

**NAME:** AVINASH SHELKE

**ROLL NO:** 324048

**PRN NO:** 22011002

**DIVISION:** D

**BATCH:** E9

## ASSIGNMENT 3

**AIM:** Perform parsing of family tree using knowledge- base

**THEORY:** Parsing a family tree using knowledge-base theory involves the use of a logical language, such as Prolog, to encode the information contained in the family tree. In Prolog, the family tree is represented as facts and rules. The facts are used to represent the relationships between family members and the rules are used to describe how new relationships can be inferred. In the context of family tree parsing, the structured representation of family relationships can be used to create a knowledge-base that captures familial relationships. This knowledge-base can then be used to parse the family tree in order to obtain information about family members and their relationships.

### CODE:

This program parses family tree with python logic programming . sympy is a Python package that enables symbolic computation. Kanren provides pattern matching and unification on user defined types.

```
!pip list -
v          # Provides list of installed packages ! is showing it's she
ll command
```

Package	Version	Location
Installer		
-----		
absl-py	1.3.0	
/usr/local/lib/python3.8/dist-packages	pip	
aepl	0.0.33	
/usr/local/lib/python3.8/dist-packages	pip	
aesara	2.7.9	
/usr/local/lib/python3.8/dist-packages	pip	

```
aiohttp 3.8.3
/usr/local/lib/python3.8/dist-packages pip
aiosignal 1.3.1
/usr/local/lib/python3.8/dist-packages pip
alabaster 0.7.12
/usr/local/lib/python3.8/dist-packages pip
alumentations 1.2.1
/usr/local/lib/python3.8/dist-packages pip
altair 4.2.0
/usr/local/lib/python3.8/dist-packages pip
appdirs 1.4.4
/usr/local/lib/python3.8/dist-packages pip
arviz 0.12.1
/usr/local/lib/python3.8/dist-packages pip
astor 0.8.1
/usr/local/lib/python3.8/dist-packages pip
astropy 4.3.1
/usr/local/lib/python3.8/dist-packages pip
astunparse 1.6.3
/usr/local/lib/python3.8/dist-packages pip
async-timeout 4.0.2
/usr/local/lib/python3.8/dist-packages pip
asynctest 0.13.0
/usr/local/lib/python3.8/dist-packages pip
atari-py 0.2.9
/usr/local/lib/python3.8/dist-packages pip
atomicwrites 1.4.1
/usr/local/lib/python3.8/dist-packages pip
attrs 22.1.0
/usr/local/lib/python3.8/dist-packages pip
audioread 3.0.0
/usr/local/lib/python3.8/dist-packages pip
autograd 1.5
/usr/local/lib/python3.8/dist-packages pip
Babel 2.11.0
/usr/local/lib/python3.8/dist-packages pip
backcall 0.2.0
/usr/local/lib/python3.8/dist-packages pip
beautifulsoup4 4.6.3
/usr/local/lib/python3.8/dist-packages pip
bleach 5.0.1
/usr/local/lib/python3.8/dist-packages pip
blis 0.7.9
/usr/local/lib/python3.8/dist-packages pip
bokeh 2.3.3
/usr/local/lib/python3.8/dist-packages pip
branca 0.6.0
/usr/local/lib/python3.8/dist-packages pip
bs4 0.0.1
/usr/local/lib/python3.8/dist-packages pip
CacheControl 0.12.11
/usr/local/lib/python3.8/dist-packages pip
cached-property 1.5.2
/usr/local/lib/python3.8/dist-packages pip
cachetools 5.2.0
/usr/local/lib/python3.8/dist-packages pip
catalogue 2.0.8
/usr/local/lib/python3.8/dist-packages pip
```

```
certifi 2022.9.24
/usr/local/lib/python3.8/dist-packages pip
cffi 1.15.1
/usr/local/lib/python3.8/dist-packages pip
cftime 1.6.2
/usr/local/lib/python3.8/dist-packages pip
chardet 3.0.4
/usr/local/lib/python3.8/dist-packages pip
charset-normalizer 2.1.1
/usr/local/lib/python3.8/dist-packages pip
click 7.1.2
/usr/local/lib/python3.8/dist-packages pip
clikit 0.6.2
/usr/local/lib/python3.8/dist-packages pip
cloudpickle 1.5.0
/usr/local/lib/python3.8/dist-packages pip
cmake 3.22.6
/usr/local/lib/python3.8/dist-packages pip
cmdstanpy 1.0.8
/usr/local/lib/python3.8/dist-packages pip
colorcet 3.0.1
/usr/local/lib/python3.8/dist-packages pip
colorlover 0.3.0
/usr/local/lib/python3.8/dist-packages pip
community 1.0.0b1
/usr/local/lib/python3.8/dist-packages pip
confection 0.0.3
/usr/local/lib/python3.8/dist-packages pip
cons 0.4.5
/usr/local/lib/python3.8/dist-packages pip
contextlib2 0.5.5
/usr/local/lib/python3.8/dist-packages pip
convertdate 2.4.0
/usr/local/lib/python3.8/dist-packages pip
crashtest 0.3.1
/usr/local/lib/python3.8/dist-packages pip
crcmod 1.7
/usr/local/lib/python3.8/dist-packages pip
cufflinks 0.17.3
/usr/local/lib/python3.8/dist-packages pip
cvxopt 1.3.0
/usr/local/lib/python3.8/dist-packages pip
cvxpy 1.2.2
/usr/local/lib/python3.8/dist-packages pip
cyclcr 0.11.0
/usr/local/lib/python3.8/dist-packages pip
cymem 2.0.7
/usr/local/lib/python3.8/dist-packages pip
Cython 0.29.32
/usr/local/lib/python3.8/dist-packages pip
daft 0.0.4
/usr/local/lib/python3.8/dist-packages pip
dask 2022.2.0
/usr/local/lib/python3.8/dist-packages pip
datascience 0.17.5
/usr/local/lib/python3.8/dist-packages pip
db-dtypes 1.0.4
/usr/local/lib/python3.8/dist-packages pip
```

```
debugpy 1.0.0
/usr/local/lib/python3.8/dist-packages pip
decorator 4.4.2
/usr/local/lib/python3.8/dist-packages pip
defusedxml 0.7.1
/usr/local/lib/python3.8/dist-packages pip
descartes 1.1.0
/usr/local/lib/python3.8/dist-packages pip
dill 0.3.6
/usr/local/lib/python3.8/dist-packages pip
distributed 2022.2.0
/usr/local/lib/python3.8/dist-packages pip
dlib 19.24.0
/usr/local/lib/python3.8/dist-packages pip
dm-tree 0.1.7
/usr/local/lib/python3.8/dist-packages pip
dnspython 2.2.1
/usr/local/lib/python3.8/dist-packages pip
docutils 0.17.1
/usr/local/lib/python3.8/dist-packages pip
dopamine-rl 1.0.5
/usr/local/lib/python3.8/dist-packages pip
earthengine-api 0.1.332
/usr/local/lib/python3.8/dist-packages pip
easydict 1.10
/usr/local/lib/python3.8/dist-packages pip
ecos 2.0.10
/usr/local/lib/python3.8/dist-packages pip
editdistance 0.5.3
/usr/local/lib/python3.8/dist-packages pip
en-core-web-sm 3.4.1
/usr/local/lib/python3.8/dist-packages pip
entrypoints 0.4
/usr/local/lib/python3.8/dist-packages pip
ephem 4.1.3
/usr/local/lib/python3.8/dist-packages pip
et-xmlfile 1.1.0
/usr/local/lib/python3.8/dist-packages pip
etils 0.9.0
/usr/local/lib/python3.8/dist-packages pip
etuples 0.3.8
/usr/local/lib/python3.8/dist-packages pip
fa2 0.3.5
/usr/local/lib/python3.8/dist-packages pip
fastai 2.7.10
/usr/local/lib/python3.8/dist-packages pip
fastcore 1.5.27
/usr/local/lib/python3.8/dist-packages pip
fastdownload 0.0.7
/usr/local/lib/python3.8/dist-packages pip
fastdtw 0.3.4
/usr/local/lib/python3.8/dist-packages pip
fastjsonschema 2.16.2
/usr/local/lib/python3.8/dist-packages pip
fastprogress 1.0.3
/usr/local/lib/python3.8/dist-packages pip
fastrlock 0.8.1
/usr/local/lib/python3.8/dist-packages pip
```

```
feather-format 0.4.1
/usr/local/lib/python3.8/dist-packages pip
filelock 3.8.0
/usr/local/lib/python3.8/dist-packages pip
firebase-admin 5.3.0
/usr/local/lib/python3.8/dist-packages pip
fix-yahoo-finance 0.0.22
/usr/local/lib/python3.8/dist-packages pip
Flask 1.1.4
/usr/local/lib/python3.8/dist-packages pip
flatbuffers 1.12
/usr/local/lib/python3.8/dist-packages pip
folium 0.12.1.post1
/usr/local/lib/python3.8/dist-packages pip
frozenlist 1.3.3
/usr/local/lib/python3.8/dist-packages pip
fsspec 2022.11.0
/usr/local/lib/python3.8/dist-packages pip
future 0.16.0
/usr/local/lib/python3.8/dist-packages pip
gast 0.4.0
/usr/local/lib/python3.8/dist-packages pip
GDAL 2.2.2
/usr/local/lib/python3.8/dist-packages pip
gdown 4.4.0
/usr/local/lib/python3.8/dist-packages pip
gensim 3.6.0
/usr/local/lib/python3.8/dist-packages pip
geographiclib 1.52
/usr/local/lib/python3.8/dist-packages pip
geopy 1.17.0
/usr/local/lib/python3.8/dist-packages pip
gin-config 0.5.0
/usr/local/lib/python3.8/dist-packages pip
glob2 0.7
/usr/local/lib/python3.8/dist-packages pip
google 2.0.3
/usr/local/lib/python3.8/dist-packages pip
google-api-core 2.8.2
/usr/local/lib/python3.8/dist-packages pip
google-api-python-client 1.12.11
/usr/local/lib/python3.8/dist-packages pip
google-auth 2.14.1
/usr/local/lib/python3.8/dist-packages pip
google-auth-httpplib2 0.0.4
/usr/local/lib/python3.8/dist-packages pip
google-auth-oauthlib 0.4.6
/usr/local/lib/python3.8/dist-packages pip
google-cloud-bigquery 3.3.6
/usr/local/lib/python3.8/dist-packages pip
google-cloud-bigquery-storage 2.16.2
/usr/local/lib/python3.8/dist-packages pip
google-cloud-core 2.3.2
/usr/local/lib/python3.8/dist-packages pip
google-cloud-datastore 2.9.0
/usr/local/lib/python3.8/dist-packages pip
google-cloud-firestore 2.7.2
/usr/local/lib/python3.8/dist-packages pip
```

```
google-cloud-language      2.6.1
/usr/local/lib/python3.8/dist-packages pip
google-cloud-storage       2.5.0
/usr/local/lib/python3.8/dist-packages pip
google-cloud-translate     3.8.4
/usr/local/lib/python3.8/dist-packages pip
google-colab               1.0.0
/usr/local/lib/python3.8/dist-packages pip
google-crc32c              1.5.0
/usr/local/lib/python3.8/dist-packages pip
google-pasta               0.2.0
/usr/local/lib/python3.8/dist-packages pip
google-resumable-media     2.4.0
/usr/local/lib/python3.8/dist-packages pip
googleapis-common-protos   1.57.0
/usr/local/lib/python3.8/dist-packages pip
googledrivedownloader      0.4
/usr/local/lib/python3.8/dist-packages pip
graphviz                   0.10.1
/usr/local/lib/python3.8/dist-packages pip
greenlet                   2.0.1
/usr/local/lib/python3.8/dist-packages pip
grpcio                     1.50.0
/usr/local/lib/python3.8/dist-packages pip
grpcio-status              1.48.2
/usr/local/lib/python3.8/dist-packages pip
gspread                    3.4.2
/usr/local/lib/python3.8/dist-packages pip
gspread-dataframe          3.0.8
/usr/local/lib/python3.8/dist-packages pip
gym                         0.25.2
/usr/local/lib/python3.8/dist-packages pip
gym-notices                0.0.8
/usr/local/lib/python3.8/dist-packages pip
h5py                       3.1.0
/usr/local/lib/python3.8/dist-packages pip
HeapDict                   1.0.1
/usr/local/lib/python3.8/dist-packages pip
hijri-converter            2.2.4
/usr/local/lib/python3.8/dist-packages pip
holidays                   0.17
/usr/local/lib/python3.8/dist-packages pip
holoviews                  1.14.9
/usr/local/lib/python3.8/dist-packages pip
html5lib                   1.0.1
/usr/local/lib/python3.8/dist-packages pip
httpimport                 0.5.18
/usr/local/lib/python3.8/dist-packages pip
httplib2                   0.17.4
/usr/local/lib/python3.8/dist-packages pip
httpstan                   4.6.1
/usr/local/lib/python3.8/dist-packages pip
humanize                   0.5.1
/usr/local/lib/python3.8/dist-packages pip
hyperopt                   0.1.2
/usr/local/lib/python3.8/dist-packages pip
idna                       2.10
/usr/local/lib/python3.8/dist-packages pip
```

```
imageio 2.9.0
/usr/local/lib/python3.8/dist-packages pip
imagesize 1.4.1
/usr/local/lib/python3.8/dist-packages pip
imbalanced-learn 0.8.1
/usr/local/lib/python3.8/dist-packages pip
imblearn 0.0
/usr/local/lib/python3.8/dist-packages pip
imgaug 0.4.0
/usr/local/lib/python3.8/dist-packages pip
importlib-metadata 4.13.0
/usr/local/lib/python3.8/dist-packages pip
importlib-resources 5.10.0
/usr/local/lib/python3.8/dist-packages pip
imutils 0.5.4
/usr/local/lib/python3.8/dist-packages pip
inflect 2.1.0
/usr/local/lib/python3.8/dist-packages pip
intel-openmp 2022.2.1
/usr/local/lib/python3.8/dist-packages pip
intervaltree 2.1.0
/usr/local/lib/python3.8/dist-packages pip
ipykernel 5.3.4
/usr/local/lib/python3.8/dist-packages pip
ipython 7.9.0
/usr/local/lib/python3.8/dist-packages pip
ipython-genutils 0.2.0
/usr/local/lib/python3.8/dist-packages pip
ipython-sql 0.3.9
/usr/local/lib/python3.8/dist-packages pip
ipywidgets 7.7.1
/usr/local/lib/python3.8/dist-packages pip
itsdangerous 1.1.0
/usr/local/lib/python3.8/dist-packages pip
jax 0.3.25
/usr/local/lib/python3.8/dist-packages pip
jaxlib 0.3.25+cuda11.cudnn805
/usr/local/lib/python3.8/dist-packages pip
jieba 0.42.1
/usr/local/lib/python3.8/dist-packages pip
Jinja2 2.11.3
/usr/local/lib/python3.8/dist-packages pip
joblib 1.2.0
/usr/local/lib/python3.8/dist-packages pip
jpeg4py 0.1.4
/usr/local/lib/python3.8/dist-packages pip
jsonschema 4.3.3
/usr/local/lib/python3.8/dist-packages pip
jupyter-client 6.1.12
/usr/local/lib/python3.8/dist-packages pip
jupyter-console 6.1.0
/usr/local/lib/python3.8/dist-packages pip
jupyter-core 4.11.2
/usr/local/lib/python3.8/dist-packages pip
jupyterlab-widgets 3.0.3
/usr/local/lib/python3.8/dist-packages pip
kaggle 1.5.12
/usr/local/lib/python3.8/dist-packages pip
```

```
kapre 0.3.7
/usr/local/lib/python3.8/dist-packages pip
keras 2.9.0
/usr/local/lib/python3.8/dist-packages pip
Keras-Preprocessing 1.1.2
/usr/local/lib/python3.8/dist-packages pip
keras-vis 0.4.1
/usr/local/lib/python3.8/dist-packages pip
kiwisolver 1.4.4
/usr/local/lib/python3.8/dist-packages pip
korean-lunar-calendar 0.3.1
/usr/local/lib/python3.8/dist-packages pip
langcodes 3.3.0
/usr/local/lib/python3.8/dist-packages pip
libclang 14.0.6
/usr/local/lib/python3.8/dist-packages pip
librosa 0.8.1
/usr/local/lib/python3.8/dist-packages pip
lightgbm 2.2.3
/usr/local/lib/python3.8/dist-packages pip
llvmlite 0.39.1
/usr/local/lib/python3.8/dist-packages pip
lmdb 0.99
/usr/local/lib/python3.8/dist-packages pip
locket 1.0.0
/usr/local/lib/python3.8/dist-packages pip
logical-unification 0.4.5
/usr/local/lib/python3.8/dist-packages pip
LunarCalendar 0.0.9
/usr/local/lib/python3.8/dist-packages pip
lxml 4.9.1
/usr/local/lib/python3.8/dist-packages pip
Markdown 3.4.1
/usr/local/lib/python3.8/dist-packages pip
MarkupSafe 2.0.1
/usr/local/lib/python3.8/dist-packages pip
marshmallow 3.19.0
/usr/local/lib/python3.8/dist-packages pip
matplotlib 3.2.2
/usr/local/lib/python3.8/dist-packages pip
matplotlib-venn 0.11.7
/usr/local/lib/python3.8/dist-packages pip
miniKanren 1.0.3
/usr/local/lib/python3.8/dist-packages pip
missingno 0.5.1
/usr/local/lib/python3.8/dist-packages pip
mistune 0.8.4
/usr/local/lib/python3.8/dist-packages pip
mizani 0.7.3
/usr/local/lib/python3.8/dist-packages pip
mkl 2019.0
/usr/local/lib/python3.8/dist-packages pip
mlxtend 0.14.0
/usr/local/lib/python3.8/dist-packages pip
more-itertools 9.0.0
/usr/local/lib/python3.8/dist-packages pip
moviepy 0.2.3.5
/usr/local/lib/python3.8/dist-packages pip
```



```
mpmath 1.2.1
/usr/local/lib/python3.8/dist-packages pip
msgpack 1.0.4
/usr/local/lib/python3.8/dist-packages pip
multidict 6.0.2
/usr/local/lib/python3.8/dist-packages pip
multipledispatch 0.6.0
/usr/local/lib/python3.8/dist-packages pip
multitasking 0.0.11
/usr/local/lib/python3.8/dist-packages pip
murmurhash 1.0.9
/usr/local/lib/python3.8/dist-packages pip
music21 5.5.0
/usr/local/lib/python3.8/dist-packages pip
natsort 5.5.0
/usr/local/lib/python3.8/dist-packages pip
nbconvert 5.6.1
/usr/local/lib/python3.8/dist-packages pip
nbformat 5.7.0
/usr/local/lib/python3.8/dist-packages pip
netCDF4 1.6.2
/usr/local/lib/python3.8/dist-packages pip
networkx 2.6.3
/usr/local/lib/python3.8/dist-packages pip
nibabel 3.0.2
/usr/local/lib/python3.8/dist-packages pip
nltk 3.7
/usr/local/lib/python3.8/dist-packages pip
notebook 5.7.16
/usr/local/lib/python3.8/dist-packages pip
numba 0.56.4
/usr/local/lib/python3.8/dist-packages pip
numexpr 2.8.4
/usr/local/lib/python3.8/dist-packages pip
numpy 1.21.6
/usr/local/lib/python3.8/dist-packages pip
oauth2client 4.1.3
/usr/local/lib/python3.8/dist-packages pip
oauthlib 3.2.2
/usr/local/lib/python3.8/dist-packages pip
okgrade 0.4.3
/usr/local/lib/python3.8/dist-packages pip
opencv-contrib-python 4.6.0.66
/usr/local/lib/python3.8/dist-packages pip
opencv-python 4.6.0.66
/usr/local/lib/python3.8/dist-packages pip
opencv-python-headless 4.6.0.66
/usr/local/lib/python3.8/dist-packages pip
openpyxl 3.0.10
/usr/local/lib/python3.8/dist-packages pip
opt-einsum 3.3.0
/usr/local/lib/python3.8/dist-packages pip
osqp 0.6.2.post0
/usr/local/lib/python3.8/dist-packages pip
packaging 21.3
/usr/local/lib/python3.8/dist-packages pip
palettable 3.3.0
/usr/local/lib/python3.8/dist-packages pip
```

```
pandas 1.3.5
/usr/local/lib/python3.8/dist-packages pip
pandas-datareader 0.9.0
/usr/local/lib/python3.8/dist-packages pip
pandas-gbq 0.17.9
/usr/local/lib/python3.8/dist-packages pip
pandas-profiling 1.4.1
/usr/local/lib/python3.8/dist-packages pip
pandocfilters 1.5.0
/usr/local/lib/python3.8/dist-packages pip
panel 0.12.1
/usr/local/lib/python3.8/dist-packages pip
param 1.12.2
/usr/local/lib/python3.8/dist-packages pip
parso 0.8.3
/usr/local/lib/python3.8/dist-packages pip
partd 1.3.0
/usr/local/lib/python3.8/dist-packages pip
pastel 0.2.1
/usr/local/lib/python3.8/dist-packages pip
pathlib 1.0.1
/usr/local/lib/python3.8/dist-packages pip
pathy 0.9.0
/usr/local/lib/python3.8/dist-packages pip
patsy 0.5.3
/usr/local/lib/python3.8/dist-packages pip
pep517 0.13.0
/usr/local/lib/python3.8/dist-packages pip
pexpect 4.8.0
/usr/local/lib/python3.8/dist-packages pip
pickleshare 0.7.5
/usr/local/lib/python3.8/dist-packages pip
Pillow 7.1.2
/usr/local/lib/python3.8/dist-packages pip
pip 21.1.3
/usr/local/lib/python3.8/dist-packages pip
pip-tools 6.2.0
/usr/local/lib/python3.8/dist-packages pip
plotly 5.5.0
/usr/local/lib/python3.8/dist-packages pip
plotnine 0.8.0
/usr/local/lib/python3.8/dist-packages pip
pluggy 0.7.1
/usr/local/lib/python3.8/dist-packages pip
pooch 1.6.0
/usr/local/lib/python3.8/dist-packages pip
portpicker 1.3.9
/usr/local/lib/python3.8/dist-packages pip
prefetch-generator 1.0.3
/usr/local/lib/python3.8/dist-packages pip
preshed 3.0.8
/usr/local/lib/python3.8/dist-packages pip
prettytable 3.5.0
/usr/local/lib/python3.8/dist-packages pip
progressbar2 3.38.0
/usr/local/lib/python3.8/dist-packages pip
prometheus-client 0.15.0
/usr/local/lib/python3.8/dist-packages pip
```

```
promise 2.3
/usr/local/lib/python3.8/dist-packages pip
prompt-toolkit 2.0.10
/usr/local/lib/python3.8/dist-packages pip
prophet 1.1.1
/usr/local/lib/python3.8/dist-packages pip
proto-plus 1.22.1
/usr/local/lib/python3.8/dist-packages pip
protobuf 3.19.6
/usr/local/lib/python3.8/dist-packages pip
psutil 5.4.8
/usr/local/lib/python3.8/dist-packages pip
psycopg2 2.9.5
/usr/local/lib/python3.8/dist-packages pip
ptyprocess 0.7.0
/usr/local/lib/python3.8/dist-packages pip
py 1.11.0
/usr/local/lib/python3.8/dist-packages pip
pyarrow 9.0.0
/usr/local/lib/python3.8/dist-packages pip
pyasn1 0.4.8
/usr/local/lib/python3.8/dist-packages pip
pyasn1-modules 0.2.8
/usr/local/lib/python3.8/dist-packages pip
pycocotools 2.0.6
/usr/local/lib/python3.8/dist-packages pip
pycuparser 2.21
/usr/local/lib/python3.8/dist-packages pip
pyct 0.4.8
/usr/local/lib/python3.8/dist-packages pip
pydantic 1.10.2
/usr/local/lib/python3.8/dist-packages pip
pydata-google-auth 1.4.0
/usr/local/lib/python3.8/dist-packages pip
pydot 1.3.0
/usr/local/lib/python3.8/dist-packages pip
pydot-ng 2.0.0
/usr/local/lib/python3.8/dist-packages pip
pydotplus 2.0.2
/usr/local/lib/python3.8/dist-packages pip
PyDrive 1.3.1
/usr/local/lib/python3.8/dist-packages pip
pyemd 0.5.1
/usr/local/lib/python3.8/dist-packages pip
pyerfa 2.0.0.1
/usr/local/lib/python3.8/dist-packages pip
Pygments 2.6.1
/usr/local/lib/python3.8/dist-packages pip
pygobject 3.26.1
/usr/lib/python3/dist-packages
pylev 1.4.0
/usr/local/lib/python3.8/dist-packages pip
pymc 4.1.4
/usr/local/lib/python3.8/dist-packages pip
PyMeeus 0.5.11
/usr/local/lib/python3.8/dist-packages pip
pymongo 4.3.3
/usr/local/lib/python3.8/dist-packages pip
```

```
pymystem3 0.2.0
/usr/local/lib/python3.8/dist-packages pip
PyOpenGL 3.1.6
/usr/local/lib/python3.8/dist-packages pip
pyparsing 3.0.9
/usr/local/lib/python3.8/dist-packages pip
pyrsistent 0.19.2
/usr/local/lib/python3.8/dist-packages pip
pysimdjson 3.2.0
/usr/local/lib/python3.8/dist-packages pip
pysndfile 1.3.8
/usr/local/lib/python3.8/dist-packages pip
PySocks 1.7.1
/usr/local/lib/python3.8/dist-packages pip
pystan 3.3.0
/usr/local/lib/python3.8/dist-packages pip
pytest 3.6.4
/usr/local/lib/python3.8/dist-packages pip
python-apt 0.0.0
/usr/local/lib/python3.8/dist-packages
python-dateutil 2.8.2
/usr/local/lib/python3.8/dist-packages pip
python-louvain 0.16
/usr/local/lib/python3.8/dist-packages pip
python-slugify 7.0.0
/usr/local/lib/python3.8/dist-packages pip
python-utils 3.4.5
/usr/local/lib/python3.8/dist-packages pip
pytz 2022.6
/usr/local/lib/python3.8/dist-packages pip
pyviz-comms 2.2.1
/usr/local/lib/python3.8/dist-packages pip
PyWavelets 1.3.0
/usr/local/lib/python3.8/dist-packages pip
PyYAML 6.0
/usr/local/lib/python3.8/dist-packages pip
pyzmq 23.2.1
/usr/local/lib/python3.8/dist-packages pip
qdldl 0.1.5.post2
/usr/local/lib/python3.8/dist-packages pip
qudida 0.0.4
/usr/local/lib/python3.8/dist-packages pip
regex 2022.6.2
/usr/local/lib/python3.8/dist-packages pip
requests 2.23.0
/usr/local/lib/python3.8/dist-packages pip
requests-oauthlib 1.3.1
/usr/local/lib/python3.8/dist-packages pip
resampy 0.4.2
/usr/local/lib/python3.8/dist-packages pip
rpy2 3.5.5
/usr/local/lib/python3.8/dist-packages pip
rsa 4.9
/usr/local/lib/python3.8/dist-packages pip
scikit-image 0.18.3
/usr/local/lib/python3.8/dist-packages pip
scikit-learn 1.0.2
/usr/local/lib/python3.8/dist-packages pip
```

```
scipy 1.7.3
/usr/local/lib/python3.8/dist-packages pip
screen-resolution-extra 0.0.0
/usr/lib/python3/dist-packages
scs 3.2.2
/usr/local/lib/python3.8/dist-packages pip
seaborn 0.11.2
/usr/local/lib/python3.8/dist-packages pip
Send2Trash 1.8.0
/usr/local/lib/python3.8/dist-packages pip
setuptools 57.4.0
/usr/local/lib/python3.8/dist-packages pip
setuptools-git 1.2
/usr/local/lib/python3.8/dist-packages pip
Shapely 1.8.5.post1
/usr/local/lib/python3.8/dist-packages pip
six 1.15.0
/usr/local/lib/python3.8/dist-packages pip
sklearn-pandas 1.8.0
/usr/local/lib/python3.8/dist-packages pip
smart-open 5.2.1
/usr/local/lib/python3.8/dist-packages pip
snowballstemmer 2.2.0
/usr/local/lib/python3.8/dist-packages pip
sortedcontainers 2.4.0
/usr/local/lib/python3.8/dist-packages pip
soundfile 0.11.0
/usr/local/lib/python3.8/dist-packages pip
spacy 3.4.3
/usr/local/lib/python3.8/dist-packages pip
spacy-legacy 3.0.10
/usr/local/lib/python3.8/dist-packages pip
spacy-loggers 1.0.3
/usr/local/lib/python3.8/dist-packages pip
Sphinx 1.8.6
/usr/local/lib/python3.8/dist-packages pip
sphinxcontrib-serializinghtml 1.1.5
/usr/local/lib/python3.8/dist-packages pip
sphinxcontrib-websupport 1.2.4
/usr/local/lib/python3.8/dist-packages pip
SQLAlchemy 1.4.44
/usr/local/lib/python3.8/dist-packages pip
sqlparse 0.4.3
/usr/local/lib/python3.8/dist-packages pip
srsly 2.4.5
/usr/local/lib/python3.8/dist-packages pip
statsmodels 0.12.2
/usr/local/lib/python3.8/dist-packages pip
sympy 1.7.1
/usr/local/lib/python3.8/dist-packages pip
tables 3.7.0
/usr/local/lib/python3.8/dist-packages pip
tabulate 0.8.10
/usr/local/lib/python3.8/dist-packages pip
tblib 1.7.0
/usr/local/lib/python3.8/dist-packages pip
tenacity 8.1.0
/usr/local/lib/python3.8/dist-packages pip
```

```
tensorboard 2.9.1
/usr/local/lib/python3.8/dist-packages pip
tensorboard-data-server 0.6.1
/usr/local/lib/python3.8/dist-packages pip
tensorboard-plugin-wit 1.8.1
/usr/local/lib/python3.8/dist-packages pip
tensorflow 2.9.2
/usr/local/lib/python3.8/dist-packages pip
tensorflow-datasets 4.6.0
/usr/local/lib/python3.8/dist-packages pip
tensorflow-estimator 2.9.0
/usr/local/lib/python3.8/dist-packages pip
tensorflow-gcs-config 2.9.1
/usr/local/lib/python3.8/dist-packages pip
tensorflow-hub 0.12.0
/usr/local/lib/python3.8/dist-packages pip
tensorflow-io-gcs-filesystem 0.28.0
/usr/local/lib/python3.8/dist-packages pip
tensorflow-metadata 1.11.0
/usr/local/lib/python3.8/dist-packages pip
tensorflow-probability 0.17.0
/usr/local/lib/python3.8/dist-packages pip
termcolor 2.1.1
/usr/local/lib/python3.8/dist-packages pip
terminado 0.13.3
/usr/local/lib/python3.8/dist-packages pip
testpath 0.6.0
/usr/local/lib/python3.8/dist-packages pip
text-unidecode 1.3
/usr/local/lib/python3.8/dist-packages pip
textblob 0.15.3
/usr/local/lib/python3.8/dist-packages pip
thinc 8.1.5
/usr/local/lib/python3.8/dist-packages pip
threadpoolctl 3.1.0
/usr/local/lib/python3.8/dist-packages pip
tifffile 2021.11.2
/usr/local/lib/python3.8/dist-packages pip
toml 0.10.2
/usr/local/lib/python3.8/dist-packages pip
tomli 2.0.1
/usr/local/lib/python3.8/dist-packages pip
toolz 0.12.0
/usr/local/lib/python3.8/dist-packages pip
torch 1.12.1+cu113
/usr/local/lib/python3.8/dist-packages pip
torchaudio 0.12.1+cu113
/usr/local/lib/python3.8/dist-packages pip
torchsummary 1.5.1
/usr/local/lib/python3.8/dist-packages pip
torchtext 0.13.1
/usr/local/lib/python3.8/dist-packages pip
torchvision 0.13.1+cu113
/usr/local/lib/python3.8/dist-packages pip
tornado 6.0.4
/usr/local/lib/python3.8/dist-packages pip
tqdm 4.64.1
/usr/local/lib/python3.8/dist-packages pip
```

```
traitlets 5.1.1
/usr/local/lib/python3.8/dist-packages pip
tweepy 3.10.0
/usr/local/lib/python3.8/dist-packages pip
typeguard 2.7.1
/usr/local/lib/python3.8/dist-packages pip
typer 0.7.0
/usr/local/lib/python3.8/dist-packages pip
typing-extensions 4.1.1
/usr/local/lib/python3.8/dist-packages pip
tzlocal 1.5.1
/usr/local/lib/python3.8/dist-packages pip
uritemplate 3.0.1
/usr/local/lib/python3.8/dist-packages pip
urllib3 1.24.3
/usr/local/lib/python3.8/dist-packages pip
vega-datasets 0.9.0
/usr/local/lib/python3.8/dist-packages pip
wasabi 0.10.1
/usr/local/lib/python3.8/dist-packages pip
wcwidth 0.2.5
/usr/local/lib/python3.8/dist-packages pip
webargs 8.2.0
/usr/local/lib/python3.8/dist-packages pip
webencodings 0.5.1
/usr/local/lib/python3.8/dist-packages pip
Werkzeug 1.0.1
/usr/local/lib/python3.8/dist-packages pip
wheel 0.38.4
/usr/local/lib/python3.8/dist-packages pip
widgetsnbextension 3.6.1
/usr/local/lib/python3.8/dist-packages pip
wordcloud 1.8.2.2
/usr/local/lib/python3.8/dist-packages pip
wrapt 1.14.1
/usr/local/lib/python3.8/dist-packages pip
xarray 0.20.2
/usr/local/lib/python3.8/dist-packages pip
xarray-einstats 0.2.2
/usr/local/lib/python3.8/dist-packages pip
xgboost 0.90
/usr/local/lib/python3.8/dist-packages pip
xkit 0.0.0
/usr/lib/python3/dist-packages
xlrd 1.1.0
/usr/local/lib/python3.8/dist-packages pip
xlwt 1.3.0
/usr/local/lib/python3.8/dist-packages pip
yarl 1.8.1
/usr/local/lib/python3.8/dist-packages pip
yellowbrick 1.5
/usr/local/lib/python3.8/dist-packages pip
zict 2.2.0
/usr/local/lib/python3.8/dist-packages pip
zipp 3.10.0
/usr/local/lib/python3.8/dist-packages pip
```

```
pip install logic
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
Collecting logic
  Downloading logic-0.2.3.tar.gz (20 kB)
Requirement already satisfied: toolz in /usr/local/lib/python3.8/dist-packages (from logic) (0.12.0)
Requirement already satisfied: multipledispatch in /usr/local/lib/python3.8/dist-packages (from logic) (0.6.0)
Collecting unification
  Downloading unification-0.2.2-py2.py3-none-any.whl (10 kB)
Requirement already satisfied: six in /usr/local/lib/python3.8/dist-packages (from multipledispatch->logic) (1.15.0)
Building wheels for collected packages: logic
  Building wheel for logic (setup.py) ... done
  Created wheel for logic: filename=logic-0.2.3-py3-none-any.whl size=13726 sha256=3f9e727f0c2cd3ef0a6ed704b22b33137cfa355579c8993fd2ce28efeec829db
  Stored in directory: /root/.cache/pip/wheels/5a/85/de/16b5eb6b1d4acd8d7450d3d21755ef8496e69a99f7eb650b2d
Successfully built logic
Installing collected packages: unification, logic
Successfully installed logic-0.2.3 unification-0.2.2
```

```
pip install sympy
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
Requirement already satisfied: sympy in /usr/local/lib/python3.8/dist-packages (1.7.1)
Requirement already satisfied: mpmath>=0.19 in /usr/local/lib/python3.8/dist-packages (from sympy) (1.2.1)
```

```
pip install kanren
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
Collecting kanren
  Downloading kanren-0.2.3.tar.gz (23 kB)
Requirement already satisfied: toolz in /usr/local/lib/python3.8/dist-packages (from kanren) (0.12.0)
Requirement already satisfied: multipledispatch in /usr/local/lib/python3.8/dist-packages (from kanren) (0.6.0)
Requirement already satisfied: unification in /usr/local/lib/python3.8/dist-packages (from kanren) (0.2.2)
Requirement already satisfied: six in /usr/local/lib/python3.8/dist-packages (from multipledispatch->kanren) (1.15.0)
Building wheels for collected packages: kanren
  Building wheel for kanren (setup.py) ... done
  Created wheel for kanren: filename=kanren-0.2.3-py3-none-any.whl size=15871 sha256=e832f9c0447e597c9c4667460ed6fd420105d5e867ba737c3946ca61f8d3bdc7
  Stored in directory: /root/.cache/pip/wheels/69/e7/58/f138e1a8e1b6a717490d4c69ed313e46b459fb5bde2a100b9b

```



```
Successfully built kanren
Installing collected packages: kanren
Successfully installed kanren-0.2.3
```

```
import json
from logpy import Relation, facts, run, conde, var, eq, membero
```

```
def wife(x,y):
    temp=var()
    return conde((father(y,temp),mother(x,temp)))
```

```
def grandMother(x,y):
    temp=var()
    return conde((father(temp,y),mother(x,temp)))
```

```
def nephew(x,y):
    temp=var()
    return conde((father(temp,x),sibling(y,temp)))
```

```
# Check if 'x' is the parent of 'y'
def parent(x, y):
    return conde([father(x, y)], [mother(x, y)])
```

```
# Check if 'x' is the grandparent of 'y'
def grandparent(x, y):
    temp = var()
    return conde((parent(x, temp), parent(temp, y)))
```

```
# Check for sibling relationship between 'a' and 'b'
def sibling(x, y):
    temp = var()
    return conde((parent(temp, x), parent(temp, y)))
```

```
# Check if x is y's uncle
def uncle(x, y):
    temp = var()
    return conde((father(temp, x), grandparent(temp, y)))
```

```
if __name__=='__main__':
    father = Relation()
    mother = Relation()
```

```
gender=Relation()
```

```
with open ('/content/Shivaji_Maharaj.json') as f:  
    d = json.loads(f.read())
```

```
for item in d['father']:  
    facts(father, (list(item.keys())[0], list(item.values())[0]))  
for item in d['mother']:  
    facts(mother, (list(item.keys())[0], list(item.values())[0]))  
for item in d['Gender']:  
    facts(gender, (list(item.keys())[0], list(item.values())[0]))
```

```
temp = var()
```

```
#nephew  
name="Dipabai"  
output = run(0, temp, nephew(temp, name))  
for item in output:  
    print(item)
```

```
Shivaji Maharaj(Second)  
Sambhaji Maharaj(Second)  
Shahu Maharaj
```

```
#grandmother  
name="Sambhaji Maharaj(Second)"  
output = run(0, temp, grandMother(temp, name))  
for item in output:  
    print(item)
```

```
Soyrabai
```

```
#wife of Rajaram Maharaj  
name='Rajaram Maharaj'  
temp=var()  
output=run(0,temp,father(name,temp),mother(temp,temp))  
print("List of "+ name + "'s wife:")  
for item in output:  
    print(item)
```

```
List of Rajaram Maharaj's wife:
```

```
name='Rajaram Maharaj'  
output=run(0,temp,wife(temp,name))  
print("List of Rajaram Maharaj's wife:")  
for item in output:
```

```
print(item)
```

```
List of Rajaram Maharaj's wife:  
Tarabai  
Rajasbai
```

```
#co-sister-in-law  
name='Yesubai'  
temp=var()  
temp1=var()  
y=var()  
output=run(0,temp,mother(name,temp),father(y,temp),father(temp1,y),father(temp1,temp),gender(temp,"female"))  
# output = [temp for temp in output if temp != 'Sambhaji Maharaj']  
  
output = [temp for temp in output if temp != y]  
print("List of " + name + "'s co-sisters-in-law:")  
for item in output:  
    print(item)
```

```
List of Yesubai's co-sisters-in-law:
```

```
#daughter in law of shivaji maharaj  
name='Shivaji Maharaj'  
y=var()  
temp=var()  
output=run(0,temp,father(name,y),father(y,temp),mother(temp,temp))  
print("List of " + name + "'s daughters-in-law:")  
for item in output:  
    print(item)
```

```
List of Shivaji Maharaj's daughters-in-law:
```

```
# Rajaram Maharaj's children  
name = 'Rajaram Maharaj'  
output = run(0, temp, father(name, temp))  
print("\nList of " + name + "'s children:")  
for item in output:  
    print(item)
```

```
List of Rajaram Maharaj's children:  
Shivaji Maharaj (Second)  
Sambhaji Maharaj (Second)
```

```
#Who is Sambhaji Maharaj's mother?  
name = 'Sambhaji Maharaj'  
output = run(0, temp, mother(temp, name))[0]  
print("\n" + name + "'s mother:\n" + output)
```

```
Sambhaji Maharaj's mother:
```

Saibai

```
# Shivaji Maharaj(Second) parents name
name = 'Shivaji Maharaj(Second) '
output = run(0, temp, parent(temp, name))
print("\nList of " + name + "'s parents:")
for item in output:
    print(item)
```

List of Shivaji Maharaj(Second)'s parents:  
Rajaram Maharaj  
Tarabai

```
# Shahu Maharaj's grandparents
name = 'Shahu Maharaj'
output = run(0, temp, grandparent(temp, name))
print("\nList of " + name + "'s grandparents:")
for item in output:
    print(item)
```

List of Shahu Maharaj's grandparents:  
Saibai  
Shivaji Maharaj

```
# Sambhaji Maharaj's siblings
name = 'Sambhaji Maharaj'
output = run(0, temp, sibling(temp, name))
siblings = [temp for temp in output if temp != name]
print("\nList of " + name + "'s siblings:")
for item in siblings:
    print(item)
```

List of Sambhaji Maharaj's siblings:  
RajKunvarbai  
Kamalabai  
Sakhubai  
Ranubai  
Rajaram Maharaj  
Ambikabai  
Dipabai

```
# Shahu Maharaj's uncle
name = 'Shahu Maharaj'
name_father = run(0, temp, father(temp, name))[0]
output = run(0, temp, uncle(temp, name), gender(temp, "male"))
output = [temp for temp in output if temp != name_father]
print("\nList of " + name + "'s uncles:")
for item in output:
    print(item)
```

```
List of Shahu Maharaj's uncles:  
Rajaram Maharaj
```

```
# All spouses  
a, b, c = var(), var(), var()  
output = run(0, (a, b), (father, a, c), (mother, b, c))  
print("\nList of all spouses:")  
for item in output:  
    print('Husband:', item[0], '<==> Wife:', item[1])
```

```
List of all spouses:  
Husband: Shivaji Maharaj <==> Wife: Sagunabai  
Husband: Shivaji Maharaj <==> Wife: Sakvarbai  
Husband: Rajaram Maharaj <==> Wife: Rajasbai  
Husband: Sambhaji Maharaj <==> Wife: Yesubai  
Husband: Shivaji Maharaj <==> Wife: Saibai  
Husband: Rajaram Maharaj <==> Wife: Tarabai  
Husband: Shivaji Maharaj <==> Wife: Soyrabai
```