

Training report for Cellpose model (CellPose_Glio)

Date: 2023-11-05

Information for your materials and methods:

The Cellpose model was trained for 500 epochs on 66 paired image patches (image dimensions: (512, 512), with a batch size of 8, using the Cellpose ZeroCostDL4Mic notebook (v 1) (von Chamier & Laine et al., 2020). The model was re-trained from a pretrained model. Key python packages used include tensorflow (v 2.14.0), Keras (v y==1.4.0, aiohttp==3.8.6, aiosignal==1.3.1, alabaster==0.7.13, alumentations==1.3.1, altair==4.2.2, anyio==3.7.1, appdirs==1.4.4, argon2-cffi==23.1.0, argon2-cffi-bindings==21.2.0, array-record==0.5.0, arviz==0.15.1, astropy==5.3.4, astunparse==1.6.3, async-timeout==4.0.3, atpublic==4.0, attrs==23.1.0, audioread==3.0.1, autograd==1.6.2, Babel==2.13.1, backcall==0.2.0, beautifulsoup4==4.11.2, bidict==0.22.1, bigframes==0.10.0, bleach==6.1.0, blinker==1.4, blis==0.7.11, blosc2==2.0.0, bokeh==3.2.2, bqplot==0.12.42, branca==0.6.0, build==1.0.3, CacheControl==0.13.1, cachetools==5.3.2, catalogue==2.0.10, cellpose==2.2.3, certifi==2023.7.22, cffi==1.16.0, chardet==5.2.0, charset-normalizer==3.3.1, chex==0.1.7, click==8.1.7, click-plugins==1.1.1, cligj==0.7.2, cloudpickle==2.2.1, cmake==3.27.7, cmdstanpy==1.2.0, colorcet==3.0.1, colorlover==0.3.0, colour==0.1.5, community==1.0.0b1, confection==0.1.3, cons==0.4.6, contextlib2==21.6.0, contourpy==1.1.1, cryptography==41.0.5, cufflinks==0.17.3, cupy-cuda11x==11.0.0, cvxopt==1.3.2, cvxpy==1.3.2, cycler==0.12.1, cymem==2.0.8, Cython==3.0.4, dask==2023.8.1, datascience==0.17.6, db-dtypes==1.1.1, dbus-python==1.2.18, debugpy==1.6.6, decorator==4.4.2, defusedxml==0.7.1, diskcache==5.6.3, distributed==2023.8.1, distro==1.7.0, dlib==19.24.2, dm-tree==0.1.8, docutils==0.18.1, dopamine-rl==4.0.6, duckdb==0.8.1, earthengine-api==0.1.375, easydict==1.11, ecos==2.0.12, editdistance==0.6.2, eerepr==0.0.4, en-core-web-sm @ https://github.com/explosion/spacy-models/releases/download/en_core_web_sm-3.6.0/en_core_web_sm-3.6.0-py3-non-e-any.whl#sha256=83276fc78a70045627144786b52e1f2728ad5e29e5e43916ec37ea9c26a11212, entrypoints==0.4, et-xmlfile==1.1.0, etils==1.5.2, etuples==0.3.9, exceptiongroup==1.1.3, fastai==2.7.13, fastcore==1.5.29, fastdownload==0.0.7, fastjsonschema==2.18.1, fastprogress==1.0.3, fastremap==1.14.0, fastlock==0.8.2, filelock==3.12.4, fiona==1.9.5, firebase-admin==5.3.0, Flask==2.2.5, flatbuffers==23.5.26, flax==0.7.4, folium==0.2.1, fonttools==4.43.1, fpdf2==2.7.6, frozendict==2.3.8, frozenlist==1.4.0, fsspec==2023.6.0, future==0.18.3, gast==0.5.4, gcsfs==2023.6.0, GDAL==3.4.3, gdown==4.6.6, geemap==0.28.2, gensim==4.3.2, geocoder==1.38.1, geographiclib==2.0, geopandas==0.13.2, geopy==2.3.0, gin-config==0.5.0, glob2==0.7, google==2.0.3, google-api-core==2.11.1, google-api-python-client==2.84.0, google-auth==2.17.3, google-auth-httplib2==0.1.1, google-auth-oauthlib==1.0.0, google-cloud-bigquery==3.12.0, google-cloud-bigquery-connection==1.12.1, google-cloud-bigquery-storage==2.22.0, google-cloud-core==2.3.3, google-cloud-datastore==2.15.2, google-cloud-firestore==2.11.1, google-cloud-functions==1.13.3, google-cloud-iam==2.12.2, google-cloud-language==2.9.1, google-cloud-resource-manager==1.10.4, google-cloud-storage==2.8.0, google-cloud-translate==3.11.3, google-colab @ <file:///colabtools/dist/google-colab-1.0.0.tar.gz#sha256=840b68ab91172cd01b4b48ca4b48fb1916e15b1e6cc74cdb3ad9bf40932339c5>, google-crc32c==1.5.0, google-pasta==0.2.0, google-resumable-media==2.6.0, googleapis-common-protos==1.61.0, googledrivedownloader==0.4, graphviz==0.20.1, greenlet==3.0.0, grpc-google-iam-v1==0.12.6, grpcio==1.59.0, grpcio-status==1.48.2, gspread==3.4.2, gspread-dataframe==3.3.1, gym==0.25.2, gym-notices==0.0.8, h5netcdf==1.2.0, h5py==3.9.0, holidays==0.35, holoviews==1.17.1, html5lib==1.1, httpimport==1.3.1, httplib2==0.22.0, humanize==4.7.0, hyperopt==0.2.7, ibis-framework==6.2.0, idna==3.4, imagecodecs==2023.9.18, imageio==2.31.6, imageio-ffmpeg==0.4.9, imagesize==1.4.1, imbalanced-learn==0.10.1, imgaug==0.2.5, importlib-metadata==6.8.0, importlib-resources==6.1.0, imutils==0.5.4, inflect==7.0.0, iniconfig==2.0.0, install==1.3.5, intel-openmp==2023.2.0, ipyevents==2.0.2, ipyfilechooser==0.6.0, ipykernel==5.5.6, ipyleaflet==0.17.4, ipython==7.34.0, ipython-genutils==0.2.0, ipython-sql==0.5.0, ipytree==0.2.2, ipywidgets==7.7.1, itsdangerous==2.1.2, jax==0.4.16, jaxlib @ https://storage.googleapis.com/jax-releases/cuda11/jaxlib-0.4.16+cuda11.cudnn86-cp310-cp310-manylinux2014_x86_64.whl#sha256=78b3a9acfd4bfaae8a1dc112995d56454020f5c02dba4d24c40c906332efd4a, jeepney==0.7.1, jieba==0.42.1, Jinja2==3.1.2, joblib==1.3.2, jsonpickle==3.0.2, jsonschema==4.19.1, jsonschema-specifications==2023.7.1, jupyter-client==6.1.12, jupyter-console==6.1.0, jupyter-server==1.24.0, jupyter_core==5.4.0, jupyterlab-pygments==0.2.2, jupyterlab-widgets==3.0.9, kaggle==1.5.16, keras==2.14.0, keyring==23.5.0, kiwisolver==1.4.5, langcodes==3.3.0, launchpadlib==1.10.16, lazr.restfulclient==0.14.4, lazr.uri==1.0.6, lazy_loader==0.3, libclang==16.0.6, librosa==0.10.1, lida==0.0.10, lightgbm==4.1.0, linkify-it-py==2.0.2, llmx==0.0.15a0, llvmlite==0.39.1, locket==1.0.0, logical-unification==0.4.6, lxml==4.9.3, malloy==2023.1058,

Markdown==3.5, markdown-it-py==3.0.0, MarkupSafe==2.1.3, matplotlib==3.7.1, matplotlib-inline==0.1.6, matplotlib-venn==0.11.9, mdit-py-plugins==0.4.0, mdurl==0.1.2, memory-profiler==0.61.0, miniKanren==1.0.3, missingno==0.5.2, mistune==0.8.4, mizani==0.9.3, mkl==2023.2.0, ml-dtypes==0.2.0, mlxtend==0.22.0, more-itertools==10.1.0, moviepy==1.0.3, mpmath==1.3.0, msgpack==1.0.7, multidict==6.0.4, multipledispatch==1.0.0, multitasking==0.0.11, murmurhash==1.0.10, music21==9.1.0, natsort==8.4.0, nbclassic==1.0.0, nbclient==0.8.0, nbconvert==6.5.4, nbformat==5.9.2, nest-asyncio==1.5.8, networkx==3.2, nibabel==4.0.2, nltk==3.8.1, notebook==6.5.5, notebook_shim==0.2.3, numba==0.56.4, numexpr==2.8.7, numpy==1.23.5, oauth2client==4.1.3, oauthlib==3.2.2, opencv-contrib-python==4.8.0.76, opencv-python==4.8.0.76, opencv-python-headless==3.4.18.65, openpyxl==3.1.2, opt-einsum==3.3.0, optax==0.1.7, orbax-checkpoint==0.4.1, osqp==0.6.2.post8, packaging==23.2, pandas==1.5.3, pandas-datareader==0.10.0, pandas-gbq==0.17.9, pandas-stubs==1.5.3.230304, pandocfilters==1.5.0, panel==1.3.0, param==2.0.0, parso==0.8.3, parsy==2.1, partd==1.4.1, pathlib==1.0.1, pathy==0.10.3, patsy==0.5.3, peewee==3.17.0, pexpect==4.8.0, pickleshare==0.7.5, Pillow==9.4.0, pip==23.1.2, pip-tools==6.13.0, platformdirs==3.11.0, plotly==5.15.0, plotnine==0.12.3, pluggy==1.3.0, polars==0.17.3, pooch==1.8.0, portpicker==1.5.2, prefetch-generator==1.0.3, preshed==3.0.9, prettytable==3.9.0, proglog==0.1.10, progressbar2==4.2.0, prometheus-client==0.17.1, promise==2.3, prompt-toolkit==3.0.39, prophet==1.1.5, proto-plus==1.22.3, protobuf==3.20.3, psutil==5.9.5, pycopg2==2.9.9, pyprocess==0.7.0, py-cpuinfo==9.0.0, py4j==0.10.9.7, pyarrow==9.0.0, pyasn1==0.5.0, pyasn1-modules==0.3.0, pycocotools==2.0.7, pycparser==2.21, pyct==0.5.0, pydantic==1.10.13, pydata-google-auth==1.8.2, pydot==1.4.2, pydot-ng==2.0.0, pydotplus==2.0.2, PyDrive==1.3.1, PyDrive2==1.6.3, pyerfa==2.0.1.1, pygame==2.5.2, Pygments==2.16.1, 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soundfile==0.12.1, soupsieve==2.5, soxr==0.3.7, spacy==3.6.1, spacy-legacy==3.0.12, spacy-loggers==1.0.5, Sphinx==5.0.2, sphinxcontrib-applehelp==1.0.7, sphinxcontrib-devhelp==1.0.5, sphinxcontrib-htmlhelp==2.0.4, sphinxcontrib-jsmath==1.0.1, sphinxcontrib-qthelp==1.0.6, sphinxcontrib-serializinghtml==1.1.9, SQLAlchemy==2.0.22, sqlglot==17.16.2, sqlparse==0.4.4, srsly==2.4.8, stanio==0.3.0, statsmodels==0.14.0, sympy==1.12, tables==3.8.0, tabulate==0.9.0, tbb==2021.10.0, tblib==3.0.0, tenacity==8.2.3, tensorboard==2.14.1, tensorboard-data-server==0.7.2, tensorflow==2.14.0, tensorflow-datasets==4.9.3, tensorflow-estimator==2.14.0, tensorflow-gcs-config==2.14.0, tensorflow-hub==0.15.0, tensorflow-io-gcs-filesystem==0.34.0, tensorflow-metadata==1.14.0, tensorflow-probability==0.22.0, tensorstore==0.1.45, termcolor==2.3.0, terminado==0.17.1, text-unidecode==1.3, textblob==0.17.1, tf-slim==1.1.0, thinc==8.1.12, threadpoolctl==3.2.0, tiffio==2023.9.26, tinycss2==1.2.1, toml==0.10.2, tomli==2.0.1, toolz==0.12.0, torch @ https://download.pytorch.org/whl/cu118/torch-2.1.0%2Bcu118-cp310-cp310-linux_x86_64.whl#sha256=a81b554184492005543ddc32e96469f9369d778dedd195d73bda9bed407d6589, torchaudio @ https://download.pytorch.org/whl/cu118/torchaudio-2.1.0%2Bcu118-cp310-cp310-linux_x86_64.whl#sha256=cdfd0a129406155eee595f408cafb92589652da4090d1d2040f5453d4cae71f, torchdata==0.7.0, torchsummary==1.5.1, torchtext==0.16.0, torchvision @ https://download.pytorch.org/whl/cu118/torchvision-0.16.0%2Bcu118-cp310-cp310-linux_x86_64.whl#sha256=033712f65d45afe806676c4129dfe601ad1321d9e092df62b15847c02d4061dc, tornado==6.3.2, tqdm==4.66.1, traitlets==5.7.1, traittypes==0.2.1, triton==2.1.0, tweepy==4.13.0, typer==0.9.0, types-pytz==2023.3.1.1, types-setuptools==68.2.0.0, typing_extensions==4.5.0, tzlocal==5.2, uc-micro-py==1.0.2, uritemplate==4.1.1, urllib3==2.0.7, vega-datasets==0.9.0, wadllib==1.3.6, wasabi==1.1.2, wcwidth==0.2.8, webcolors==1.13, webencodings==0.5.1, websocket-client==1.6.4, Werkzeug==3.0.1, wget==3.2, wheel==0.41.2, widgetsnbextension==3.6.6, wordcloud==1.9.2, wrapt==1.14.1, xarray==2023.7.0, xarray-einstats==0.6.0, xgboost==2.0.1, xlrd==2.0.1, xxhash==3.4.1, xyzservices==2023.10.0, yarl==1.9.2, yfinance==0.2.31, zict==3.0.0, zipp==3.17.0), numpy (v 1.23.5), cuda (v 11.8.89 Build cuda_11.8.r11.8/compiler.31833905_0). The training was accelerated using a Tesla T4 GPU.

Augmentation: The dataset was augmented by a factor of 4

Parameters

Default Advanced Parameters were enabled

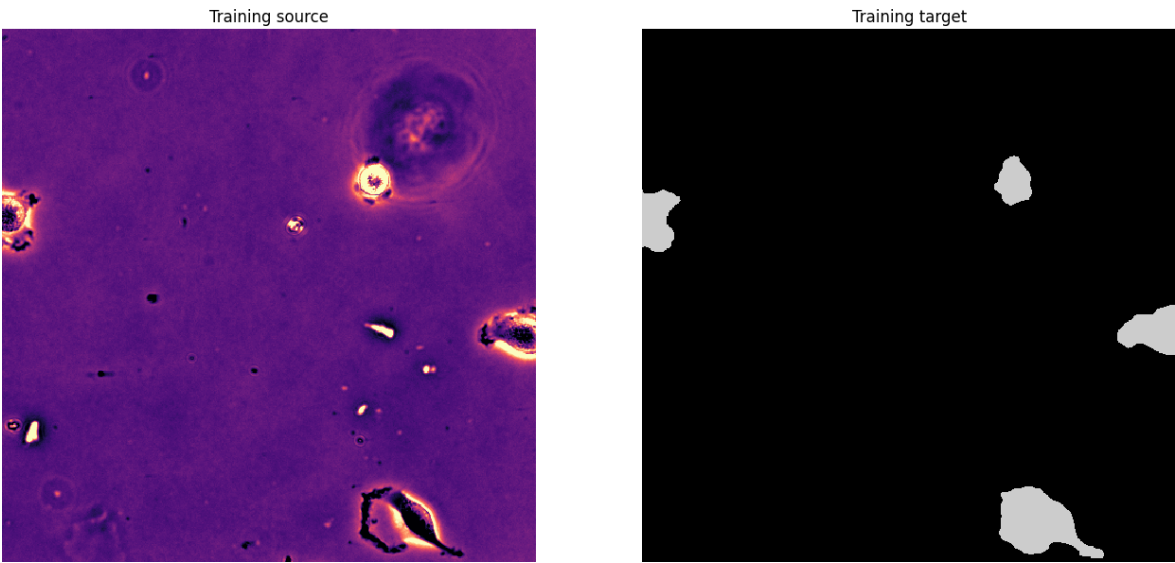
Parameter	Value
number_of_epochs	500
batch_size	8
percentage_validation	10
initial_learning_rate	0.0002

Training Dataset

Training_source: /content/gdrive/MyDrive/Colab Notebooks/workshops/datasets/ctc-glioblastoma-66im/train/sources

Model Path: /content/gdrive/MyDrive/Colab Notebooks/workshops/CellPose_Glio

Example Training pair



References:

- ZeroCostDL4Mic: von Chamier, Lucas & Laine, Romain, et al. "ZeroCostDL4Mic: an open platform to simplify access and use of Deep-Learning in Microscopy." BioRxiv (2020).

- Cellp
pages

Important:
Remember to perform the quality control step on all newly trained models
Please consider depositing your training dataset on Zenodo