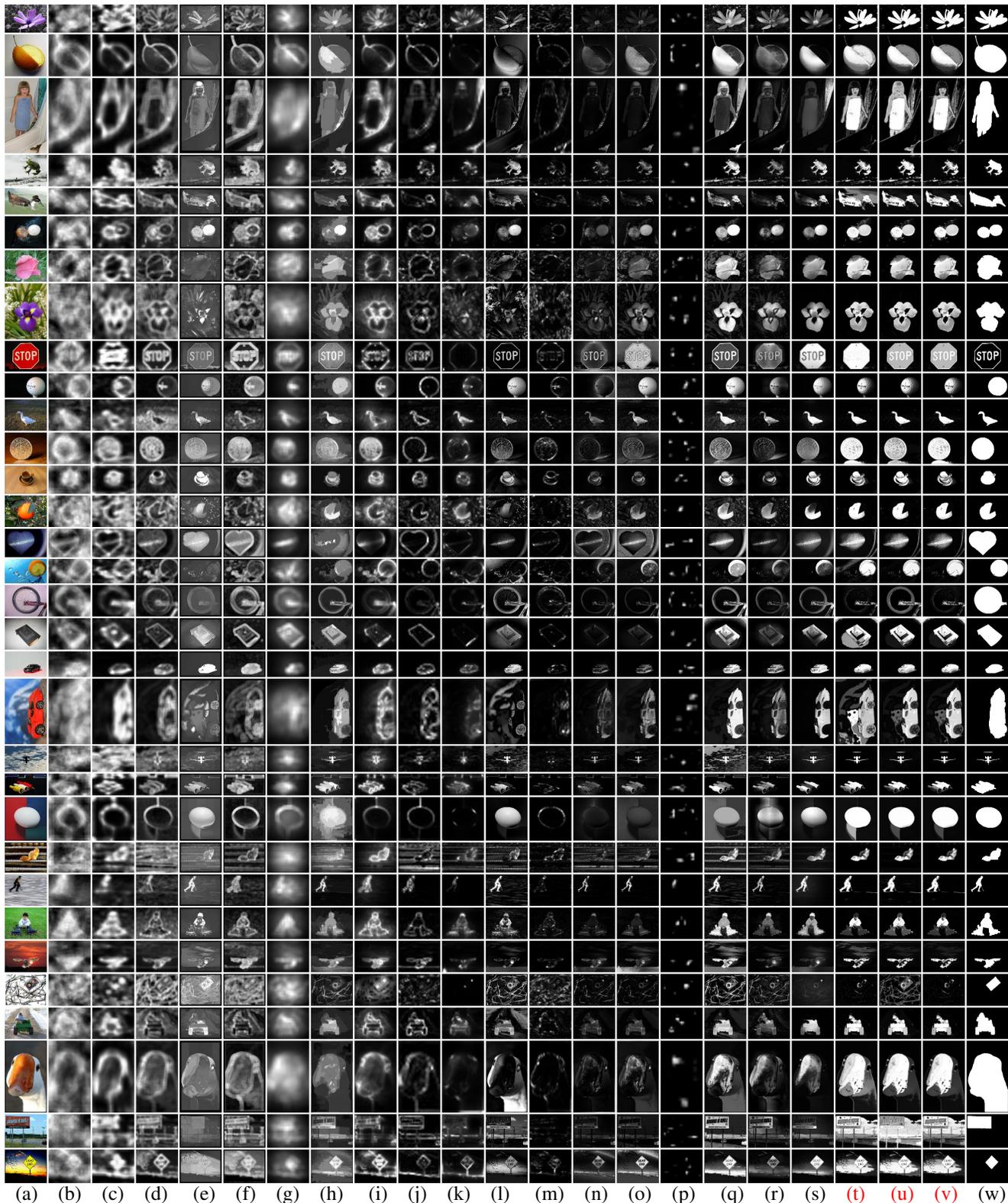


Figure 13. Comparison of saliency maps generated by our method (t) CSD, (u) GU, (v) GC, with various alternative methods: (b) IM[12], (c) SeR[15], (d) SUN[17], (e) SEG[14], (f) AIM[4], (g) SWD[6], (h) RC[5], (i) CA[7], (j) MZ[11], (k) GB[8], (l) LC[16], (m) SR[9], (n) AC[1], (o) FT[2], (p) IT[10], (q) HC[5], (r) MSS[3], (s) SF[13]. Source image and ground truth are shown in (a) and (w) for reference. Notice that our results (t), (u), (v) are generally better than others.

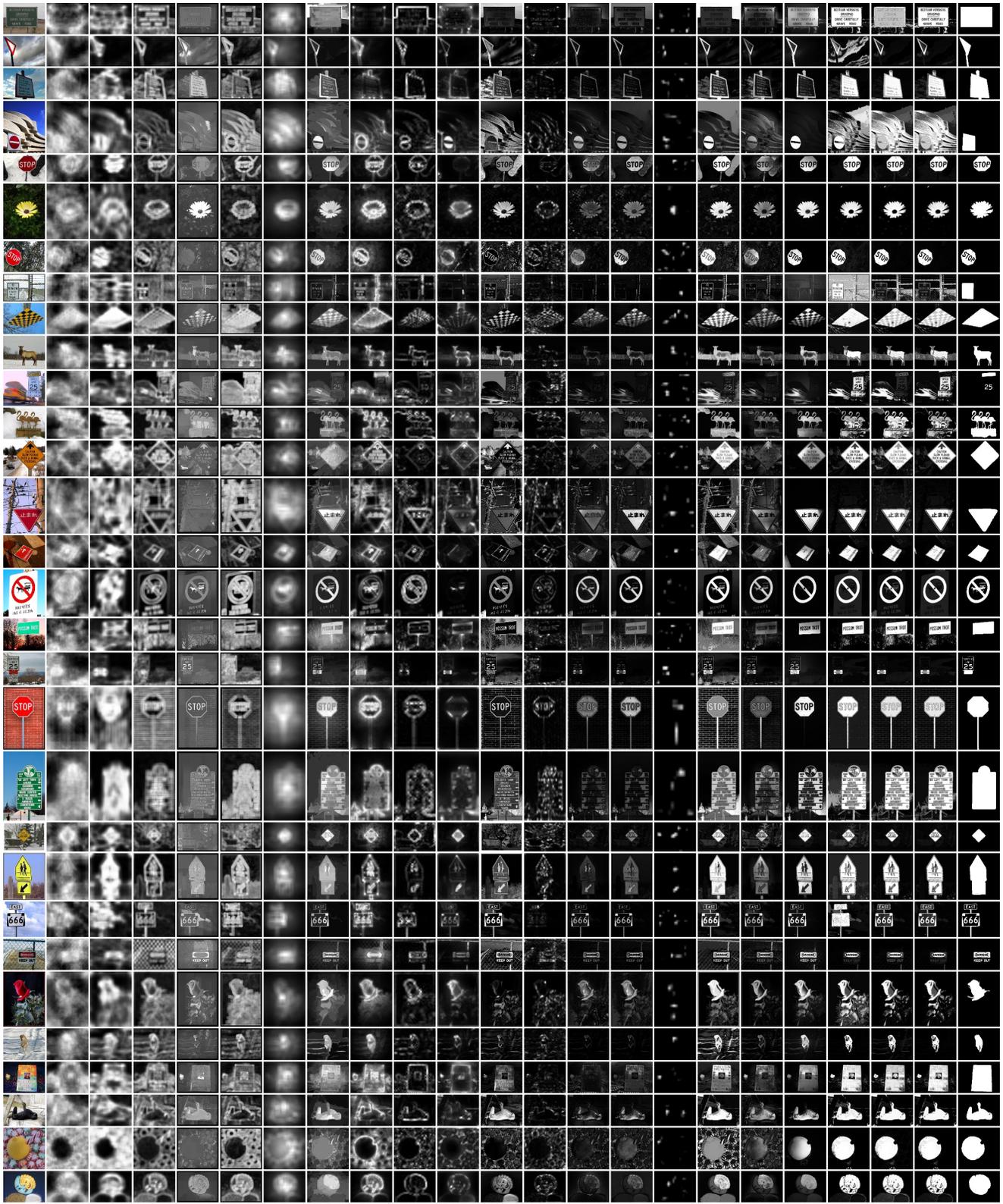
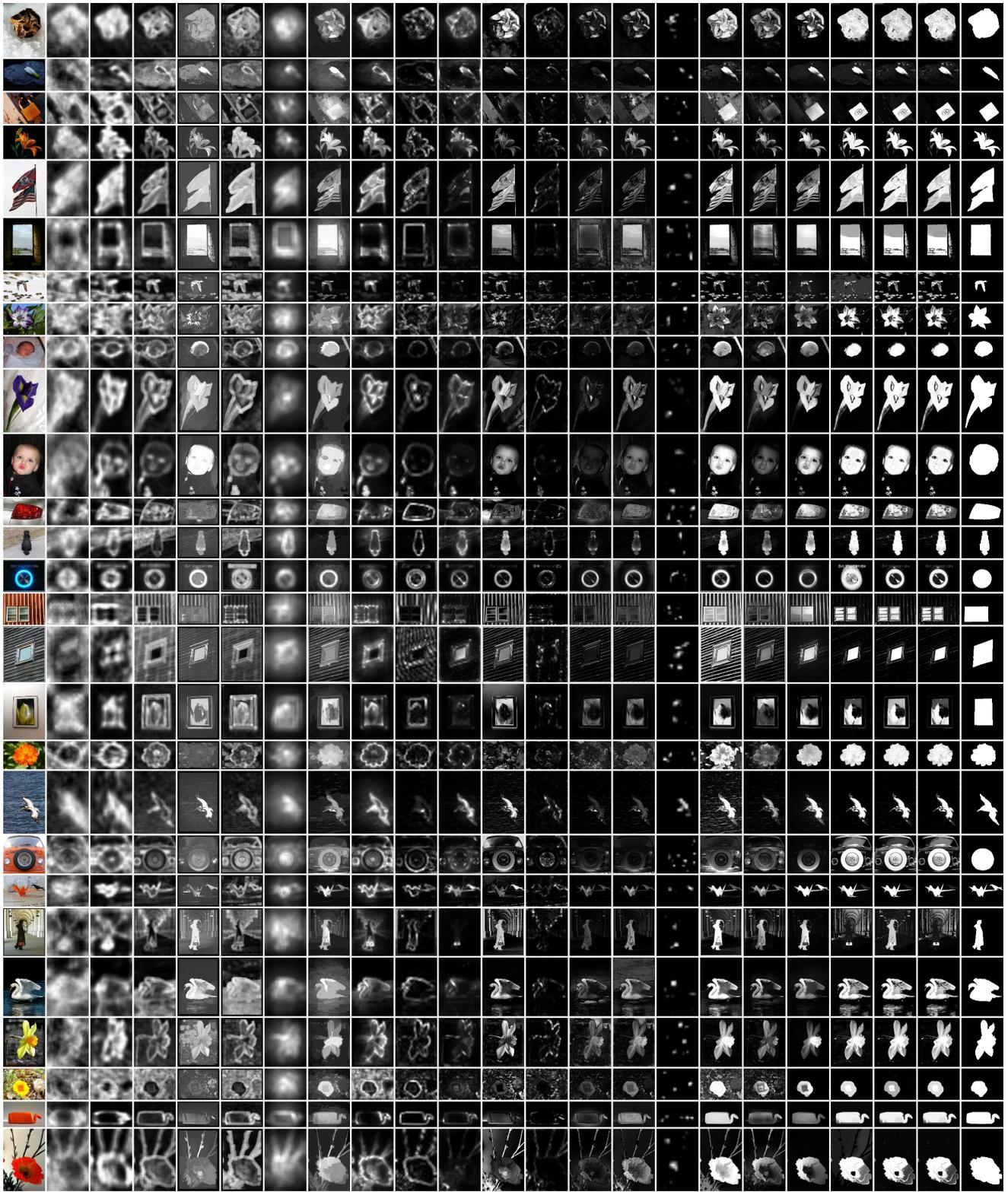


Figure 14. Comparison of saliency maps generated by our method (t) CSD, (u) GU, (v) GC, with various alternative methods: (b) IM[12], (c) SeR[15], (d) SUN[17], (e) SEG[14], (f) AIM[4], (g) SWD[6], (h) RC[5], (i) CA[7], (j) MZ[11], (k) GB[8], (l) LC[16], (m) SR[9], (n) AC[1], (o) FT[2], (p) IT[10], (q) HC[5], (r) MSS[3], (s) SF[13]. Source image and ground truth are shown in (a) and (w) for reference. Notice that our results (t), (u), (v) are generally better than others.



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Figure 16. Comparison of saliency maps generated by our method (t) CSD, (u) GU, (v) GC, with various alternative methods: (b) IM[12], (c) SeR[15], (d) SUN[17], (e) SEG[14], (f) AIM[4], (g) SWD[6], (h) RC[5], (i) CA[7], (j) MZ[11], (k) GB[8], (l) LC[16], (m) SR[9], (n) AC[1], (o) FT[2], (p) IT[10], (q) HC[5], (r) MSS[3], (s) SF[13]. Source image and ground truth are shown in (a) and (w) for reference. Notice that our results (t), (u), (v) are generally better than others.

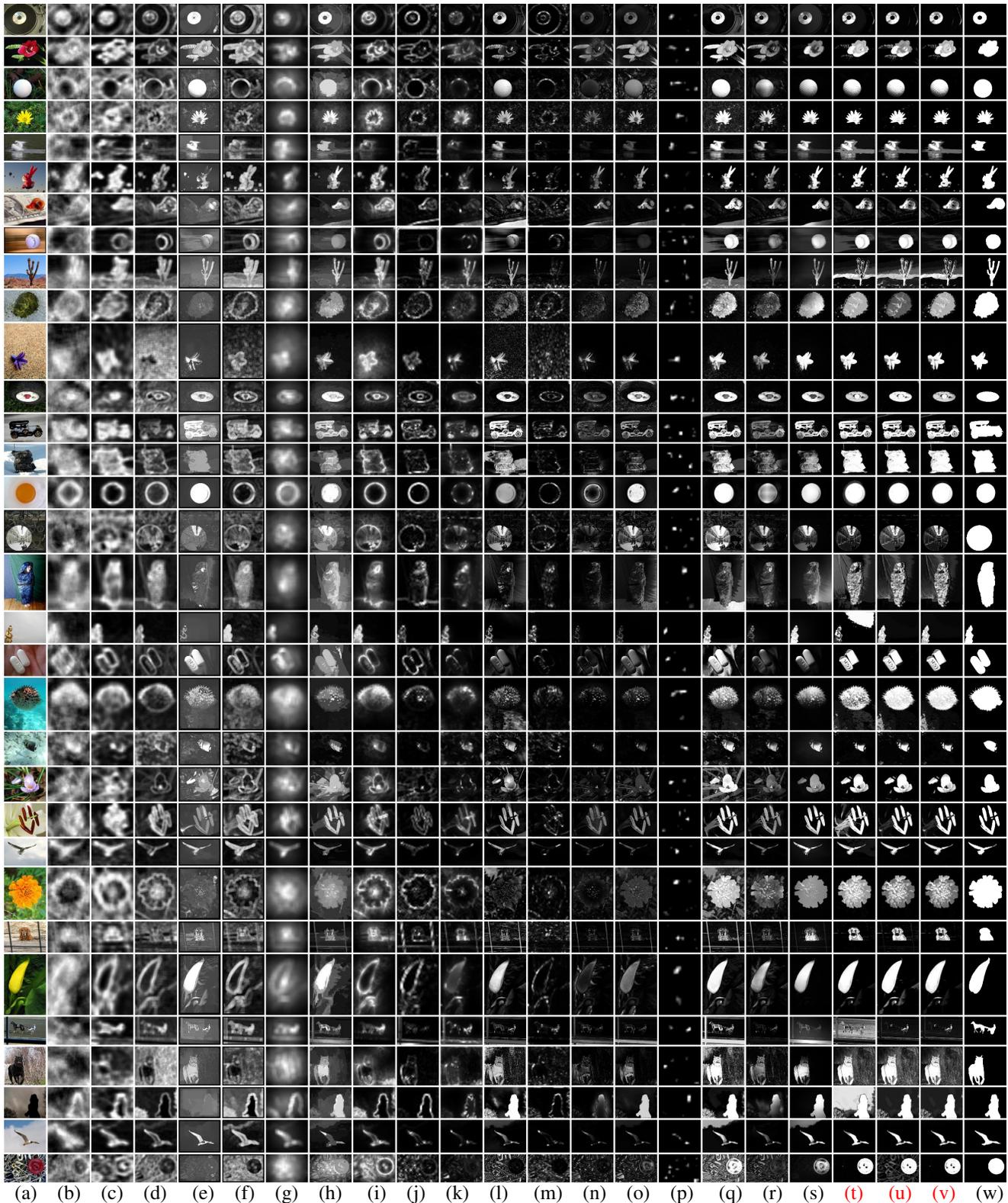
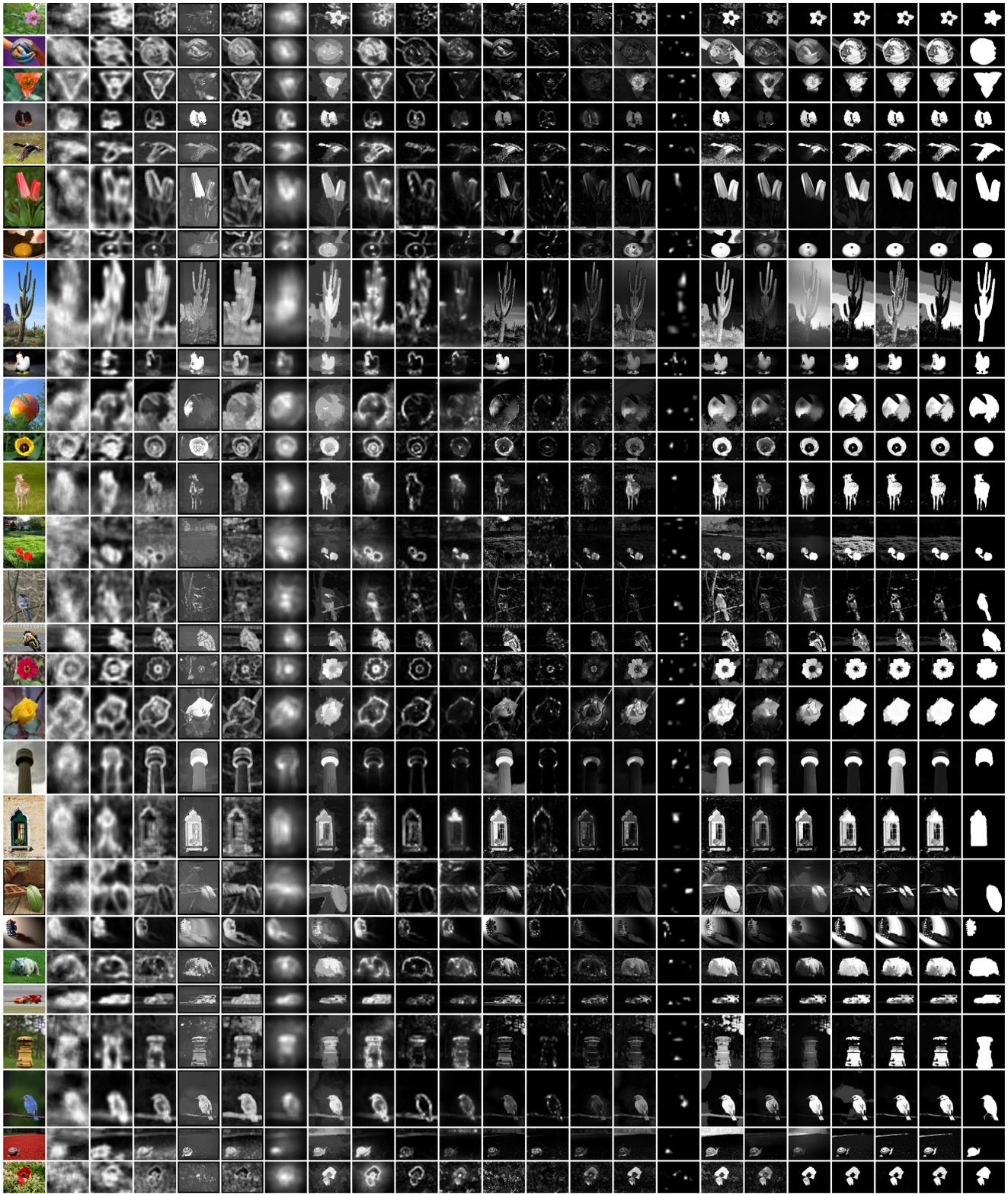


Figure 17. Comparison of saliency maps generated by our method (t) CSD, (u) GU, (v) GC, with various alternative methods: (b) IM[12], (c) SeR[15], (d) SUN[17], (e) SEG[14], (f) AIM[4], (g) SWD[6], (h) RC[5], (i) CA[7], (j) MZ[11], (k) GB[8], (l) LC[16], (m) SR[9], (n) AC[1], (o) FT[2], (p) IT[10], (q) HC[5], (r) MSS[3], (s) SF[13]. Source image and ground truth are shown in (a) and (w) for reference. Notice that **our results** (t), (u), (v) are generally better than others.



(a) (b) (c) (d) (e) (f) (g) (h) (i) (j) (k) (l) (m) (n) (o) (p) (q) (r) (s) (t) (u) (v) (w)

Figure 18. Comparison of saliency maps generated by our method (t) CSD, (u) GU, (v) GC, with various alternative methods: (b) IM[12], (c) SeR[15], (d) SUN[17], (e) SEG[14], (f) AIM[4], (g) SWD[6], (h) RC[5], (i) CA[7], (j) MZ[11], (k) GB[8], (l) LC[16], (m) SR[9], (n) AC[1], (o) FT[2], (p) IT[10], (q) HC[5], (r) MSS[3], (s) SF[13]. Source image and ground truth are shown in (a) and (w) for reference. Notice that our results (t), (u), (v) are generally better than others.

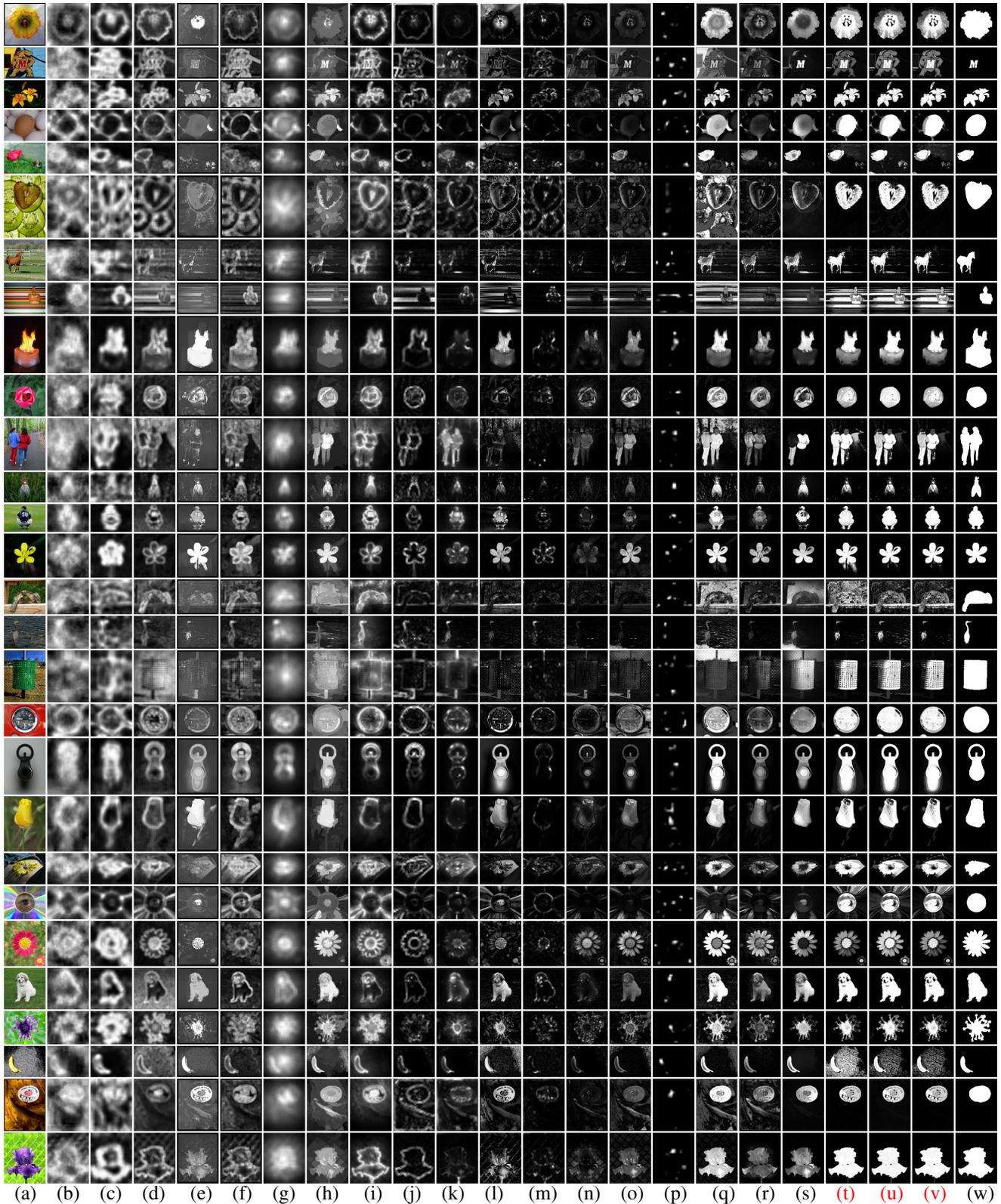


Figure 19. Comparison of saliency maps generated by our method (t) CSD, (u) GU, (v) GC, with various alternative methods: (b) IM[12], (c) SeR[15], (d) SUN[17], (e) SEG[14], (f) AIM[4], (g) SWD[6], (h) RC[5], (i) CA[7], (j) MZ[11], (k) GB[8], (l) LC[16], (m) SR[9], (n) AC[1], (o) FT[2], (p) IT[10], (q) HC[5], (r) MSS[3], (s) SF[13]. Source image and ground truth are shown in (a) and (w) for reference. Notice that our results (t), (u), (v) are generally better than others.

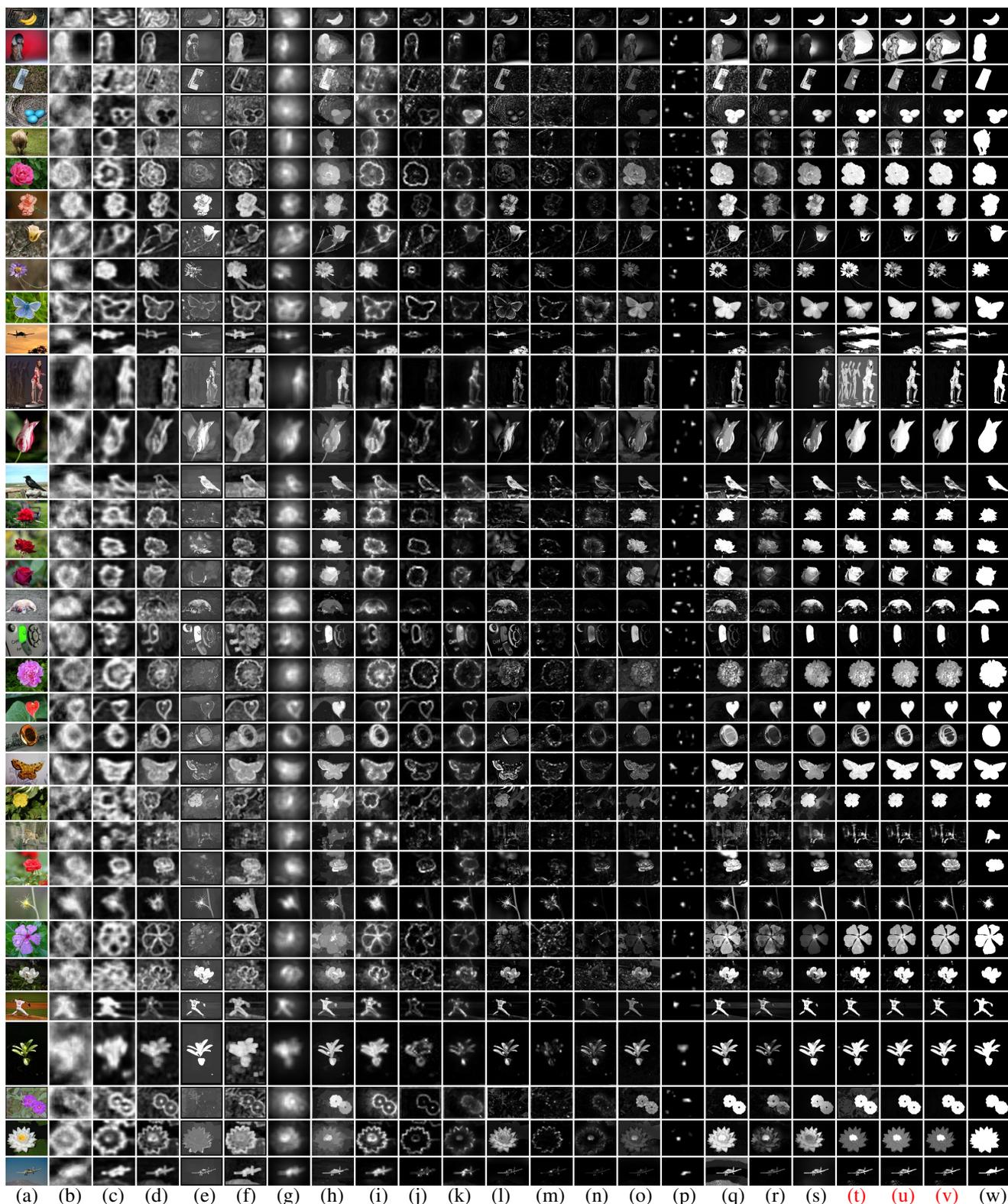
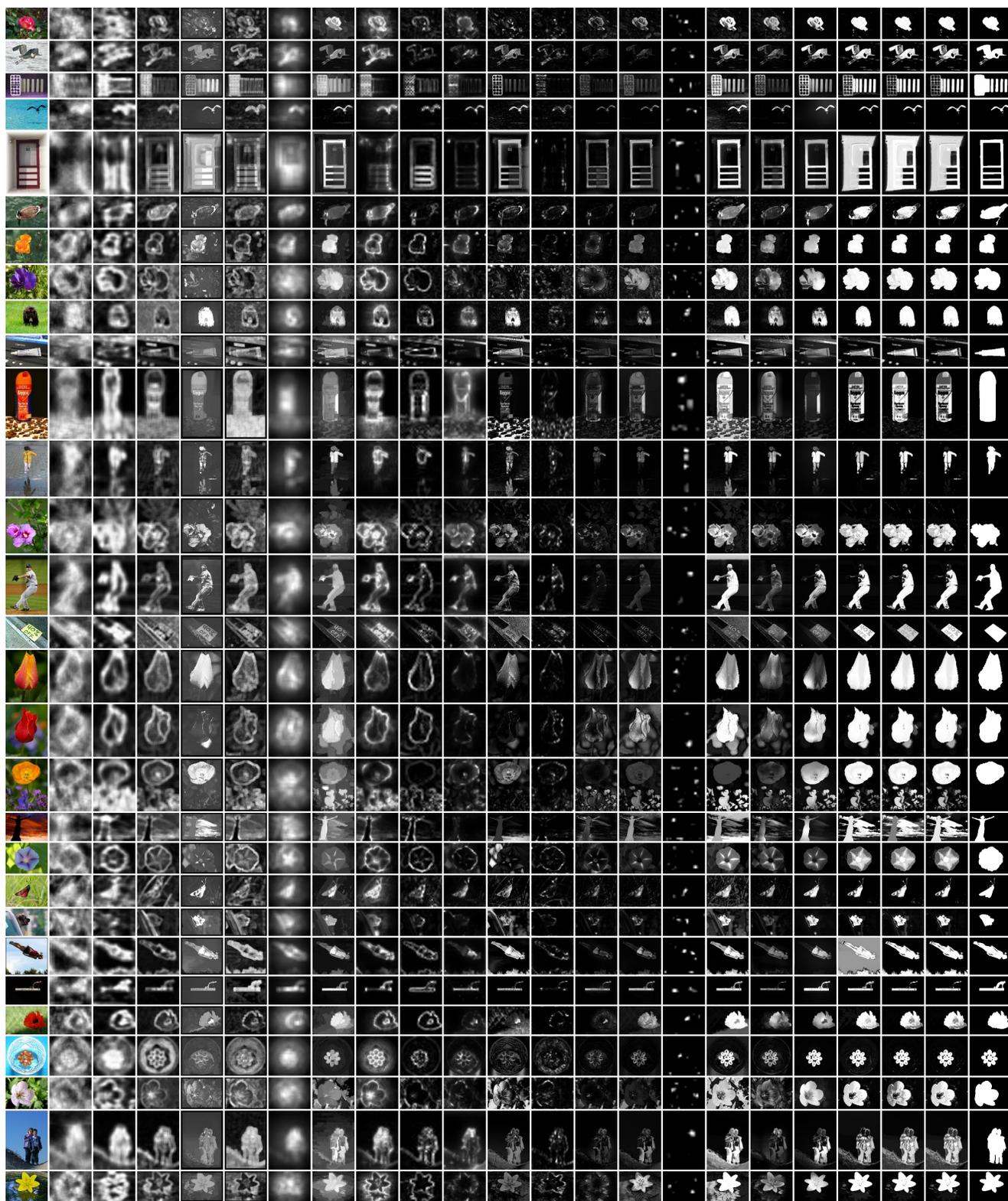
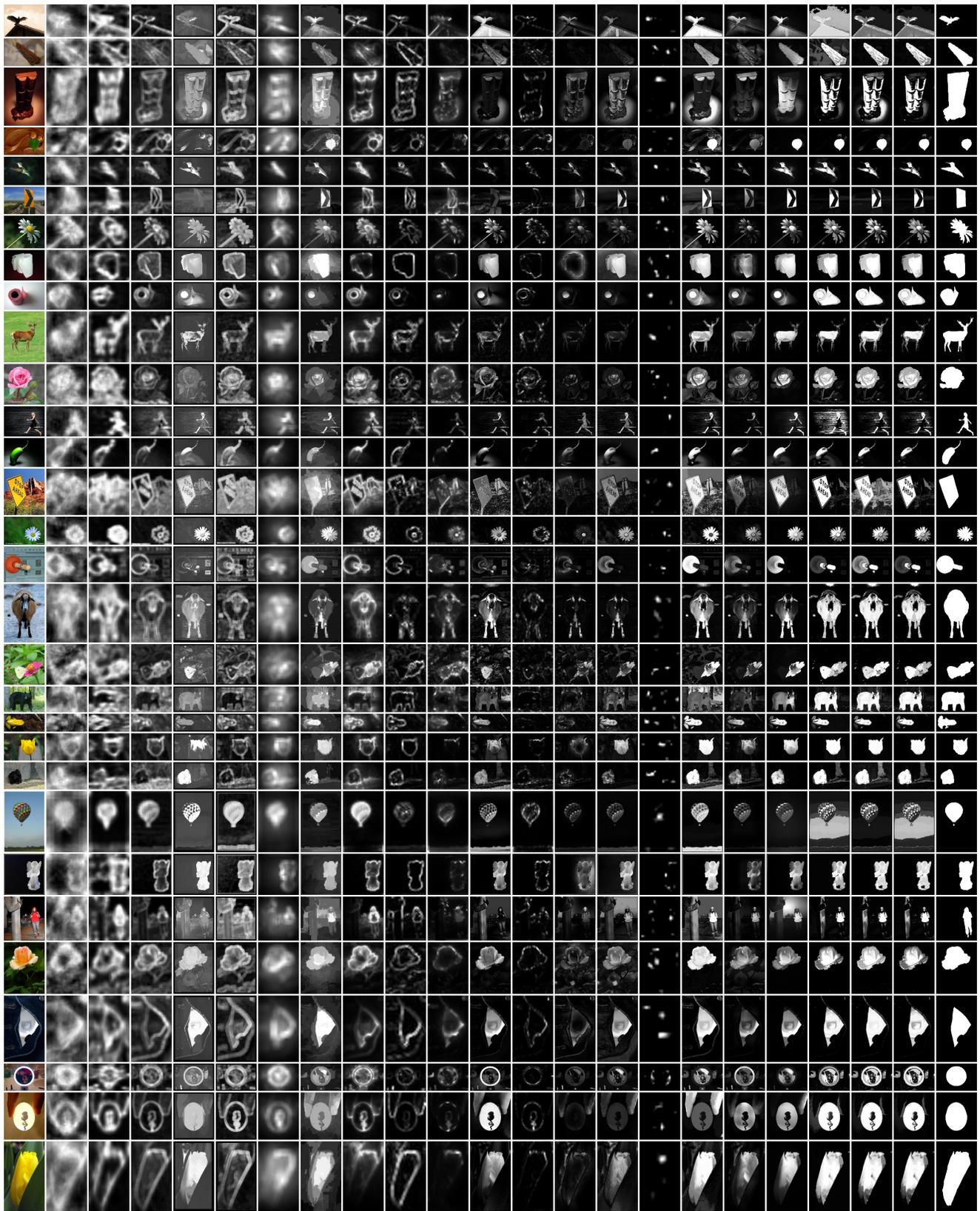


Figure 20. Comparison of saliency maps generated by our method (t) CSD, (u) GU, (v) GC, with various alternative methods: (b) IM[12], (c) SeR[15], (d) SUN[17], (e) SEG[14], (f) AIM[4], (g) SWD[6], (h) RC[5], (i) CA[7], (j) MZ[11], (k) GB[8], (l) LC[16], (m) SR[9], (n) AC[1], (o) FT[2], (p) IT[10], (q) HC[5], (r) MSS[3], (s) SF[13]. Source image and ground truth are shown in (a) and (w) for reference. Notice that our results (t), (u), (v) are generally better than others.



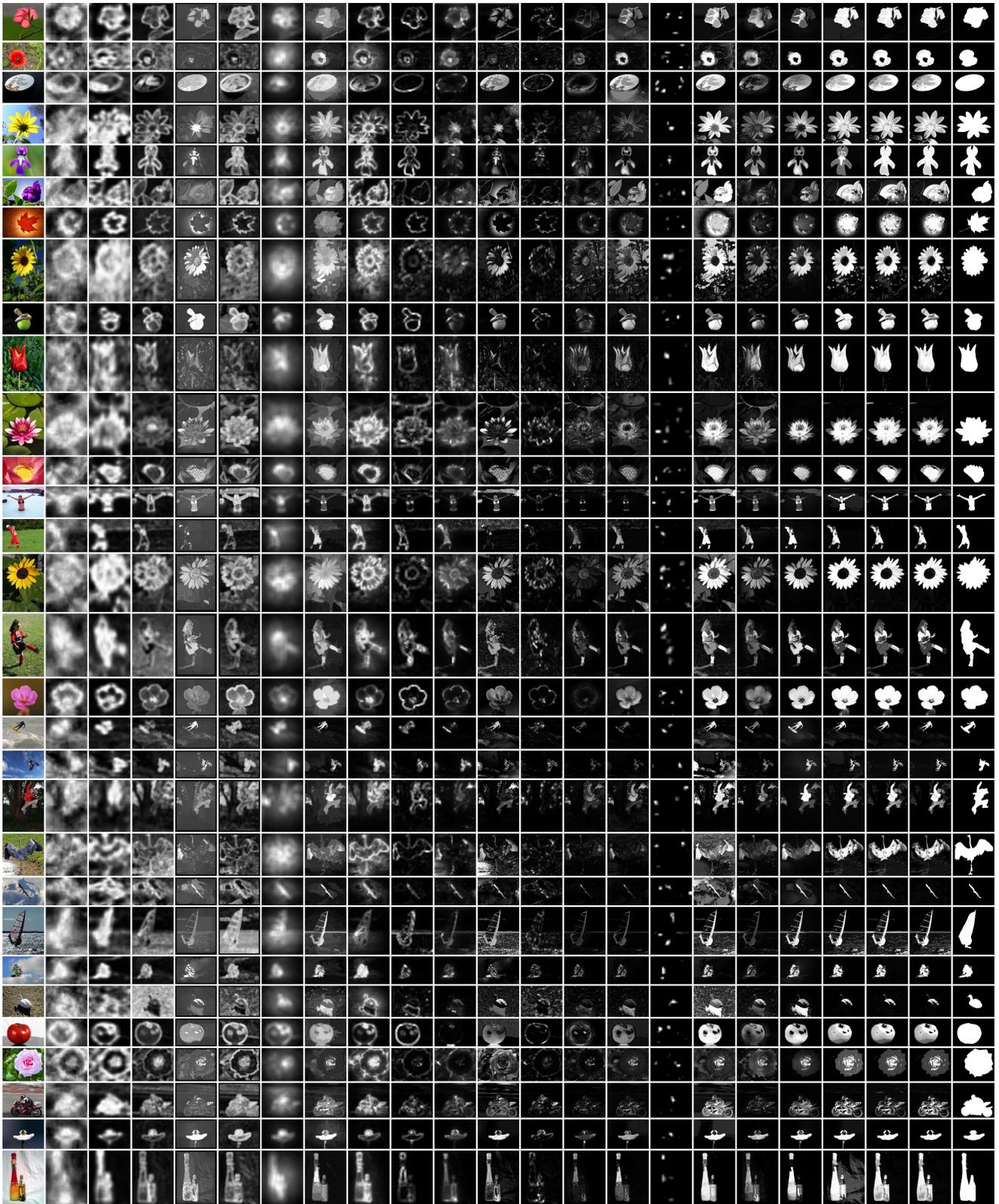
(a) (b) (c) (d) (e) (f) (g) (h) (i) (j) (k) (l) (m) (n) (o) (p) (q) (r) (s) (t) (u) (v) (w)

Figure 21. Comparison of saliency maps generated by our method (t) CSD, (u) GU, (v) GC, with various alternative methods: (b) IM[12], (c) SeR[15], (d) SUN[17], (e) SEG[14], (f) AIM[4], (g) SWD[6], (h) RC[5], (i) CA[7], (j) MZ[11], (k) GB[8], (l) LC[16], (m) SR[9], (n) AC[1], (o) FT[2], (p) IT[10], (q) HC[5], (r) MSS[3], (s) SF[13]. Source image and ground truth are shown in (a) and (w) for reference. Notice that our results (t), (u), (v) are generally better than others.



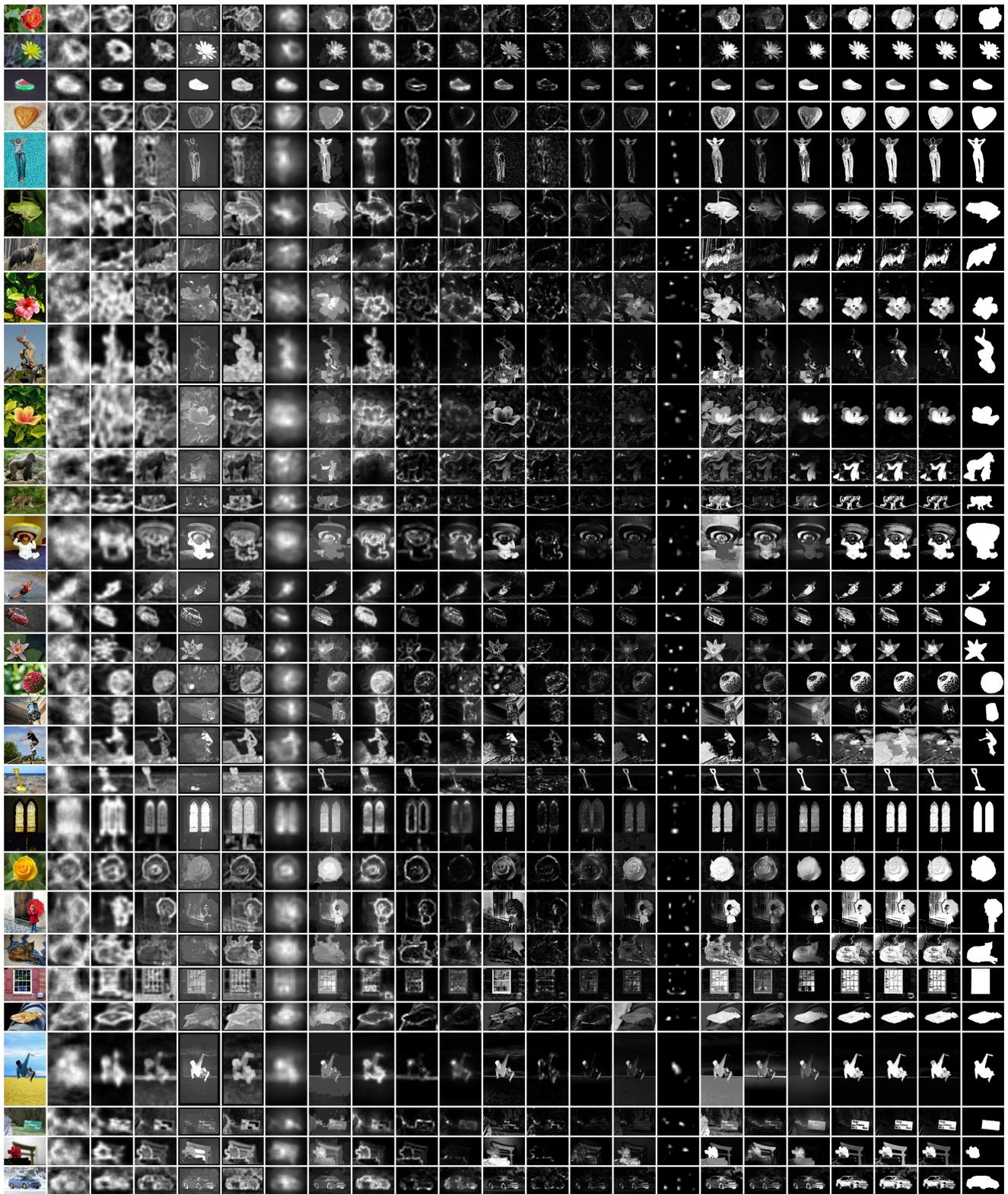
(a) (b) (c) (d) (e) (f) (g) (h) (i) (j) (k) (l) (m) (n) (o) (p) (q) (r) (s) (t) (u) (v) (w)

Figure 22. Comparison of saliency maps generated by our method (t) CSD, (u) GU, (v) GC, with various alternative methods: (b) IM[12], (c) SeR[15], (d) SUN[17], (e) SEG[14], (f) AIM[4], (g) SWD[6], (h) RC[5], (i) CA[7], (j) MZ[11], (k) GB[8], (l) LC[16], (m) SR[9], (n) AC[1], (o) FT[2], (p) IT[10], (q) HC[5], (r) MSS[3], (s) SF[13]. Source image and ground truth are shown in (a) and (w) for reference. Notice that our results (t), (u), (v) are generally better than others.



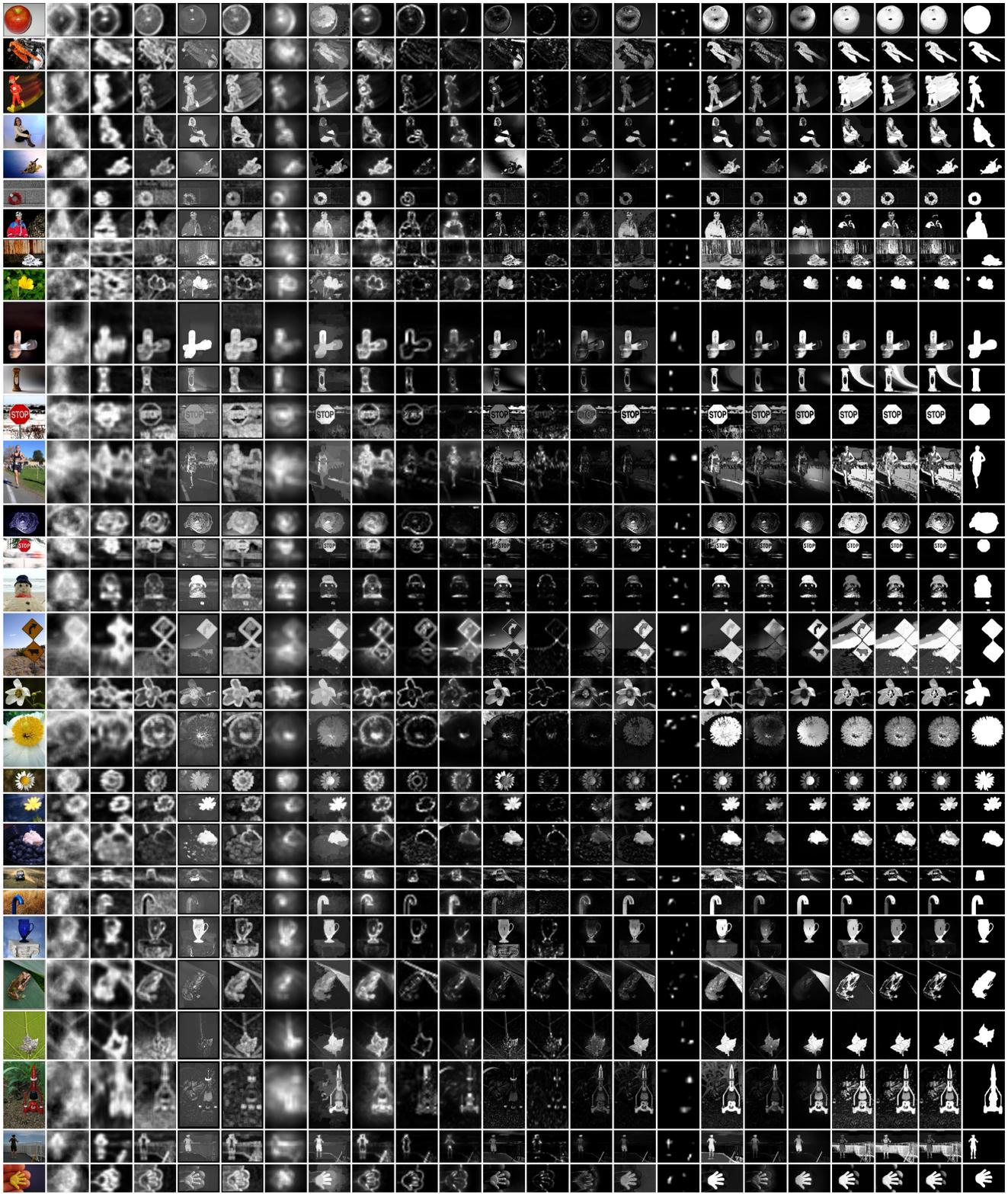
(a) (b) (c) (d) (e) (f) (g) (h) (i) (j) (k) (l) (m) (n) (o) (p) (q) (r) (s) (t) (u) (v) (w)

Figure 23. Comparison of saliency maps generated by our method (t) CSD, (u) GU, (v) GC, with various alternative methods: (b) IM[12], (c) SeR[15], (d) SUN[17], (e) SEG[14], (f) AIM[4], (g) SWD[6], (h) RC[5], (i) CA[7], (j) MZ[11], (k) GB[8], (l) LC[16], (m) SR[9], (n) AC[1], (o) FT[2], (p) IT[10], (q) HC[5], (r) MSS[3], (s) SF[13]. Source image and ground truth are shown in (a) and (w) for reference. Notice that our results (t), (u), (v) are generally better than others.



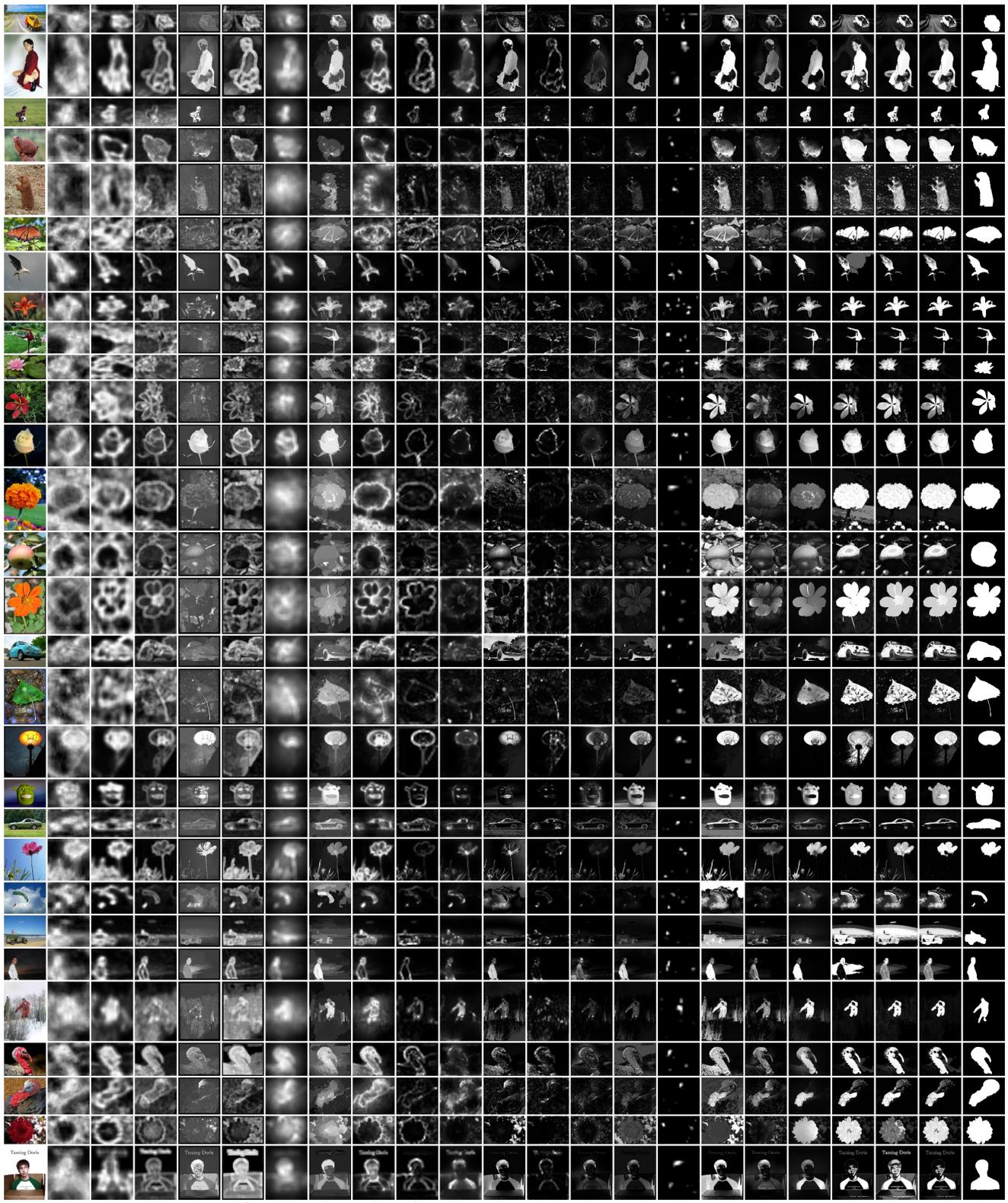
(a) (b) (c) (d) (e) (f) (g) (h) (i) (j) (k) (l) (m) (n) (o) (p) (q) (r) (s) (t) (u) (v) (w)

Figure 24. Comparison of saliency maps generated by our method (t) CSD, (u) GU, (v) GC, with various alternative methods: (b) IM[12], (c) SeR[15], (d) SUN[17], (e) SEG[14], (f) AIM[4], (g) SWD[6], (h) RC[5], (i) CA[7], (j) MZ[11], (k) GB[8], (l) LC[16], (m) SR[9], (n) AC[1], (o) FT[2], (p) IT[10], (q) HC[5], (r) MSS[3], (s) SF[13]. Source image and ground truth are shown in (a) and (w) for reference. Notice that our results (t), (u), (v) are generally better than others.

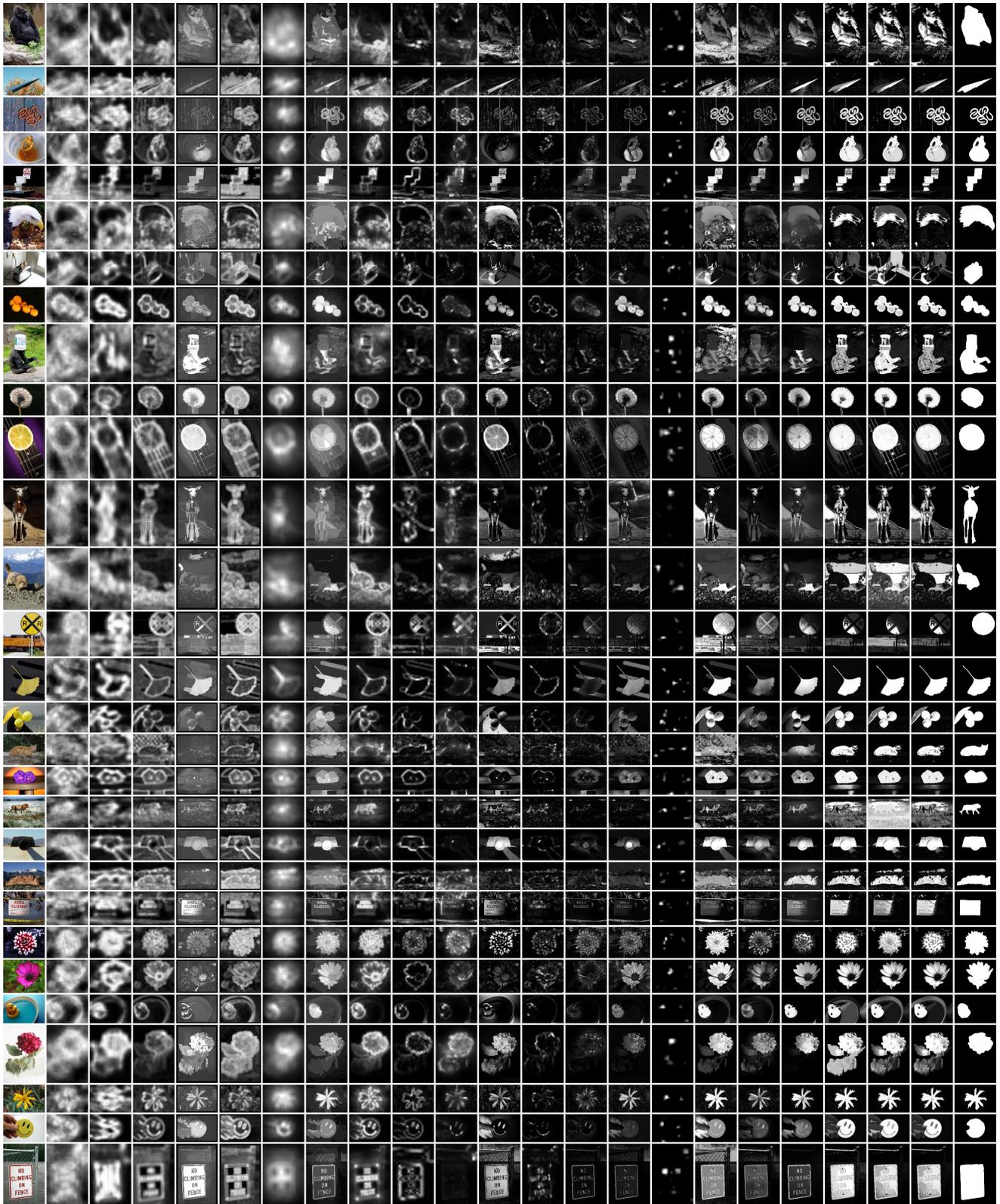


(a) (b) (c) (d) (e) (f) (g) (h) (i) (j) (k) (l) (m) (n) (o) (p) (q) (r) (s) (t) (u) (v) (w)

Figure 26. Comparison of saliency maps generated by our method (t) CSD, (u) GU, (v) GC, with various alternative methods: (b) IM[12], (c) SeR[15], (d) SUN[17], (e) SEG[14], (f) AIM[4], (g) SWD[6], (h) RC[5], (i) CA[7], (j) MZ[11], (k) GB[8], (l) LC[16], (m) SR[9], (n) AC[1], (o) FT[2], (p) IT[10], (q) HC[5], (r) MSS[3], (s) SF[13]. Source image and ground truth are shown in (a) and (w) for reference. Notice that our results (t), (u), (v) are generally better than others.



(a) (b) (c) (d) (e) (f) (g) (h) (i) (j) (k) (l) (m) (n) (o) (p) (q) (r) (s) (t) (u) (v) (w)
 Figure 27. Comparison of saliency maps generated by our method (t) CSD, (u) GU, (v) GC, with various alternative methods: (b) IM[12], (c) SeR[15], (d) SUN[17], (e) SEG[14], (f) AIM[4], (g) SWD[6], (h) RC[5], (i) CA[7], (j) MZ[11], (k) GB[8], (l) LC[16], (m) SR[9], (n) AC[1], (o) FT[2], (p) IT[10], (q) HC[5], (r) MSS[3], (s) SF[13]. Source image and ground truth are shown in (a) and (w) for reference. Notice that our results (t), (u), (v) are generally better than others.



(a) (b) (c) (d) (e) (f) (g) (h) (i) (j) (k) (l) (m) (n) (o) (p) (q) (r) (s) (t) (u) (v) (w)

Figure 28. Comparison of saliency maps generated by our method (t) CSD, (u) GU, (v) GC, with various alternative methods: (b) IM[12], (c) SeR[15], (d) SUN[17], (e) SEG[14], (f) AIM[4], (g) SWD[6], (h) RC[5], (i) CA[7], (j) MZ[11], (k) GB[8], (l) LC[16], (m) SR[9], (n) AC[1], (o) FT[2], (p) IT[10], (q) HC[5], (r) MSS[3], (s) SF[13]. Source image and ground truth are shown in (a) and (w) for reference. Notice that our results (t), (u), (v) are generally better than others.

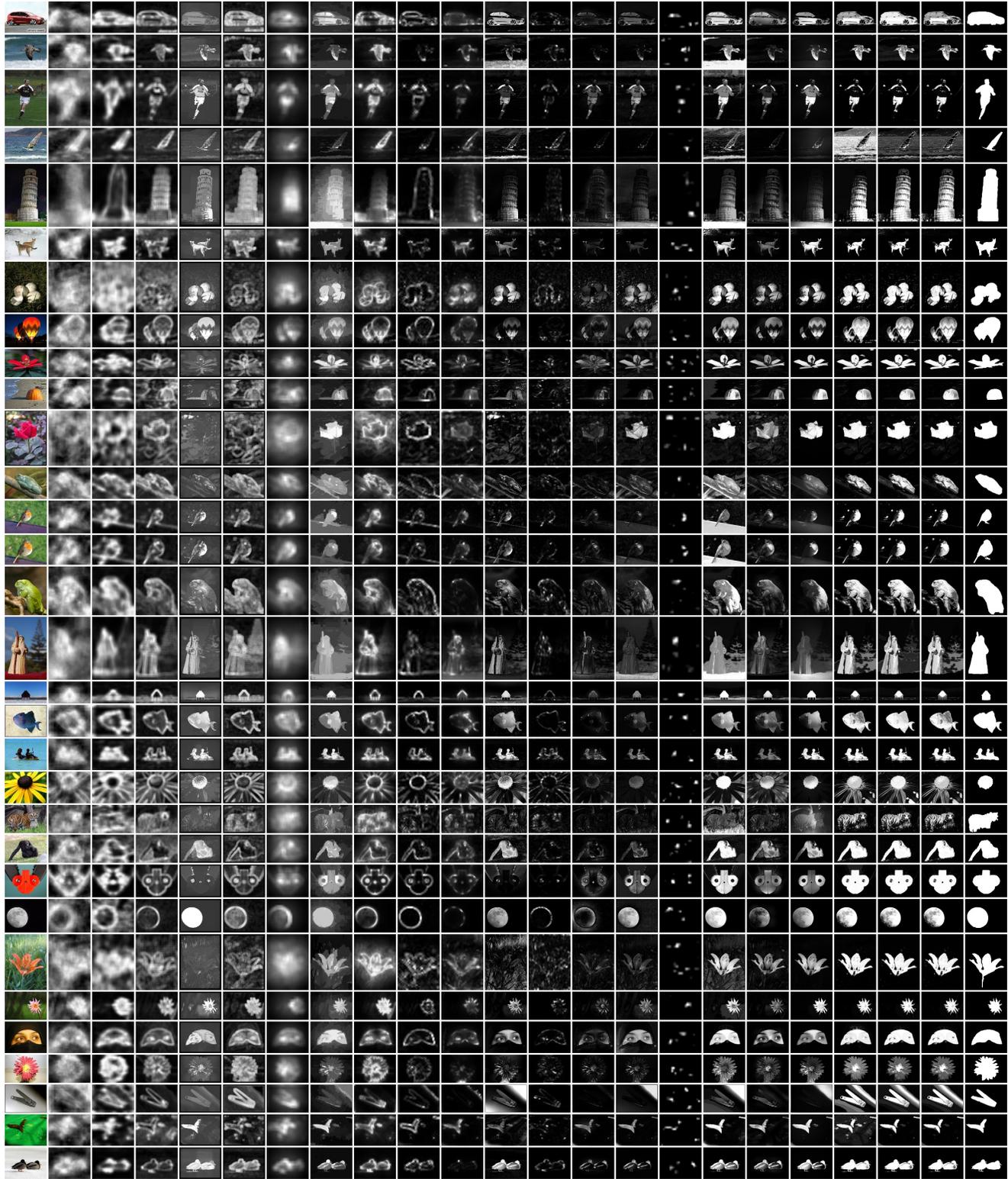
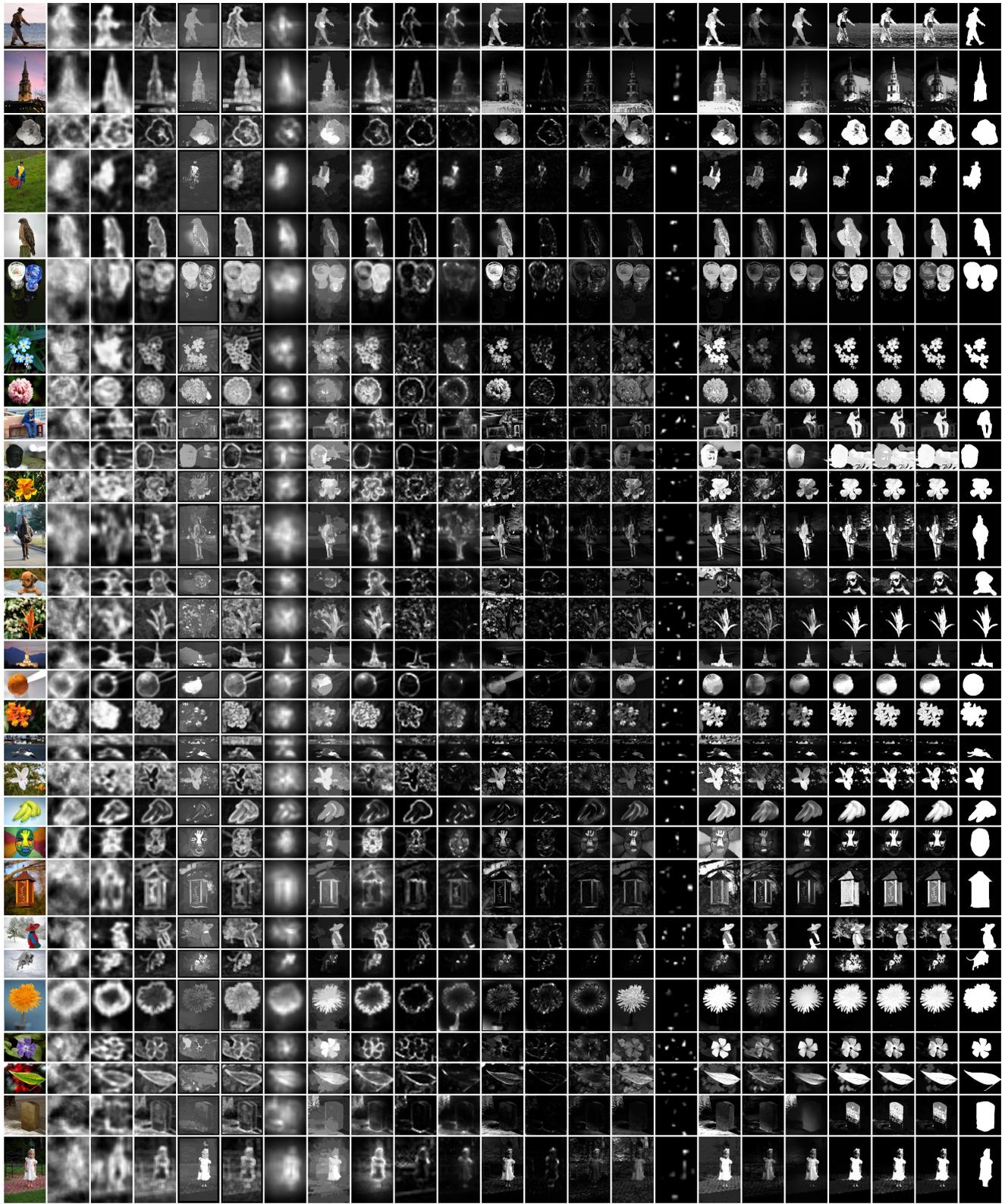
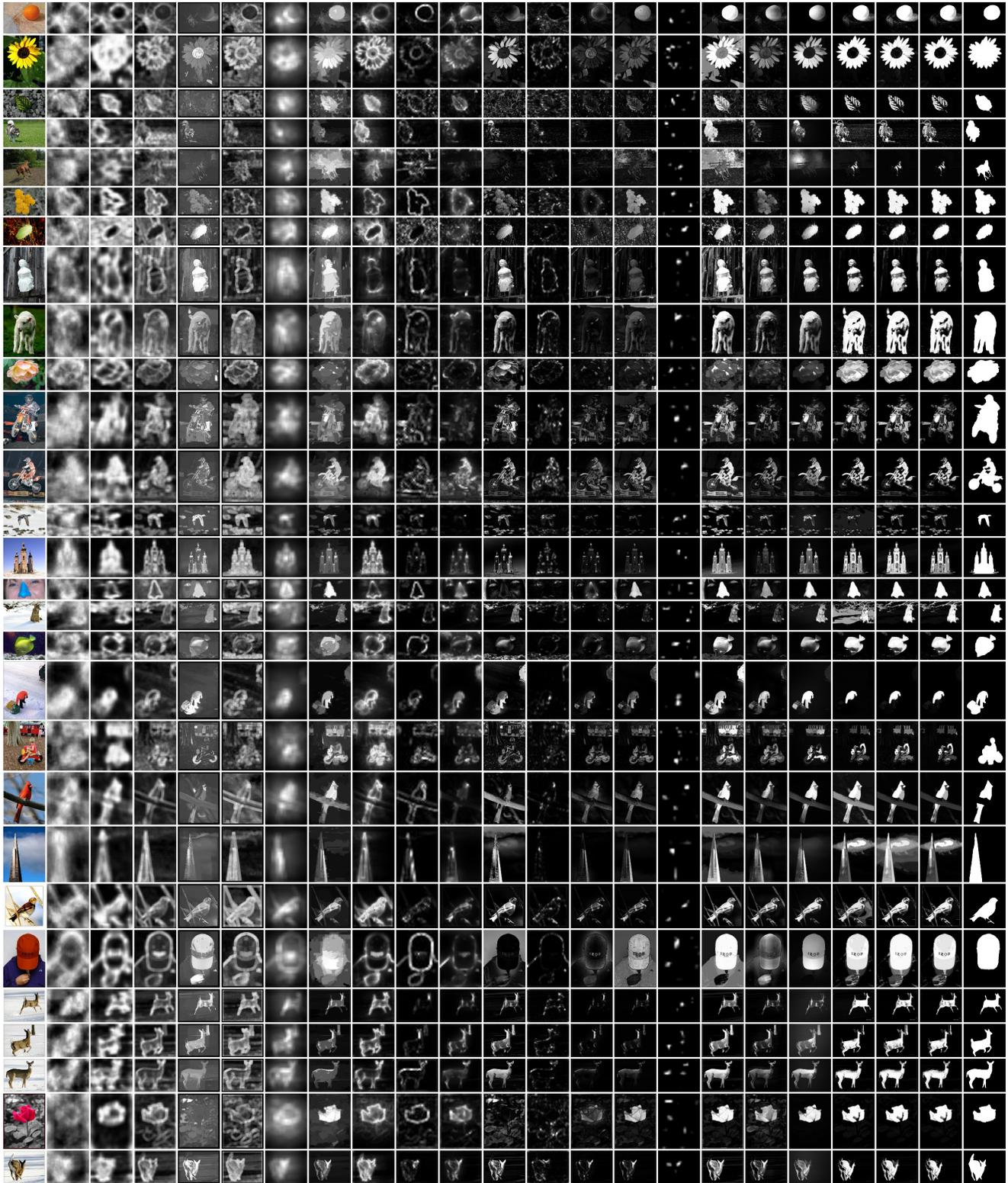


Figure 29. Comparison of saliency maps generated by our method (t) CSD, (u) GU, (v) GC, with various alternative methods: (b) IM[12], (c) SeR[15], (d) SUN[17], (e) SEG[14], (f) AIM[4], (g) SWD[6], (h) RC[5], (i) CA[7], (j) MZ[11], (k) GB[8], (l) LC[16], (m) SR[9], (n) AC[1], (o) FT[2], (p) IT[10], (q) HC[5], (r) MSS[3], (s) SF[13]. Source image and ground truth are shown in (a) and (w) for reference. Notice that our results (t), (u), (v) are generally better than others.



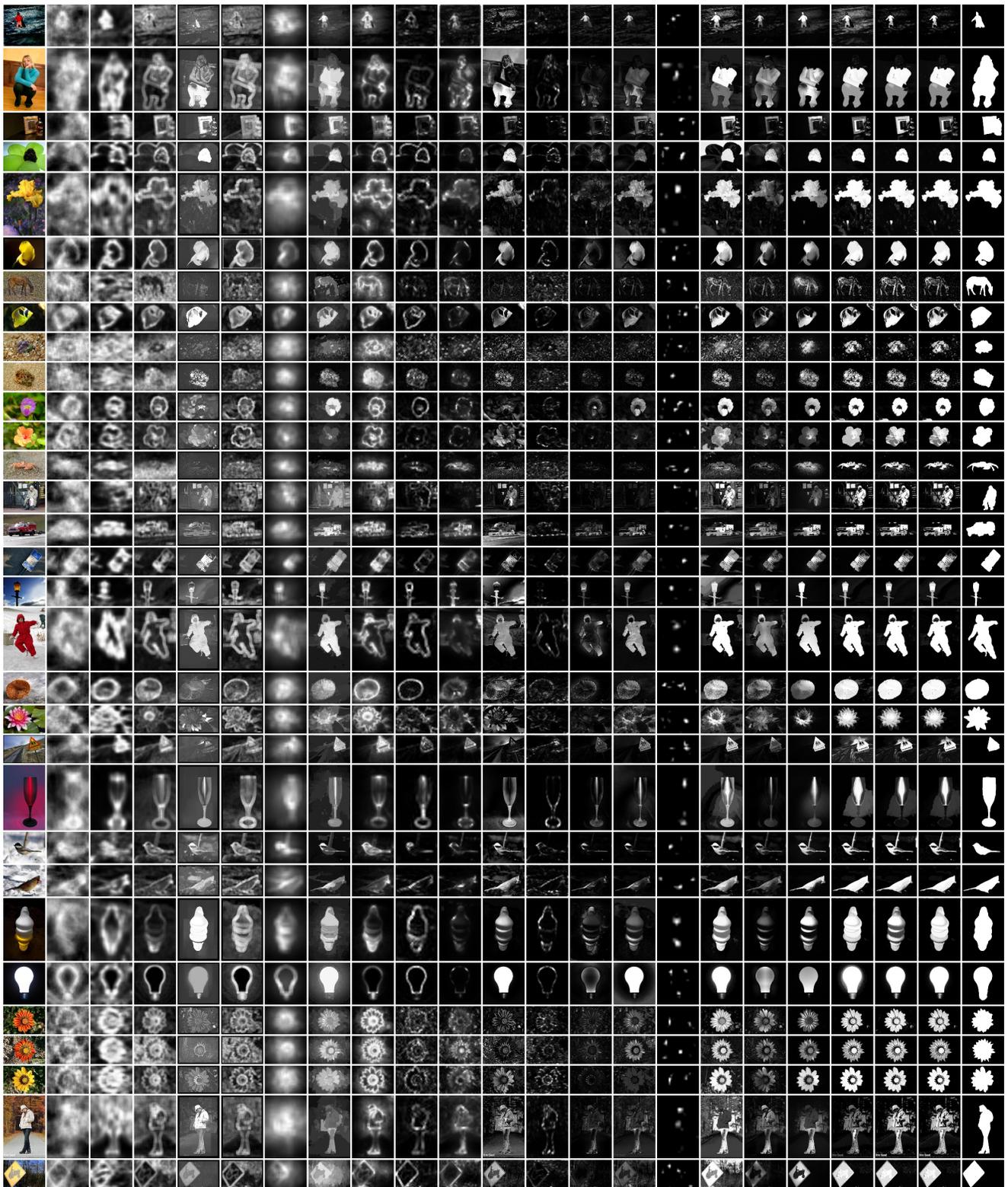
(a) (b) (c) (d) (e) (f) (g) (h) (i) (j) (k) (l) (m) (n) (o) (p) (q) (r) (s) (t) (u) (v) (w)

Figure 30. Comparison of saliency maps generated by our method (t) CSD, (u) GU, (v) GC, with various alternative methods: (b) IM[12], (c) SeR[15], (d) SUN[17], (e) SEG[14], (f) AIM[4], (g) SWD[6], (h) RC[5], (i) CA[7], (j) MZ[11], (k) GB[8], (l) LC[16], (m) SR[9], (n) AC[1], (o) FT[2], (p) IT[10], (q) HC[5], (r) MSS[3], (s) SF[13]. Source image and ground truth are shown in (a) and (w) for reference. Notice that **our results** (t), (u), (v) are generally better than others.



(a) (b) (c) (d) (e) (f) (g) (h) (i) (j) (k) (l) (m) (n) (o) (p) (q) (r) (s) (t) (u) (v) (w)

Figure 31. Comparison of saliency maps generated by our method (t) CSD, (u) GU, (v) GC, with various alternative methods: (b) IM[12], (c) SeR[15], (d) SUN[17], (e) SEG[14], (f) AIM[4], (g) SWD[6], (h) RC[5], (i) CA[7], (j) MZ[11], (k) GB[8], (l) LC[16], (m) SR[9], (n) AC[1], (o) FT[2], (p) IT[10], (q) HC[5], (r) MSS[3], (s) SF[13]. Source image and ground truth are shown in (a) and (w) for reference. Notice that **our results** (t), (u), (v) are generally better than others.



(a) (b) (c) (d) (e) (f) (g) (h) (i) (j) (k) (l) (m) (n) (o) (p) (q) (r) (s) (t) (u) (v) (w)
 Figure 32. Comparison of saliency maps generated by our method (t) CSD, (u) GU, (v) GC, with various alternative methods: (b) IM[12], (c) SeR[15], (d) SUN[17], (e) SEG[14], (f) AIM[4], (g) SWD[6], (h) RC[5], (i) CA[7], (j) MZ[11], (k) GB[8], (l) LC[16], (m) SR[9], (n) AC[1], (o) FT[2], (p) IT[10], (q) HC[5], (r) MSS[3], (s) SF[13]. Source image and ground truth are shown in (a) and (w) for reference. Notice that our results (t), (u), (v) are generally better than others.

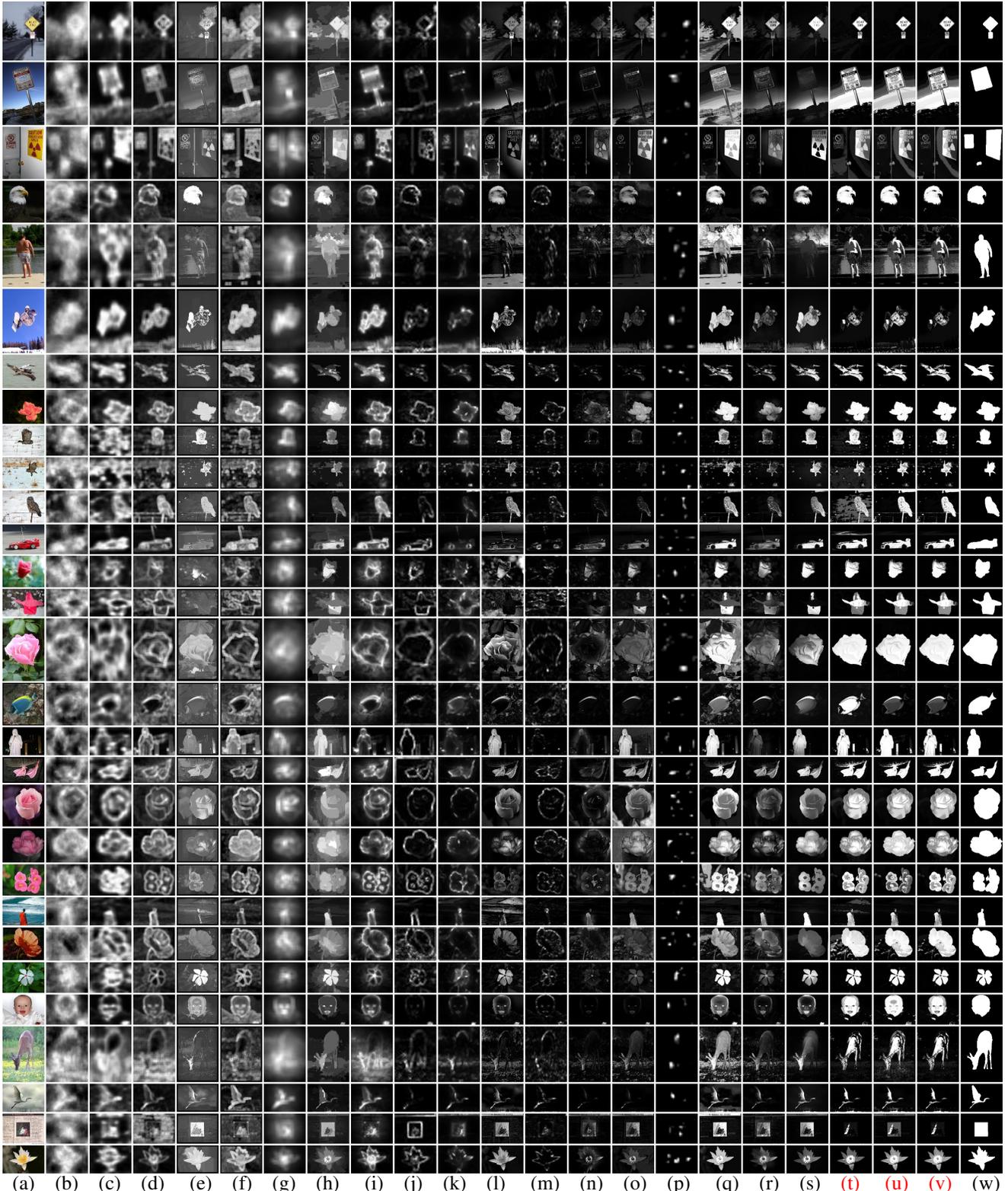


Figure 33. Comparison of saliency maps generated by our method (t) CSD, (u) GU, (v) GC, with various alternative methods: (b) IM[12], (c) SeR[15], (d) SUN[17], (e) SEG[14], (f) AIM[4], (g) SWD[6], (h) RC[5], (i) CA[7], (j) MZ[11], (k) GB[8], (l) LC[16], (m) SR[9], (n) AC[1], (o) FT[2], (p) IT[10], (q) HC[5], (r) MSS[3], (s) SF[13]. Source image and ground truth are shown in (a) and (w) for reference. Notice that our results (t), (u), (v) are generally better than others.

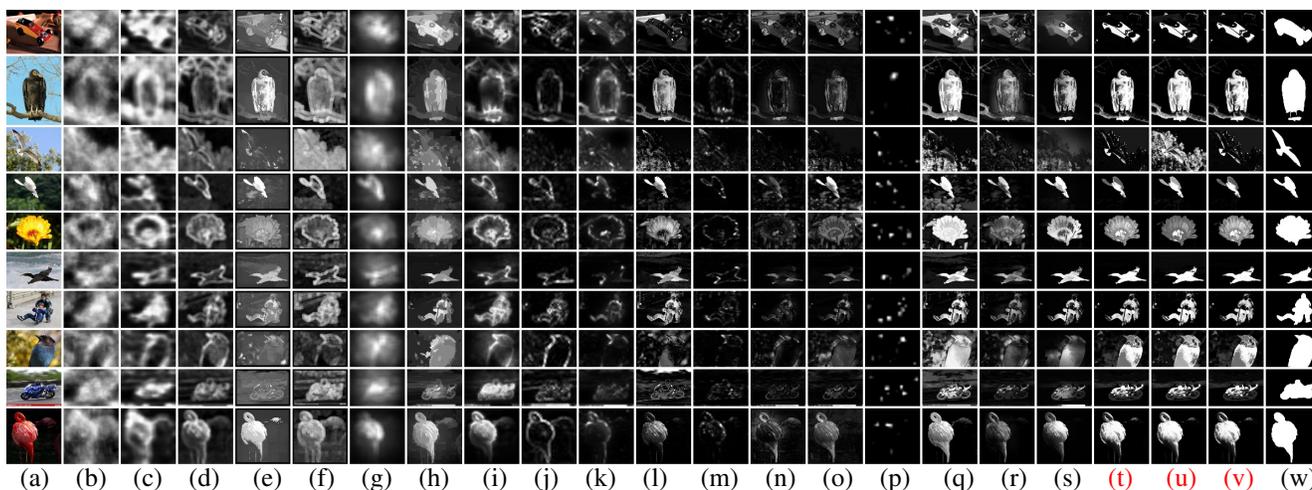


Figure 34. Comparison of saliency maps generated by our method (t) CSD, (u) GU, (v) GC, with various alternative methods: (b) IM[12], (c) SeR[15], (d) SUN[17], (e) SEG[14], (f) AIM[4], (g) SWD[6], (h) RC[5], (i) CA[7], (j) MZ[11], (k) GB[8], (l) LC[16], (m) SR[9], (n) AC[1], (o) FT[2], (p) IT[10], (q) HC[5], (r) MSS[3], (s) SF[13]. Source image and ground truth are shown in (a) and (w) for reference. Notice that our results (t), (u), (v) are generally better than others.