

Computer Vision Metrics

1 Introduction

Here we present a number of tasks in computer vision and detail the metrics applicable to them. The tasks are organized into categories. Within each metric-applied-to-task there are four points that should be covered, as shown in the example in Section ???. Comments can be made using the `\textcomment{}` command like so: **Comment: Comments can be used for ideas or references to papers.**

1.1 Example CV Task

Basic task description.

1.1.1 Metric

Details of the metric as applied to the given CV task. Points that should be covered:

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

2 Image Analysis Tasks

2.1 Object detection

Basic task description.

2.1.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*

- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

2.2 Object localisation

Basic task description.

2.2.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

2.3 Object classification

Basic task description.

2.3.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

2.4 Semantic segmentation

Basic task description.

2.4.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

2.5 Instance segmentation

Basic task description.

2.5.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

2.6 Panoptic segmentation

Basic task description.

2.6.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

2.7 Face analysis

Basic task description.

2.7.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

2.8 Saliency detection

Basic task description.

2.8.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

2.9 Scene graph generation

Basic task description.

2.9.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*

- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

2.10 Instance identification

Basic task description.

2.10.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

2.11 Feature extraction

Basic task description.

2.11.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

2.12 Geometric feature detection

Basic task description.

2.12.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

2.13 Image registration

Basic task description.

2.13.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

2.14 Image stitching

Basic task description.

2.14.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

2.15 Image similarity

Basic task description.

2.15.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

2.16 Image retrieval (including cross modal retrieval)

Basic task description.

2.16.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

3 Spatial Analysis Tasks

3.1 Depth estimation

Basic task description.

3.1.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

3.2 Object / 3D reconstruction

Basic task description.

3.2.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

3.3 Object pose estimation

Basic task description.

3.3.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

3.4 Camera pose estimation

Basic task description.

3.4.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

3.5 SLAM

Basic task description.

3.5.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

4 Temporal analysis

4.1 Optical flow estimation

Basic task description.

4.1.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

4.2 Motion detection

Basic task description.

4.2.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

4.3 Single object tracking

Basic task description.

4.3.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

4.4 Multiple object tracking

Basic task description.

4.4.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

4.5 Action recognition

Basic task description.

4.5.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

4.6 Event detection

Basic task description.

4.6.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*

- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

4.7 (Multiple) Object re-identification

Basic task description.

4.7.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

4.8 Visual Odometry

Basic task description.

4.8.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

4.9 Change detection

Basic task description.

4.9.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

4.10 Deep fake detection

Basic task description.

4.10.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

4.11 Video summarisation

Basic task description.

4.11.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

5 Image Generation Tasks

5.1 Image creation

Basic task description.

5.1.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

5.2 Image denoising

Basic task description.

5.2.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

5.3 Super-resolution

Basic task description.

5.3.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

5.4 Image inpainting

Basic task description.

5.4.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

5.5 Image-to-image translation

Basic task description.

5.5.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

5.6 Style transfer

Basic task description.

5.6.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

5.7 Object swapping

Basic task description.

5.7.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

5.8 Novel view synthesis

Basic task description.

5.8.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*

- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

6 Video Generation Tasks

6.1 Video enhancement

Basic task description.

6.1.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

6.2 Video stabilisation

Basic task description.

6.2.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

6.3 Talking head generation

Basic task description.

6.3.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

7 Multi-modal Tasks

7.1 Visual question answering

Basic task description.

7.1.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

7.2 Image captioning

Basic task description.

7.2.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

7.3 Visual grounding

Basic task description.

7.3.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*

7.4 RGB-depth fusion

Basic task description.

7.4.1 Metric

- a. *Metric definition and/or formula:*
- b. *Any further details, hyperparameters, processing steps, underspecification of the formula, context dependencies, or other ambiguities in the metric itself that can affect reproducibility:*
- c. *Typical range of values obtained with this metric on state-of-the-art systems for this particular task:*
- d. *Any other issues or subtleties that should be mentioned regarding this metric when applied to this task:*