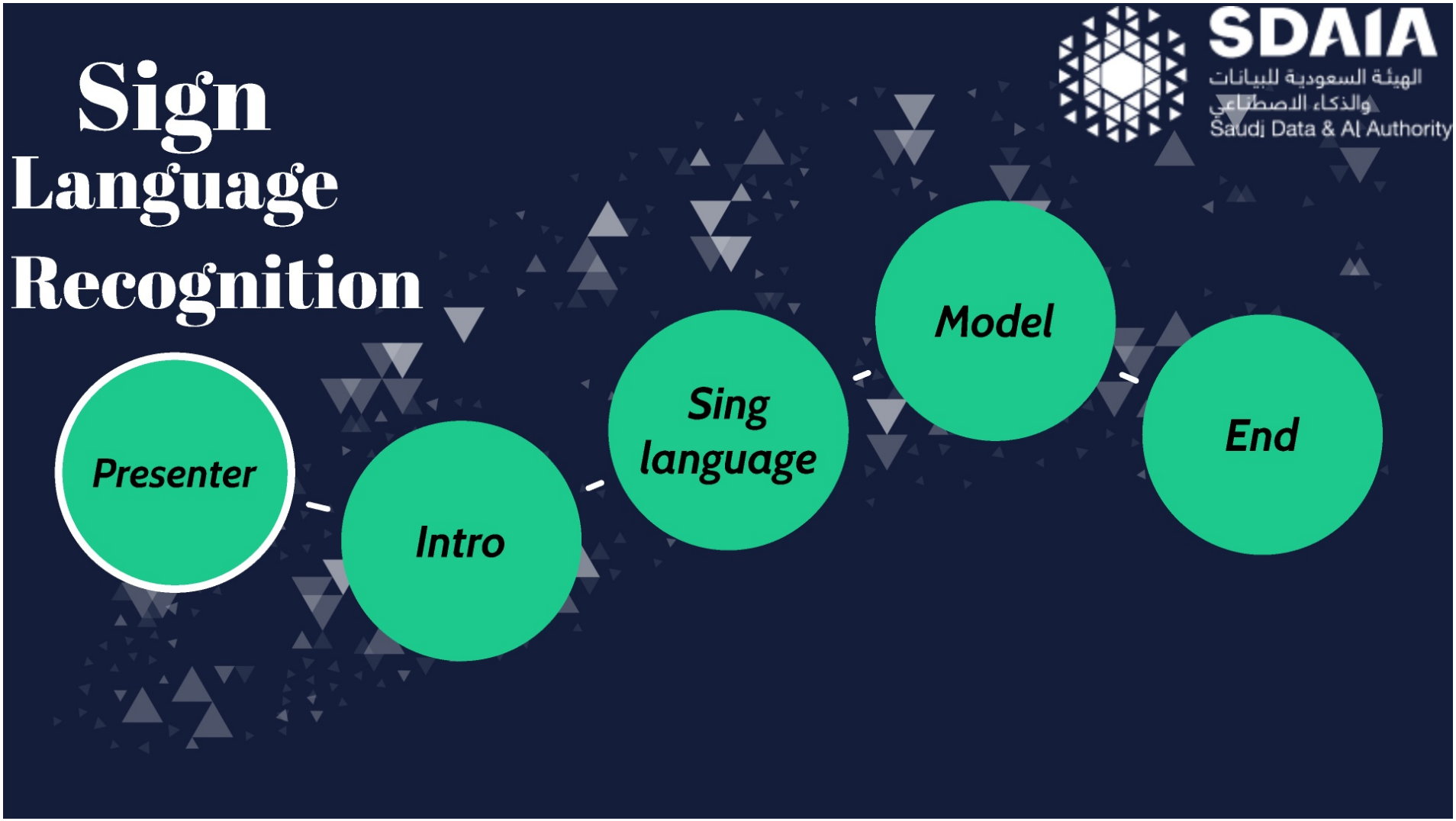
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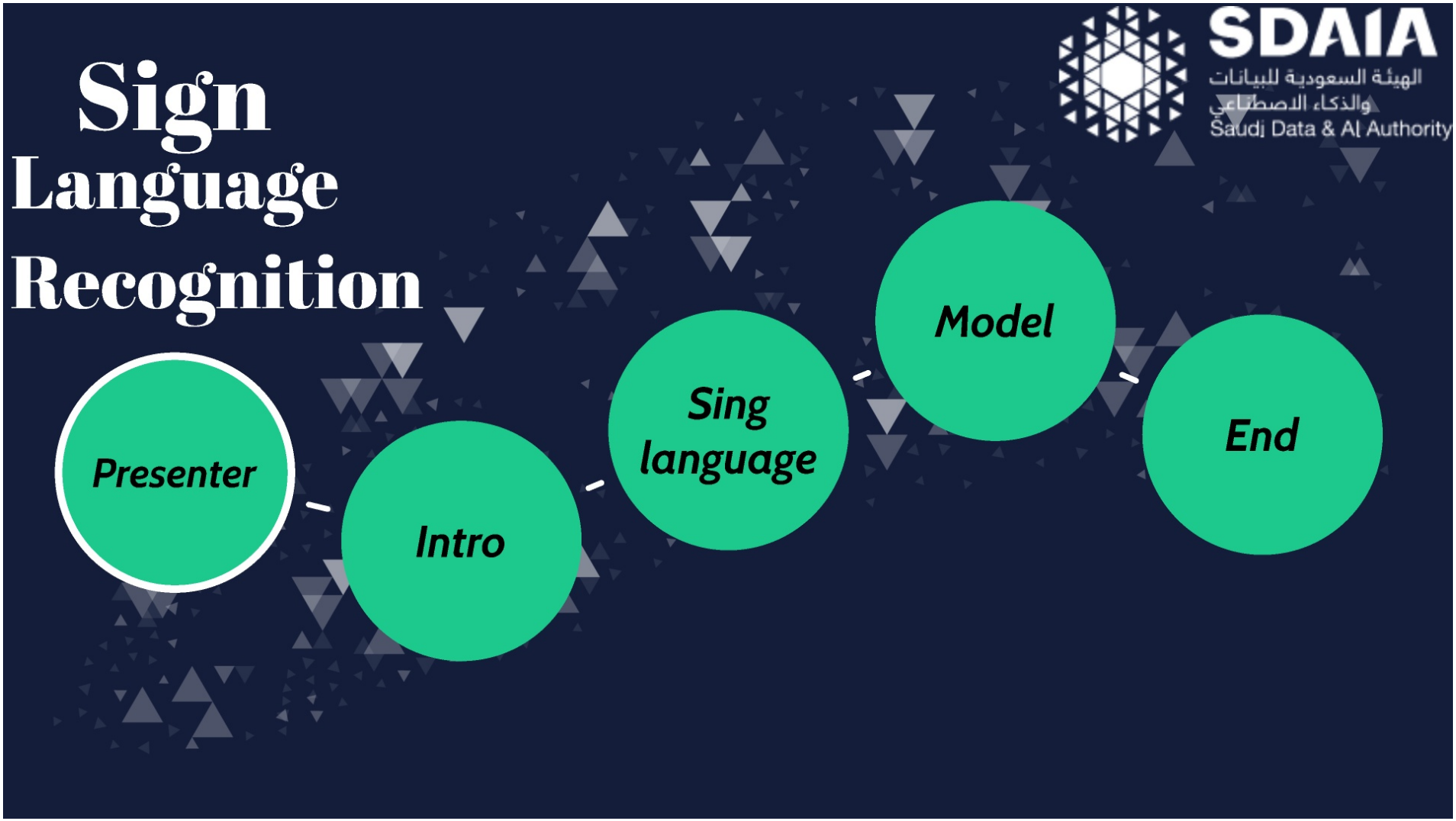
Saudi Data & AI Authority
Presenter
Intro
Sing language
Model
End

Presented By.
Eng.Nasser Alqahtani
Ghassan Alrehaili
Yasser Kaoor
Abdulkareem Alanazi
Mohammed Alshehri
Ayad Alharbi

Instructor:
Dr. Patrick Saoud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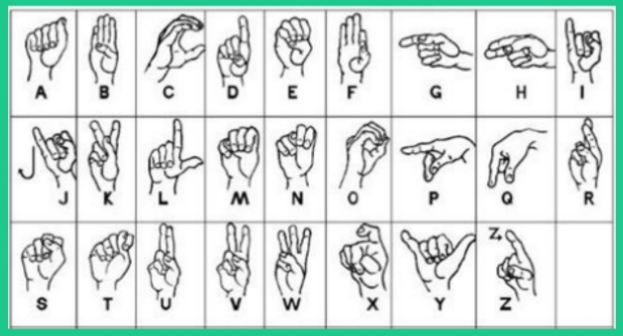
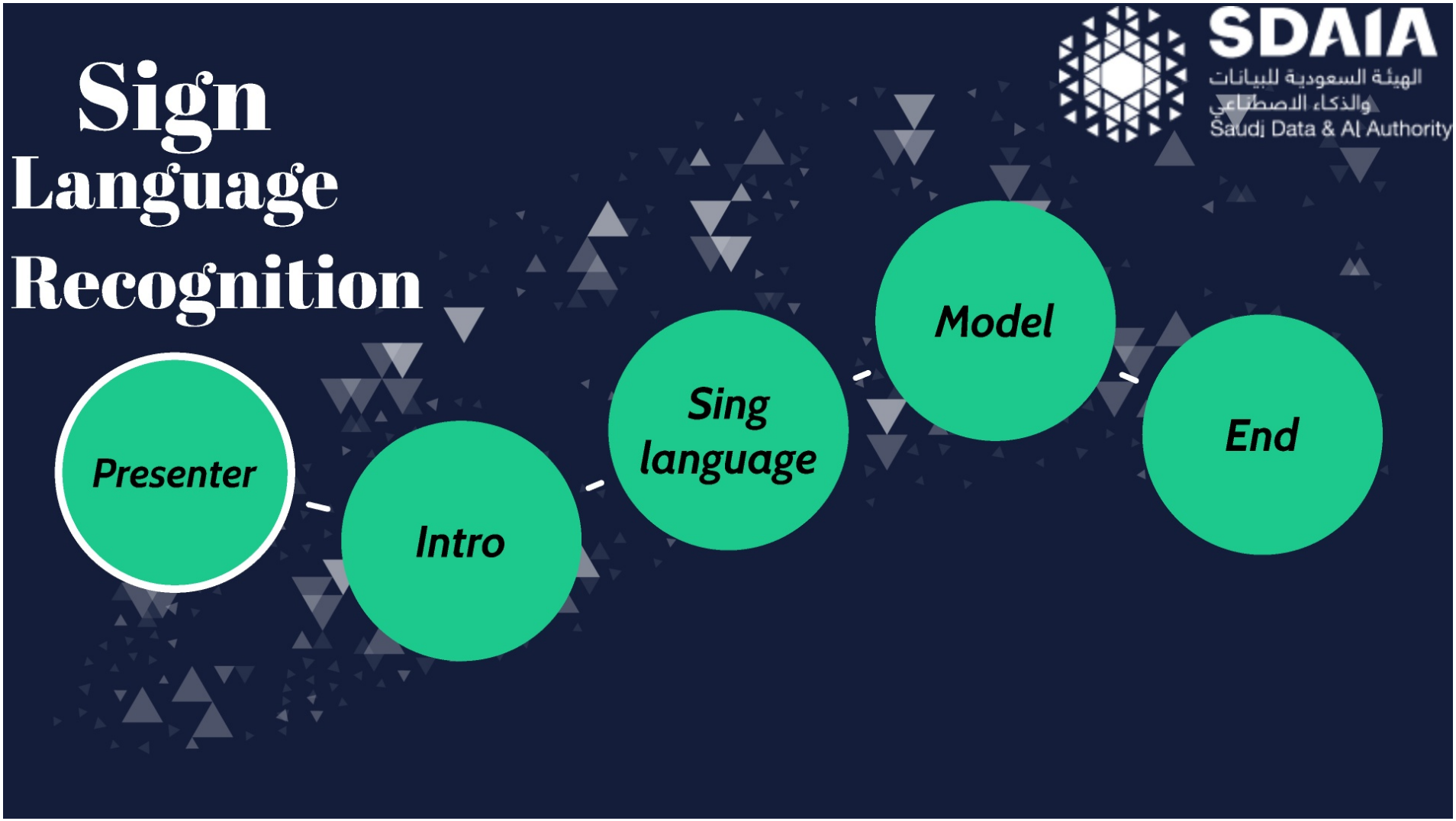
Introduction



Sign language is the only way for deaf people to communicate with other individuals, not all individuals can understand sign language. which leads to deaf people having a hard time communicating with others.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Sign Language
Our goal of this project is to build a Convolution Neural Network(CNN) that decides which is the letter based on the shape of the hand in sign language and bridging the gap in the process of communication between the Deaf and Dumb people with the rest of the world.
Design
Tools
Data

Workflow

- Pre-processing
- KNN
- CNN Keras
- Pytorch CNN


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Data

-The dataset was imported from the Kaggle website.

-It contains more than 30000 sign language images


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Tools

Python and Jupyter Notebook.

Numpy and Pandas for data manipulation.

TensorFlow, Keras and PyTorch.


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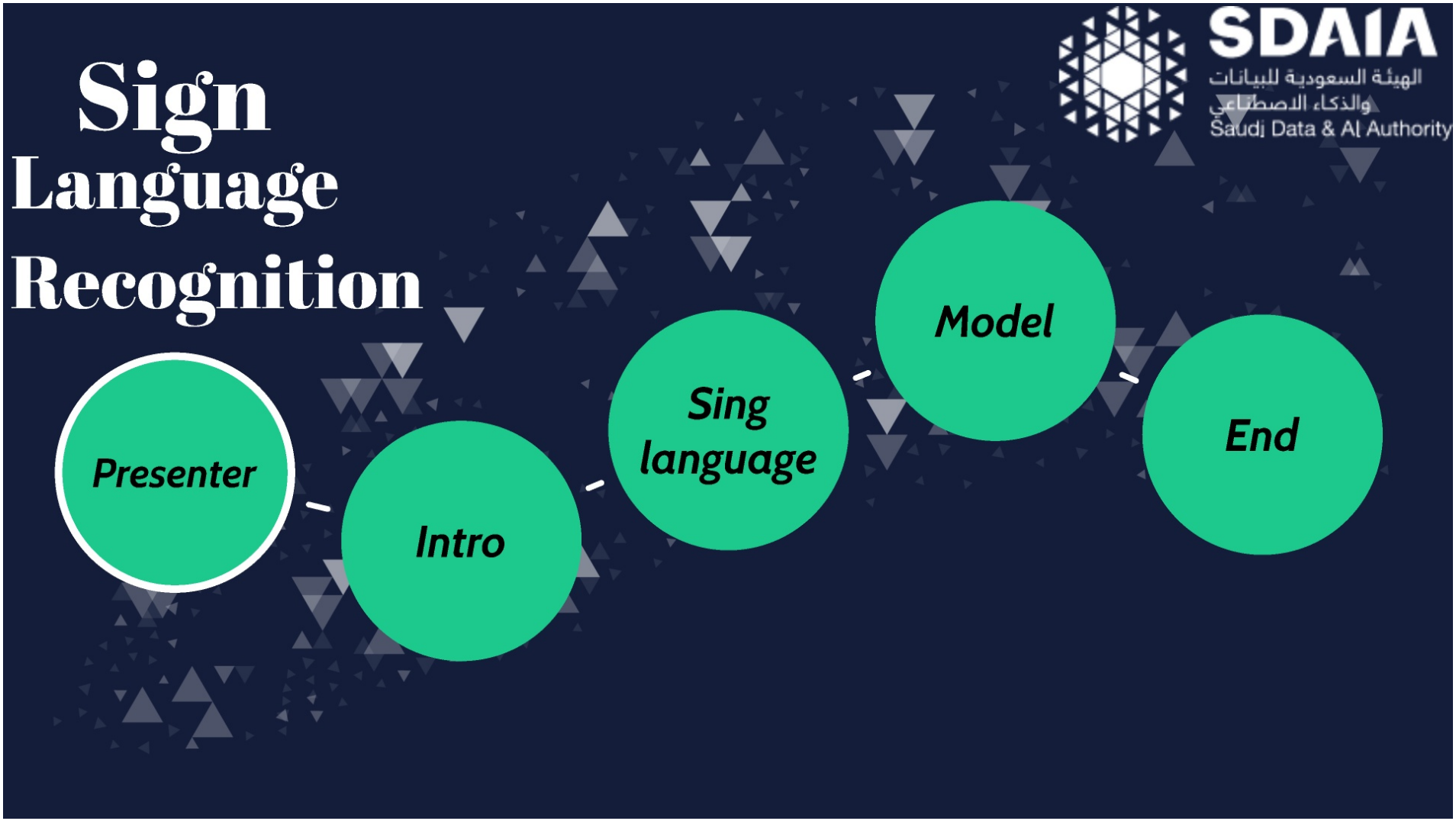
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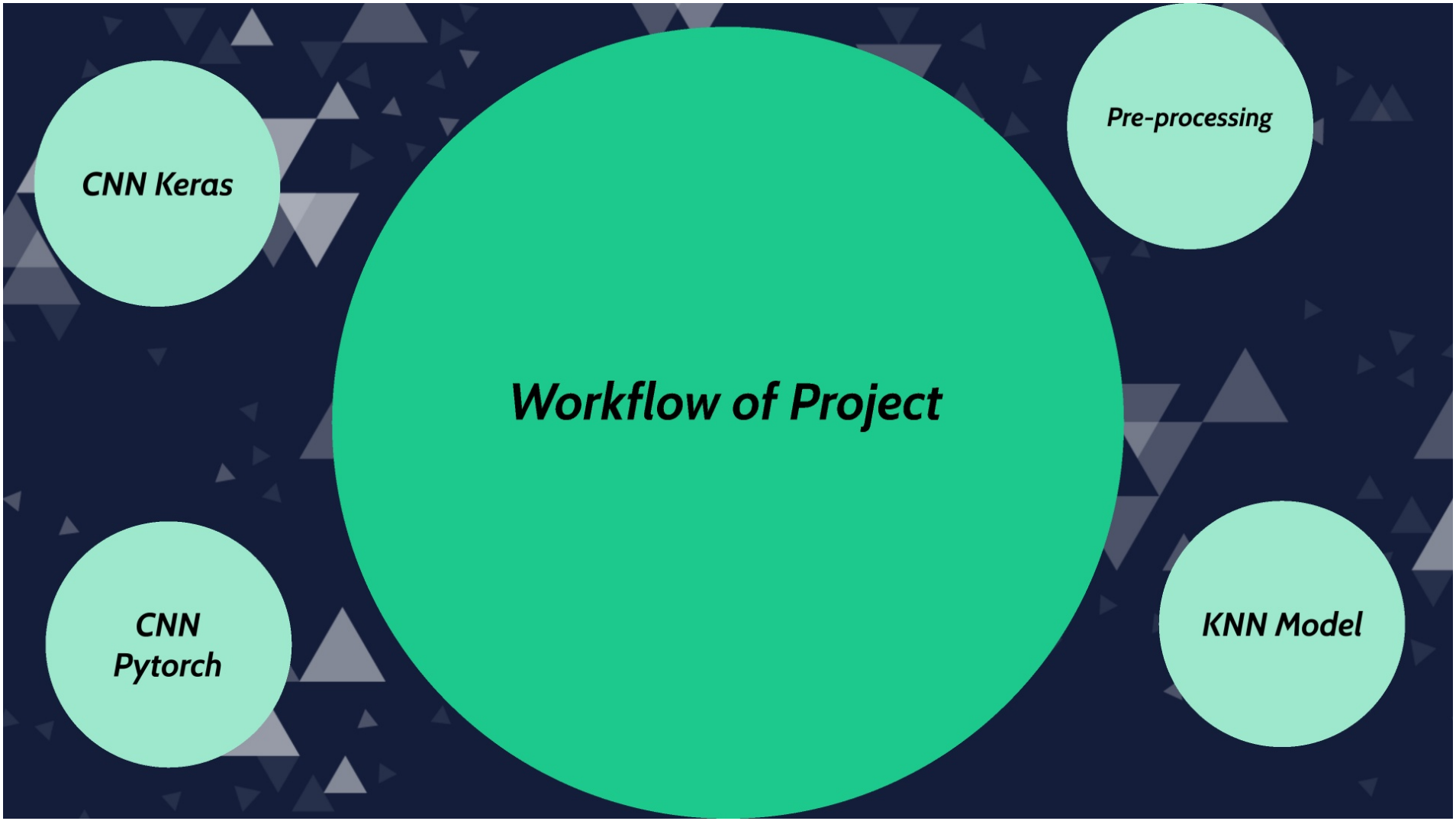
CNN Keras
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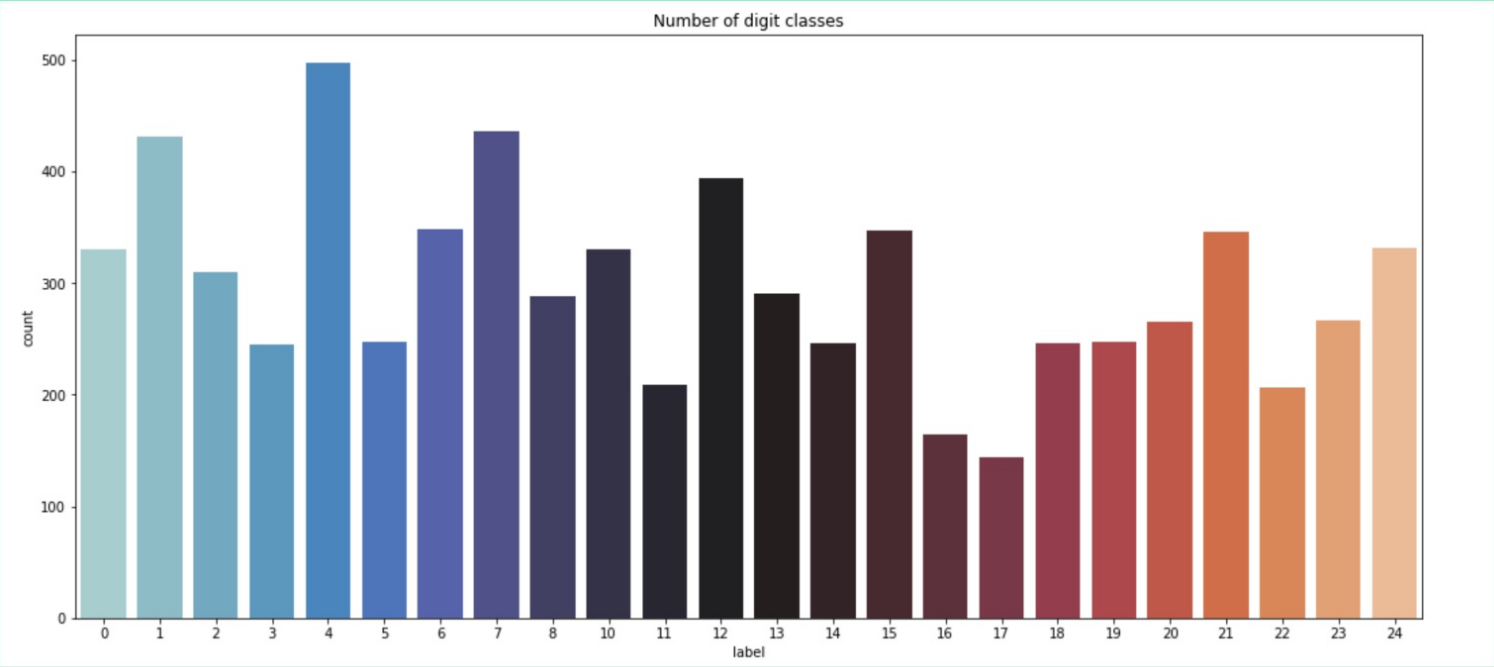
KNN Model

Pre-processing

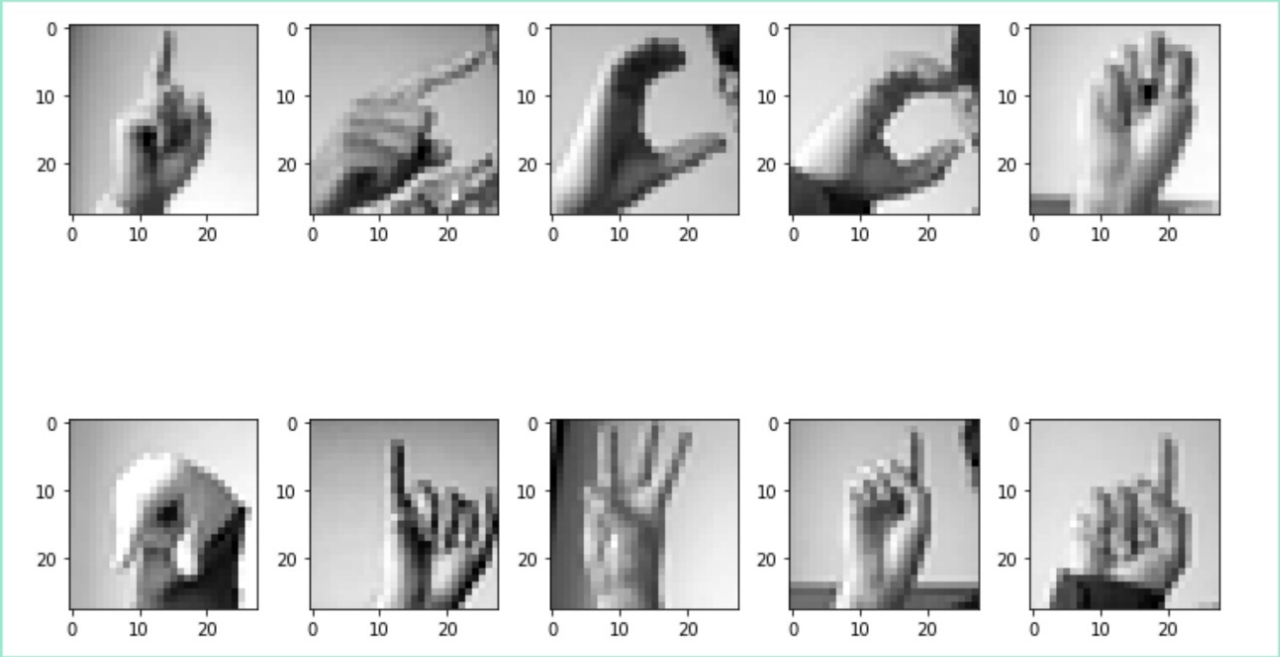
The pixcel values lies between 0-255 but it is obsearved that models performs exceptionally well if we scale pixel values
between 0-1 by divide of 255.
Convert it into 28 x 28 gray scaled image.

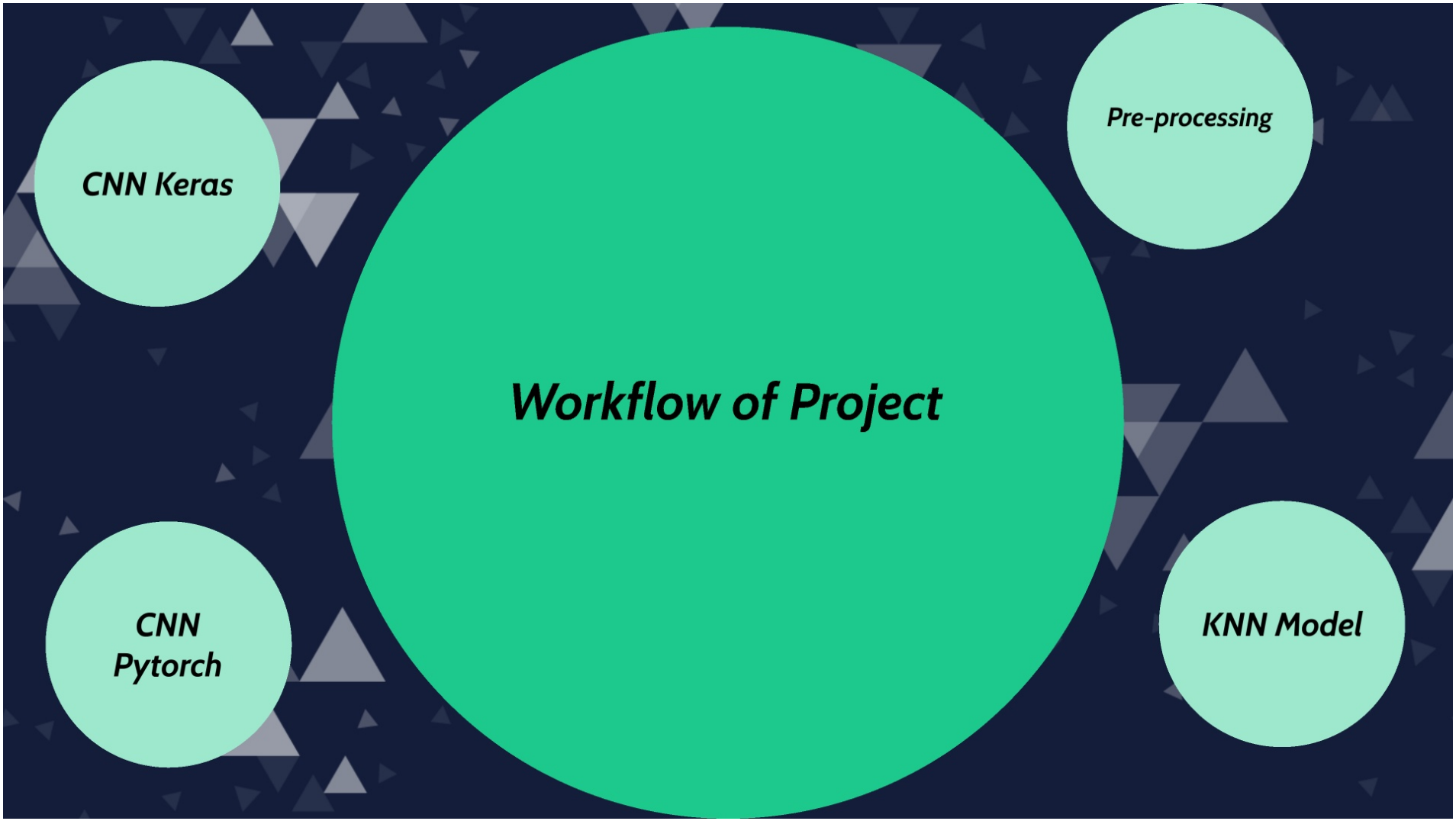
Pre-processing



Pre-processing

After scaled & convert the colors to gray.

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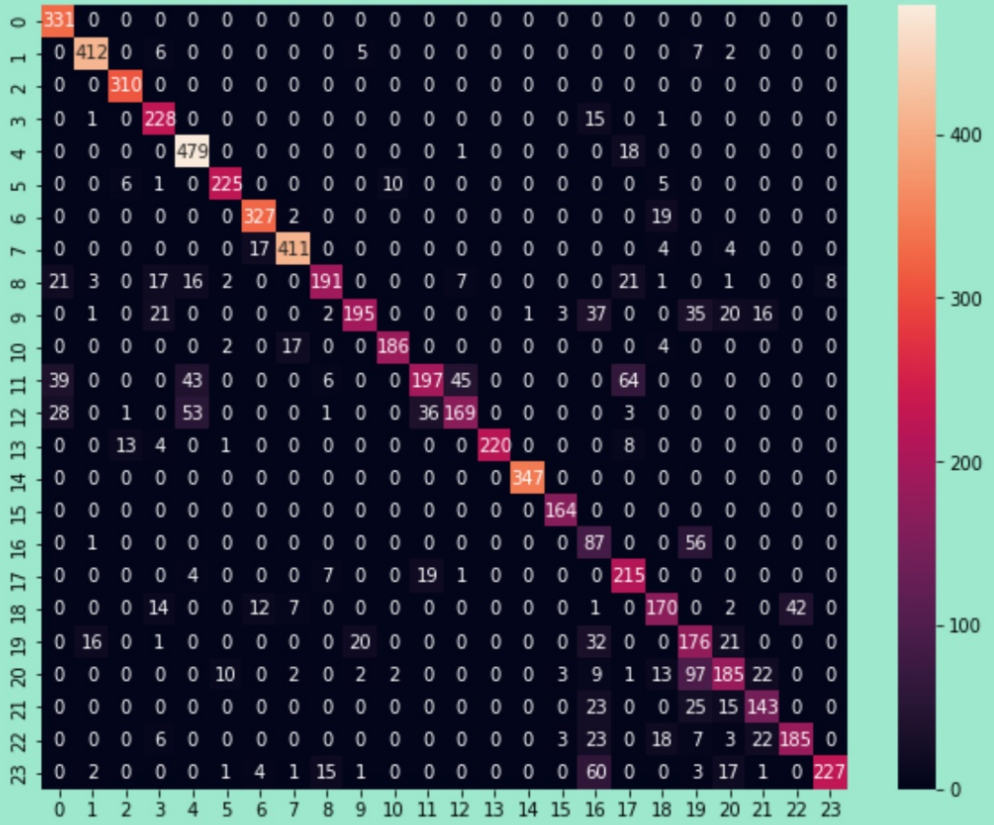
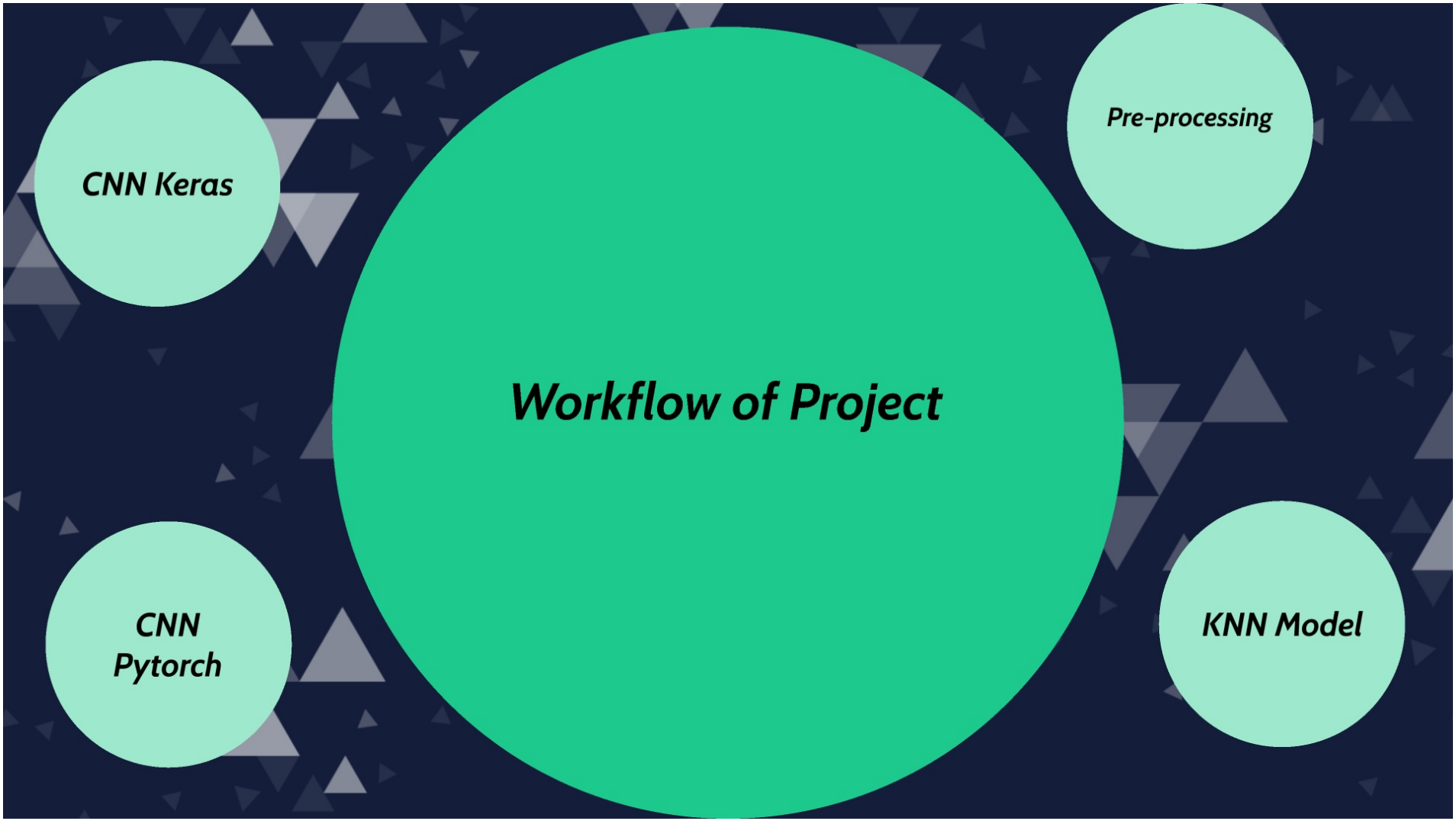
KNN Simple Model

K = 5

Result: 0.9992715352394828

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CNN Keras

Data augmentation

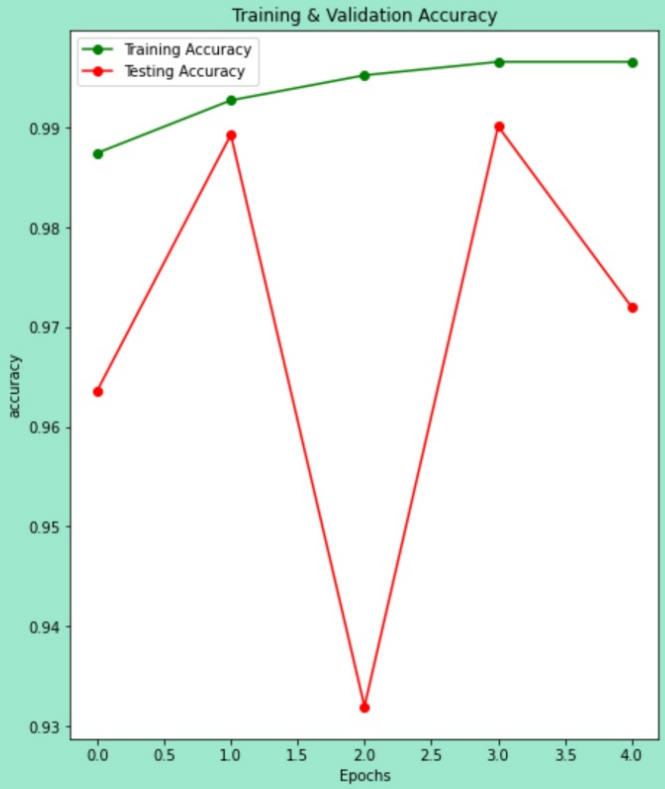
build_model: keras_tuner
epochs = 5

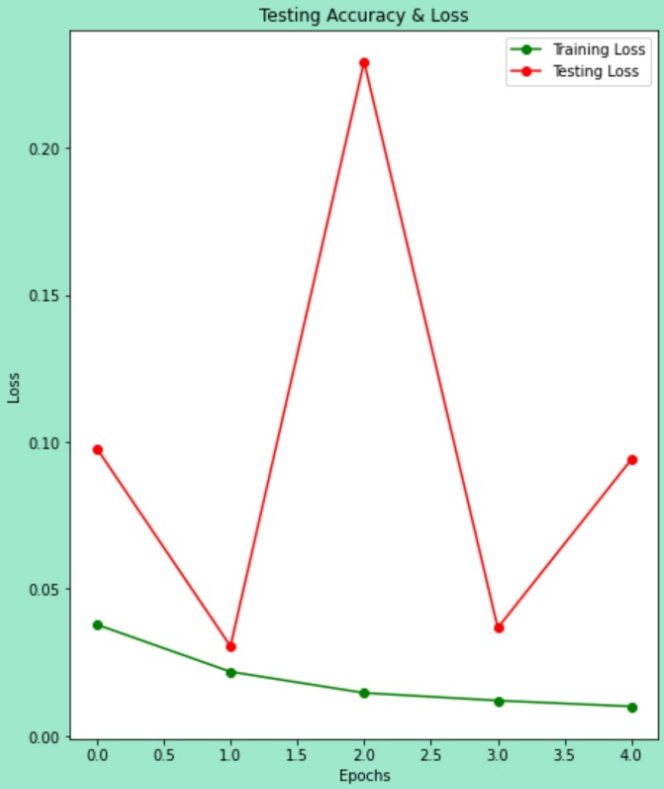
Train epochs = 10

Train Accuracy of the model is - 99.20 %
Test Accuracy of the model is - 97.19 %

CNN Keras

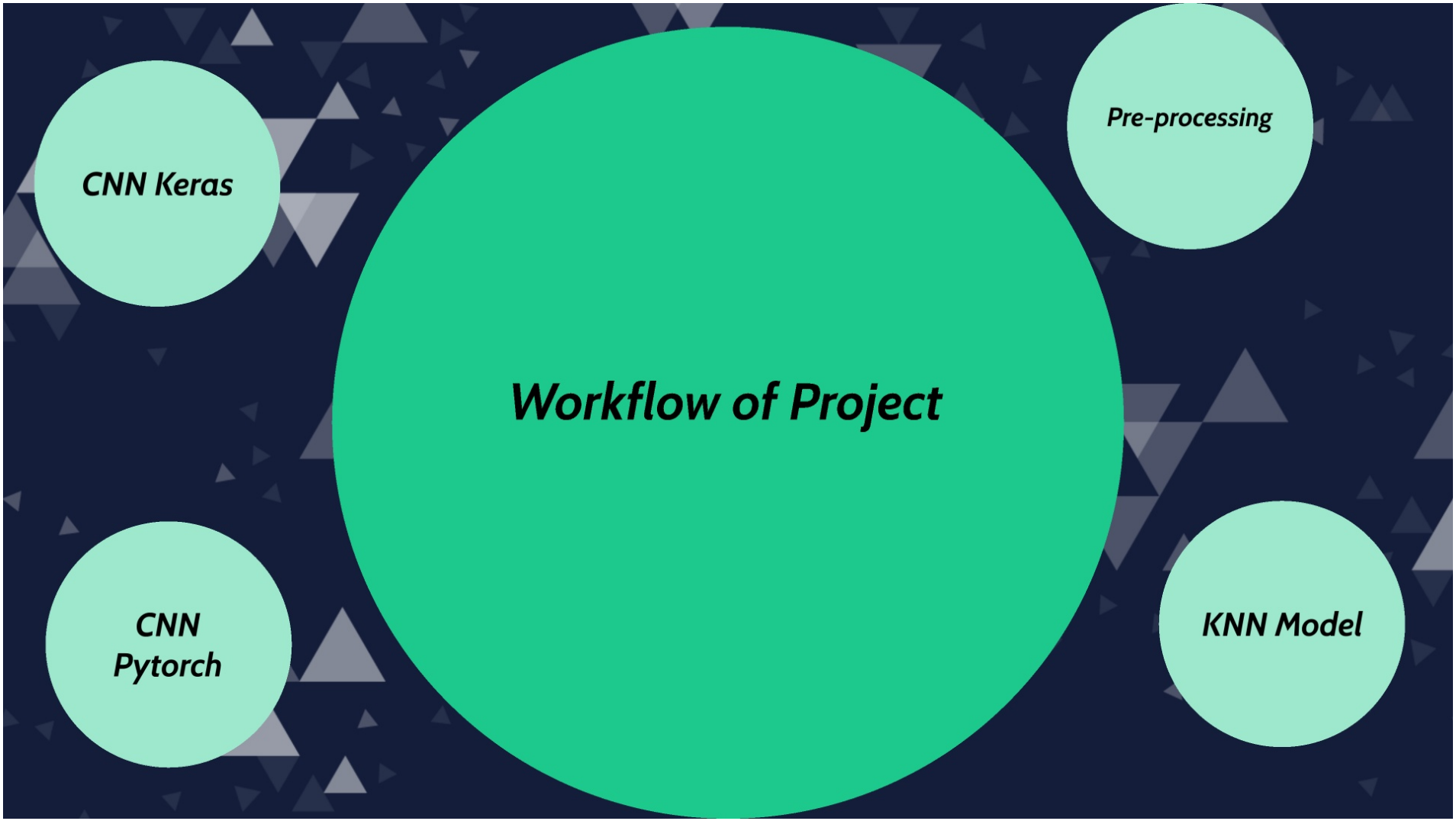
Visualization





CNN Keras

	precision	recall	f1-score	support
Class 0	1.00	1.00	1.00	331
Class 1	1.00	0.99	1.00	432
Class 2	1.00	1.00	1.00	310
Class 3	1.00	0.75	0.86	245
Class 4	1.00	1.00	1.00	498
Class 5	1.00	1.00	1.00	247
Class 6	1.00	0.92	0.96	348
Class 7	1.00	0.86	0.93	436
Class 8	0.89	1.00	0.94	288
Class 10	1.00	0.99	0.99	331
Class 11	0.92	0.99	0.95	209
Class 12	0.93	1.00	0.97	394
Class 13	0.89	1.00	0.94	291
Class 14	1.00	1.00	1.00	246
Class 15	0.99	1.00	1.00	347
Class 16	1.00	1.00	1.00	164
Class 17	0.84	0.97	0.90	144
Class 18	0.98	1.00	0.99	246
Class 19	0.92	1.00	0.96	248
Class 20	0.92	1.00	0.96	266
Class 21	1.00	0.94	0.97	346
Class 22	1.00	1.00	1.00	206
Class 23	1.00	1.00	1.00	267
Class 24	1.00	0.94	0.97	332
accuracy			0.97	7172
macro avg	0.97	0.97	0.97	7172
weighted avg	0.97	0.97	0.97	7172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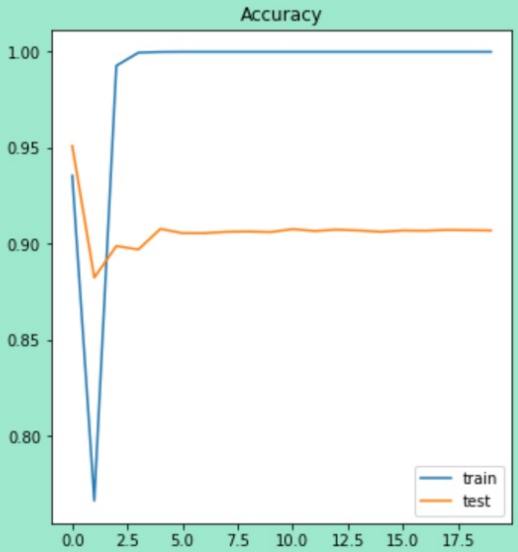
Pytorch Model

num of conv: 5
optimizer: Adam

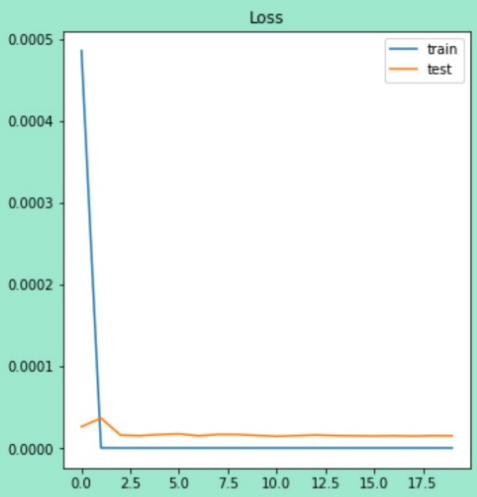
Model	Epochs	Train	Test
Pytorch	20	1.0	0.9069994422755159

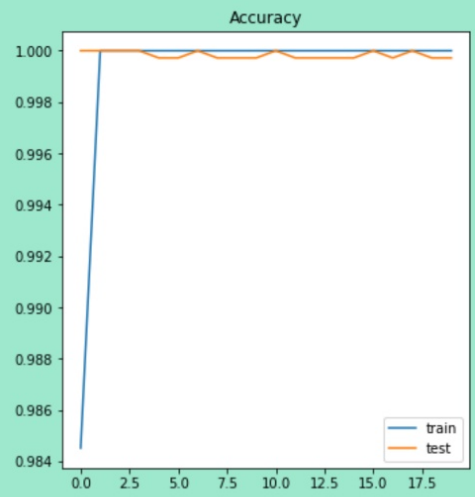


Transfer learning

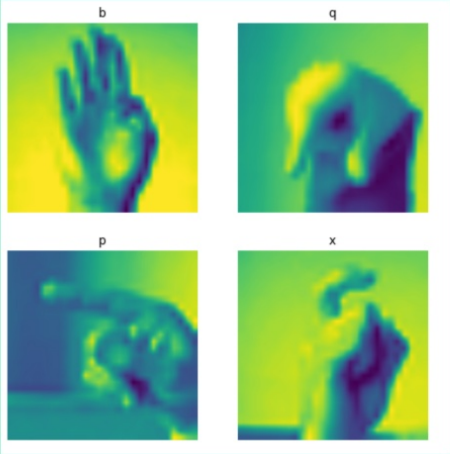
ResNet18

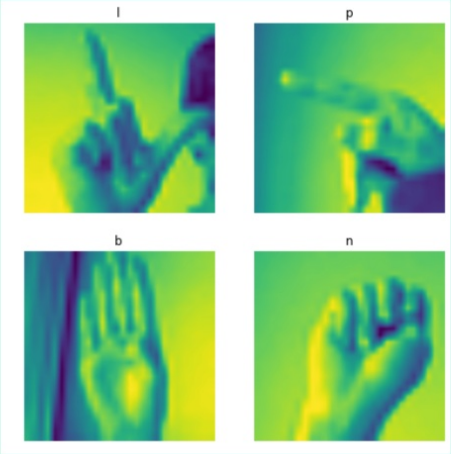
optimizer: Adam





Model	Epochs	Train	Test
Resnet18	20	1.0	0.9997211377579476


b
q
p
x


l
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A
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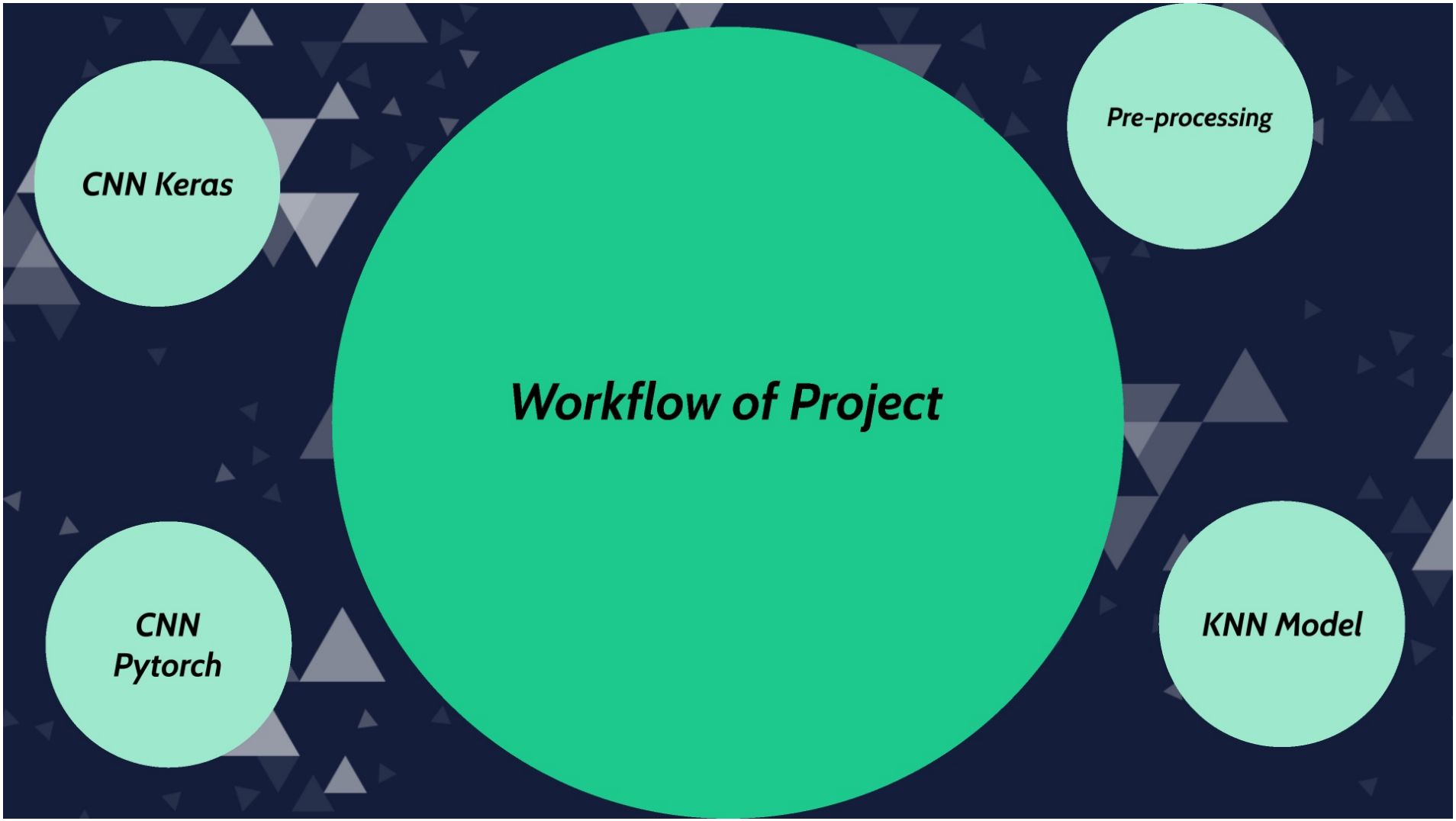
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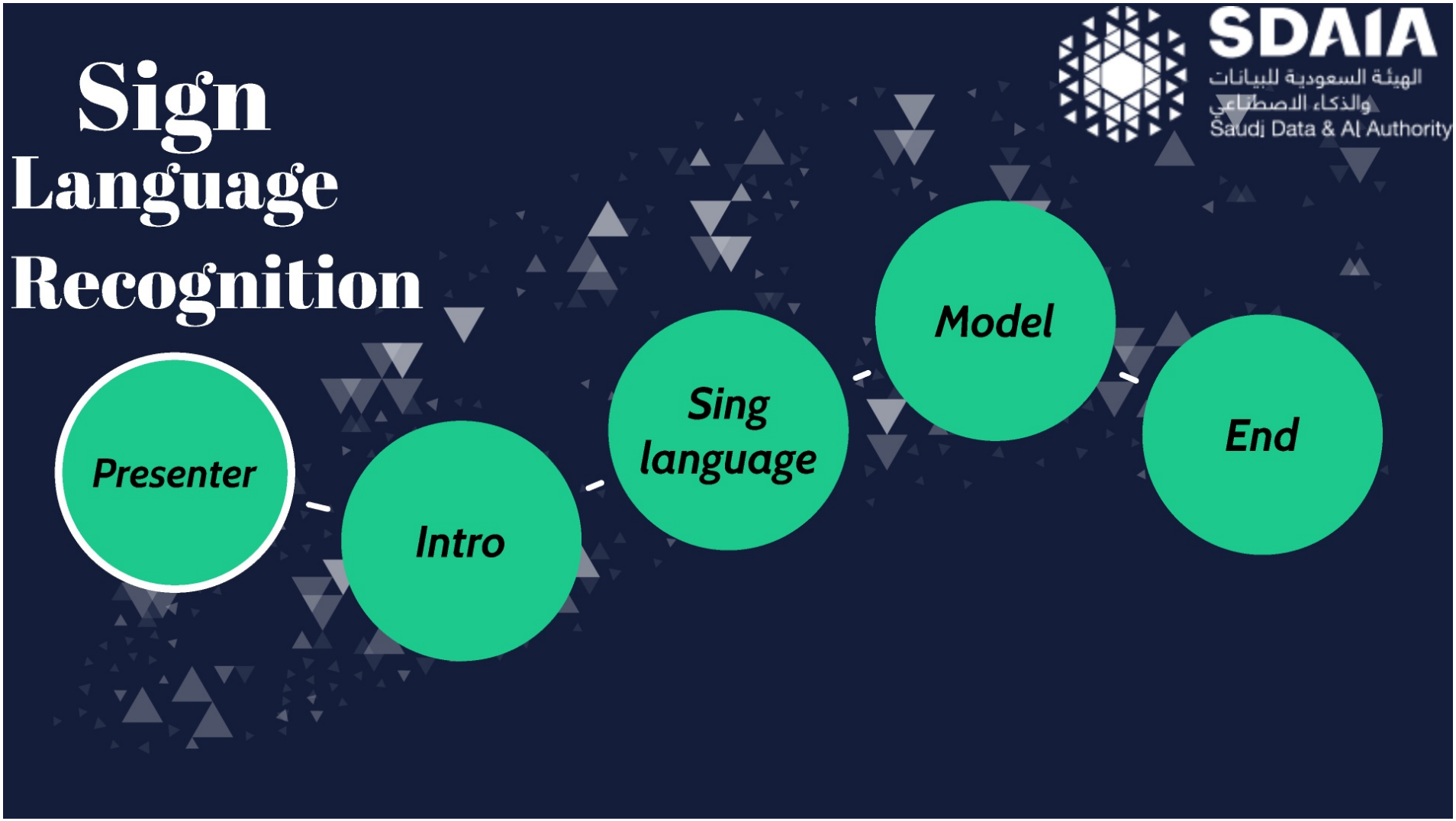
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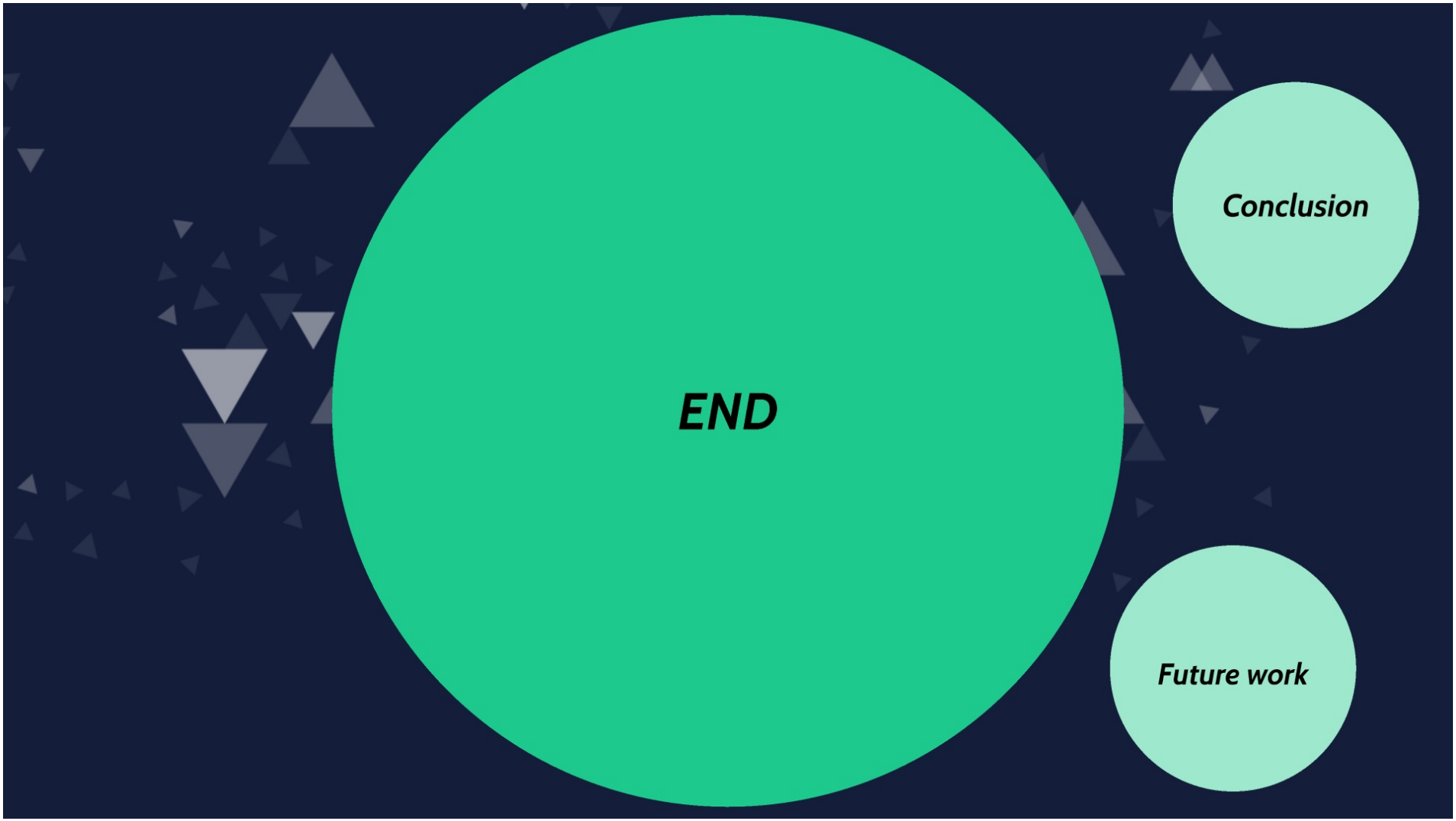
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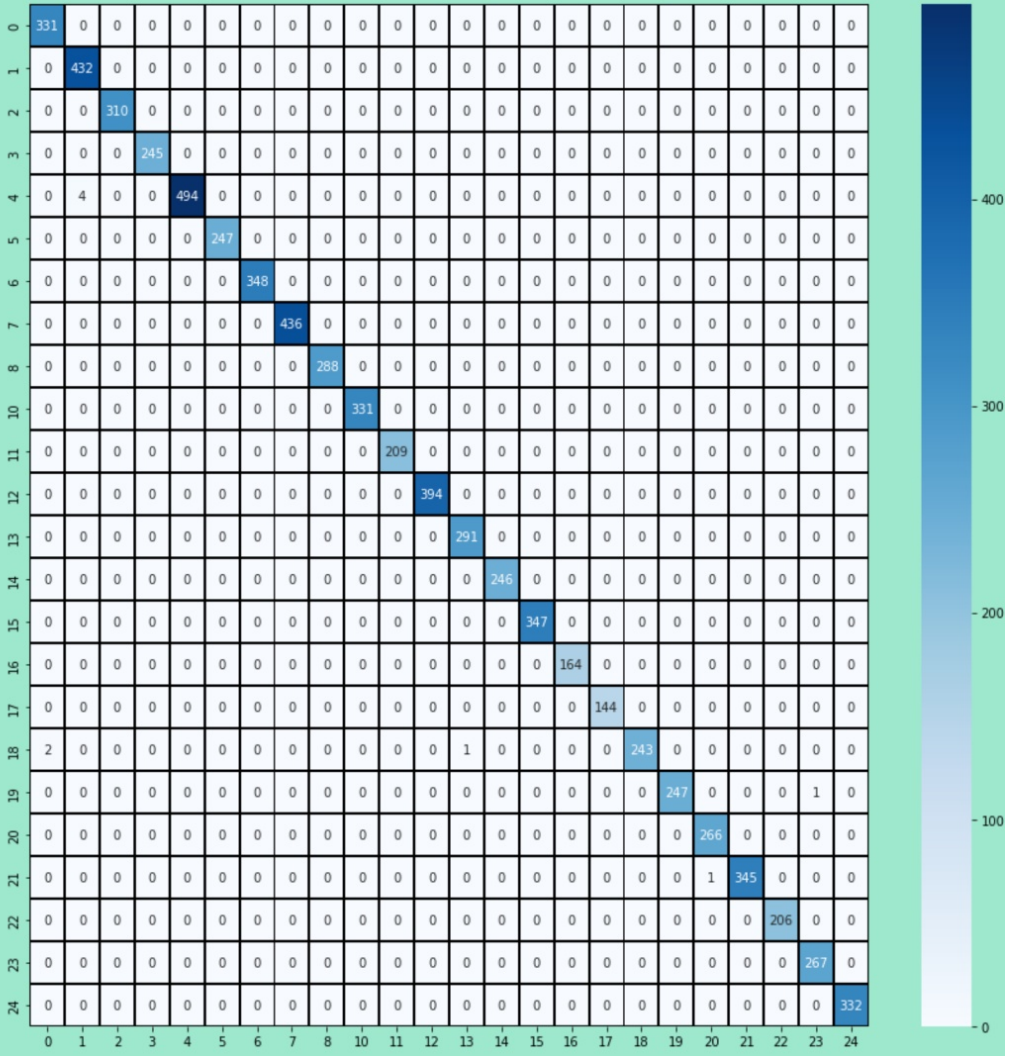
Future work

Conclusion

Confusion matrix



Conclusion

The differences between Keras and PyTorch.

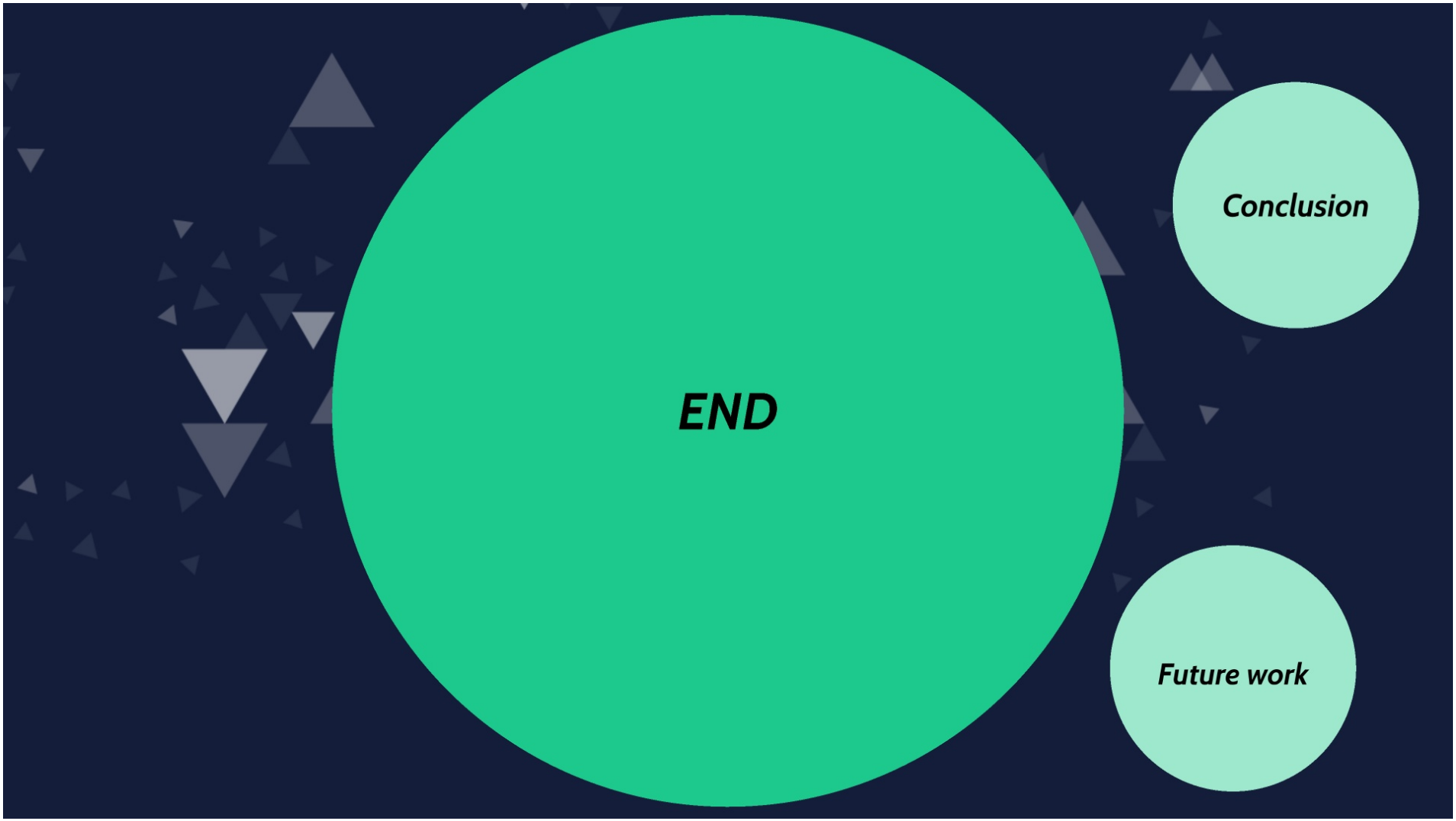
Keras has a simple architecture,making it more readable and easy to use.	While PyTorch has very low readablility due to a complex architecture.
Keras has a smaller community support.	While PyTorch has a stronger community support.
Keras is mostly used for small datasets due to its slow speed.	While PyTorch is preferred for large datasets and high performance.

Conclusion

Best Model

Pytorch with

Model	Epochs	Train	Test
Resnet18	20	1.0	0.9997211377579476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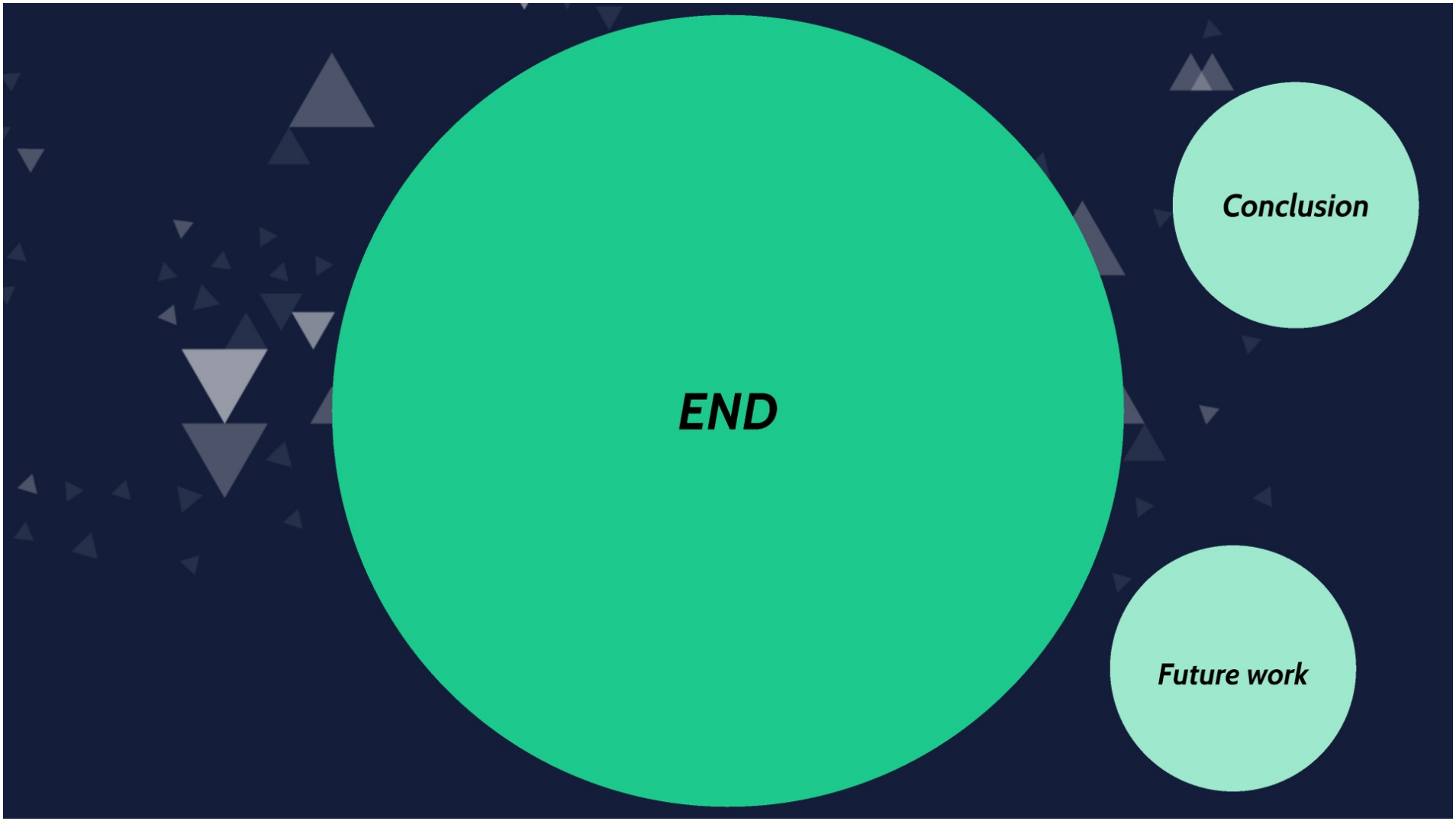
Future work

Future work

1-Add Motion Characters.
2-Deploy for Mobiles.
3-Add More Sign Languages.
4-Translate from sign language to another sign languages.
5-Translate from sign language to any neutral languages.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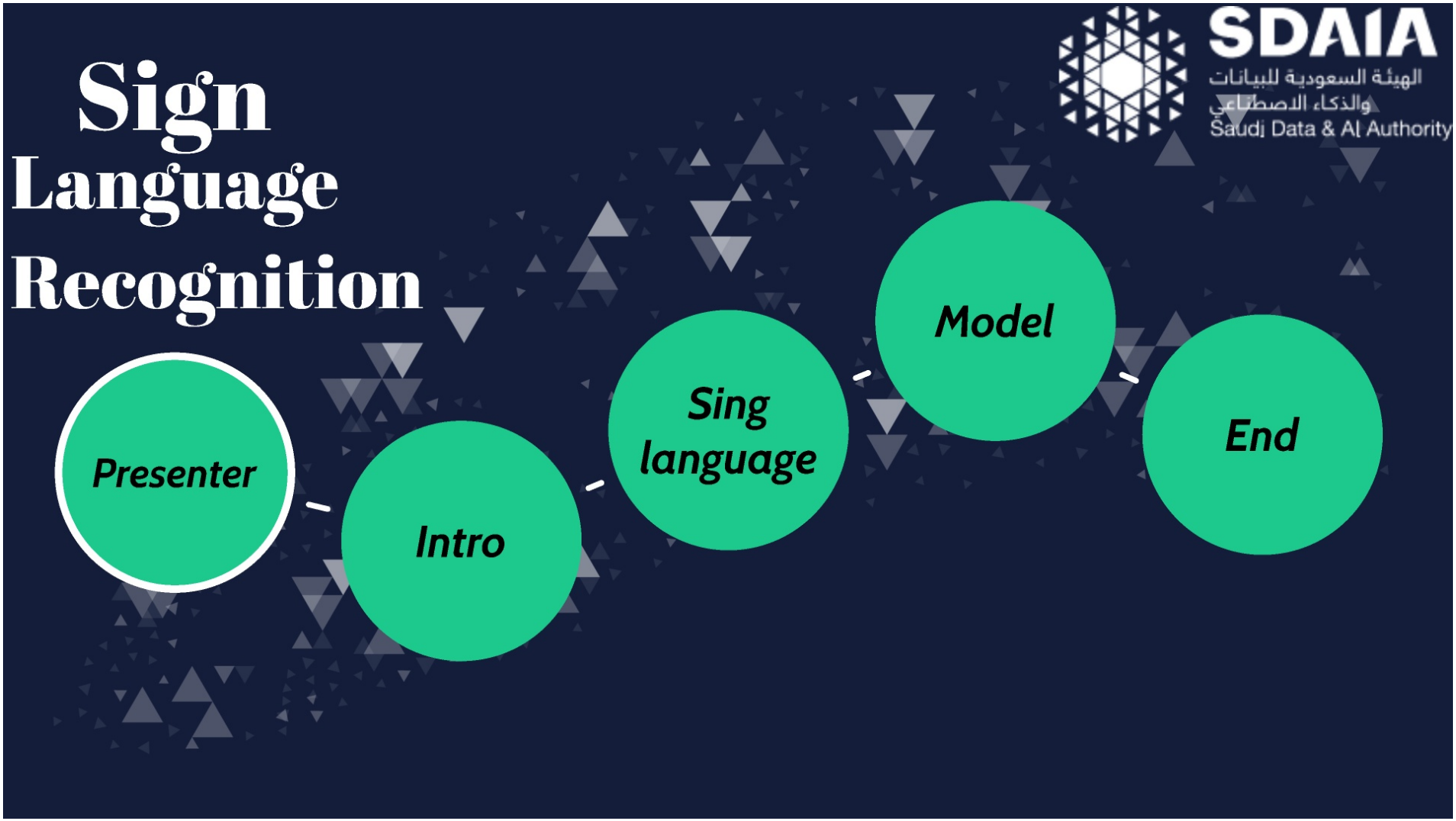
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Thank you