

# ASL SignSense

## Machine Learning

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# SITUATION

Create an application that is able to classify hand signs from the ASL alphabet using machine learning to train a model.

# TASKS



## Dataset

Choose a dataset that contained relevant images and enough data to train a model.



## Website

Create an application to be able to upload images or videos, or be able to use a live webcam feed.



## Model

Test different available models to see which offers the best accuracy to use as the final model.



## Deployment

Use the trained model and code for the web application to deploy a useable website for anyone to try.



# ACTION

**Elena**

- Flask for backend.
- OpenCV + TensorFlow for running image/videos through the model.

**Brandon**

- Comparison of different available models.
- Graphing the accuracy.
- Training the model using TensorFlow.

**Aidan**

- Media Pipe for tracking hands on webcam

# TRAINING THE MODEL

## Preprocess the Data

- Resize the images to 128 by 128.
- Batch size of 32.
- Rotated, flipped, and zoomed version of data.
- Split into training and validation sets.

```
model = Sequential([
    base_model,
    GlobalAveragePooling2D(),
    Dense(256, activation="relu"),
    Dropout(0.3),
    Dense(27, activation="softmax")
])
```

## Comparing Models

- CNN, EfficientNet, MobileNet, ResNet.
- Each trained through 15 epochs.

## Training with MobileNet (Finetuned)

- Pretrained on ImageNet.
- Images are 128 by 128 with RGB channels.
- Sparse Categorical Crossentropy Loss.  
(A, B, Blank, C, etc.)
- Adam for the optimizer.
- Modified the learning rate to increase accuracy.



# RESULT

Elaborate on the featured statistic



- Combination of two datasets found online.
- Improved accuracy for images containing a person.



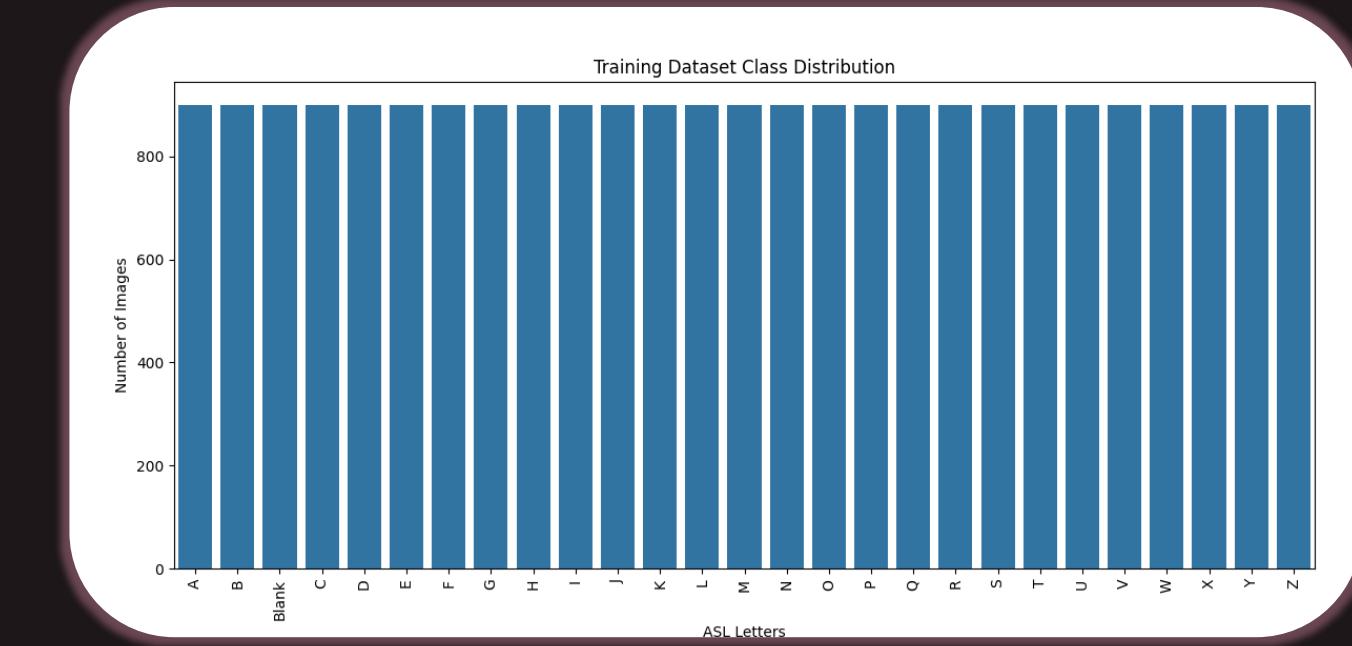
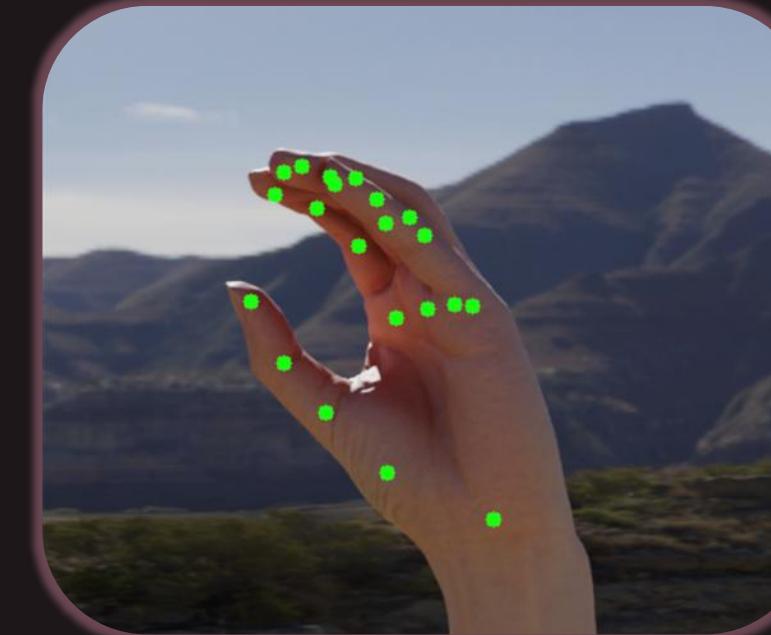
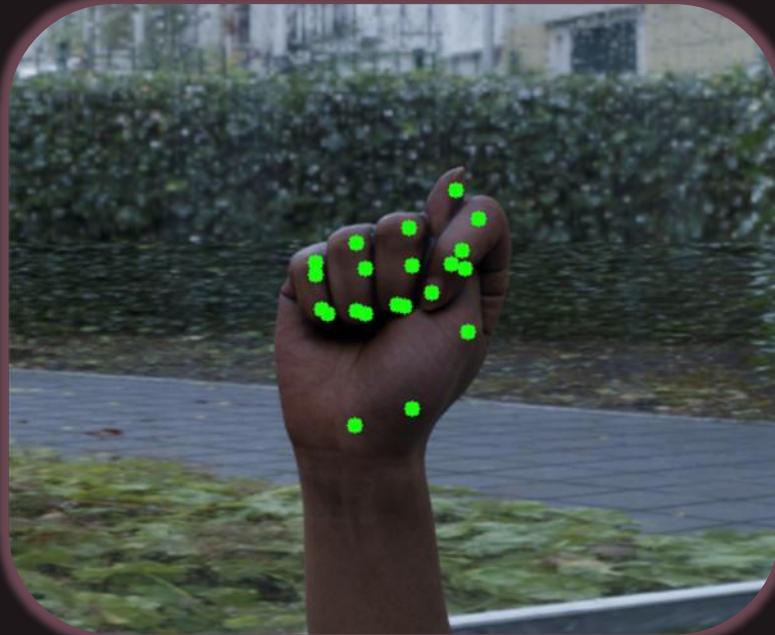
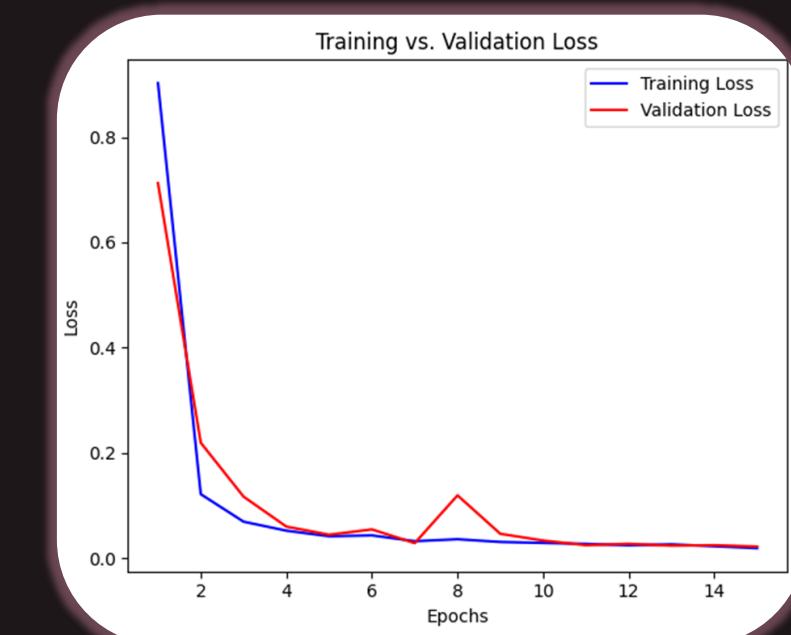
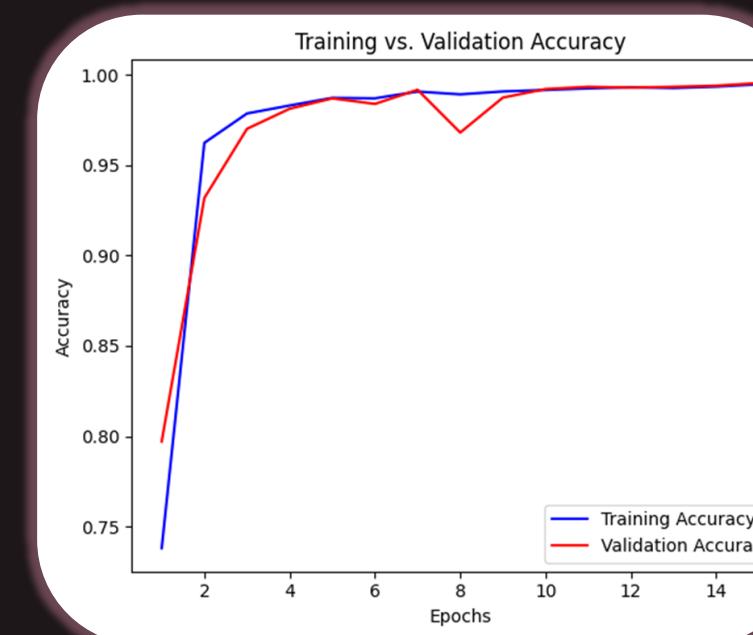
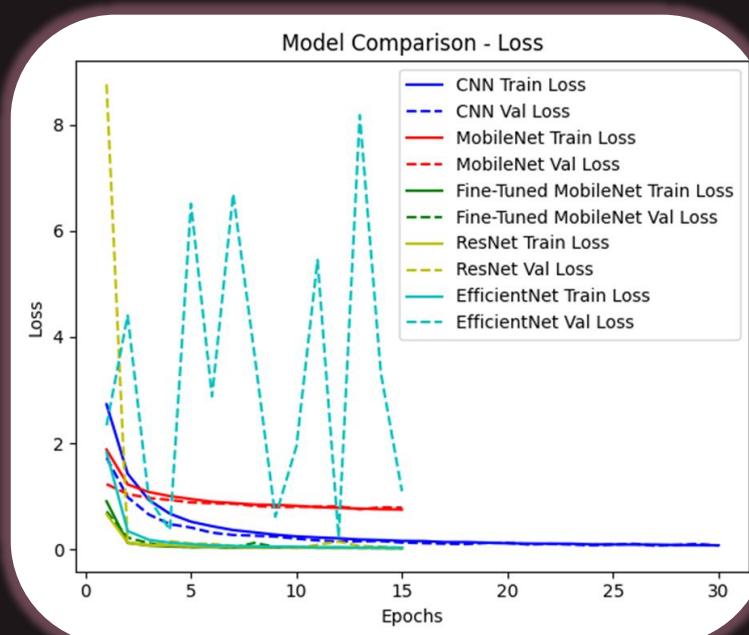
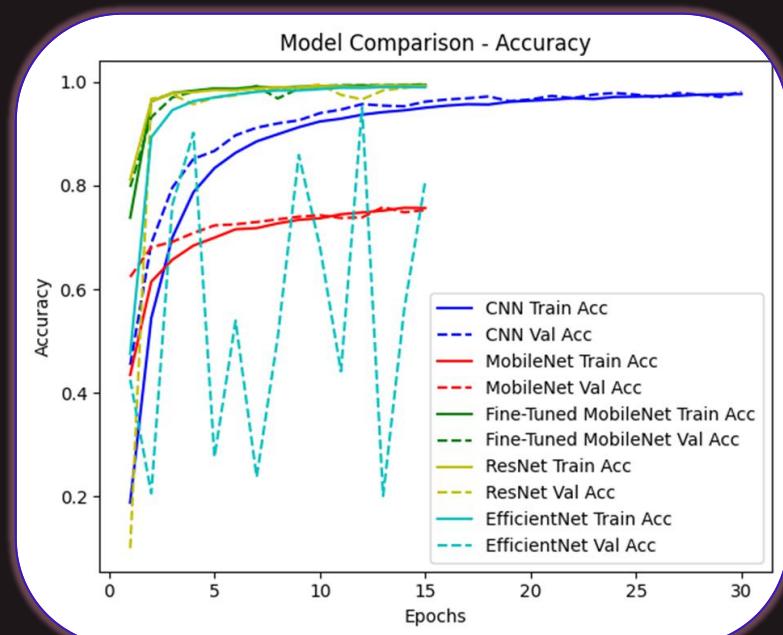
- Model trained on combined dataset through 100 epochs.
- Graphs comparing various models tested and accuracy of testing/training.



- Website allowing for image, video, and webcam detection.
- Webcam displays live prediction and includes skeletal hand tracking.

# GRAPHS

Various graphs generated displaying the comparison of the models, accuracy, and hand landmarks.

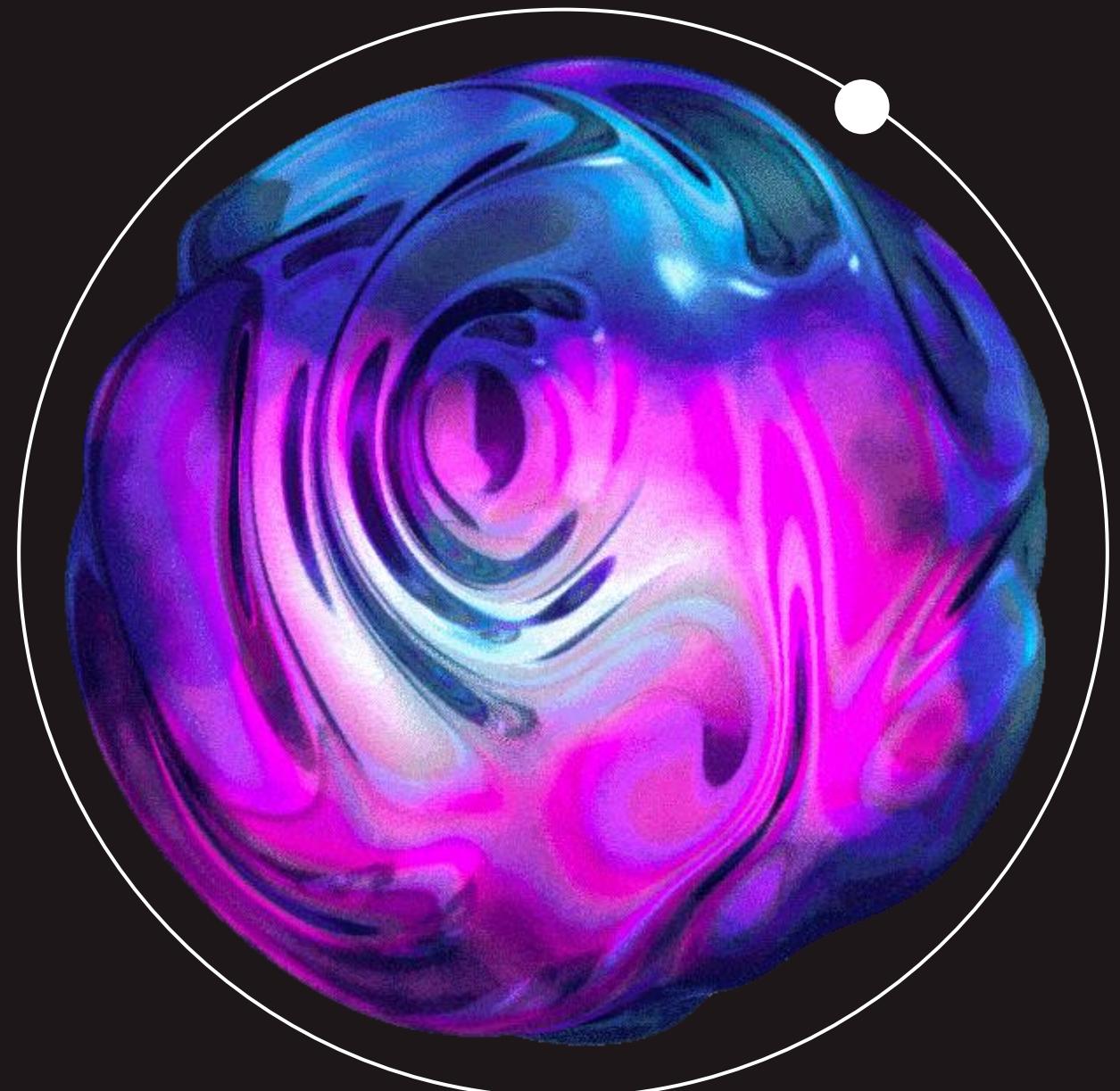


# DEMONSTRATION

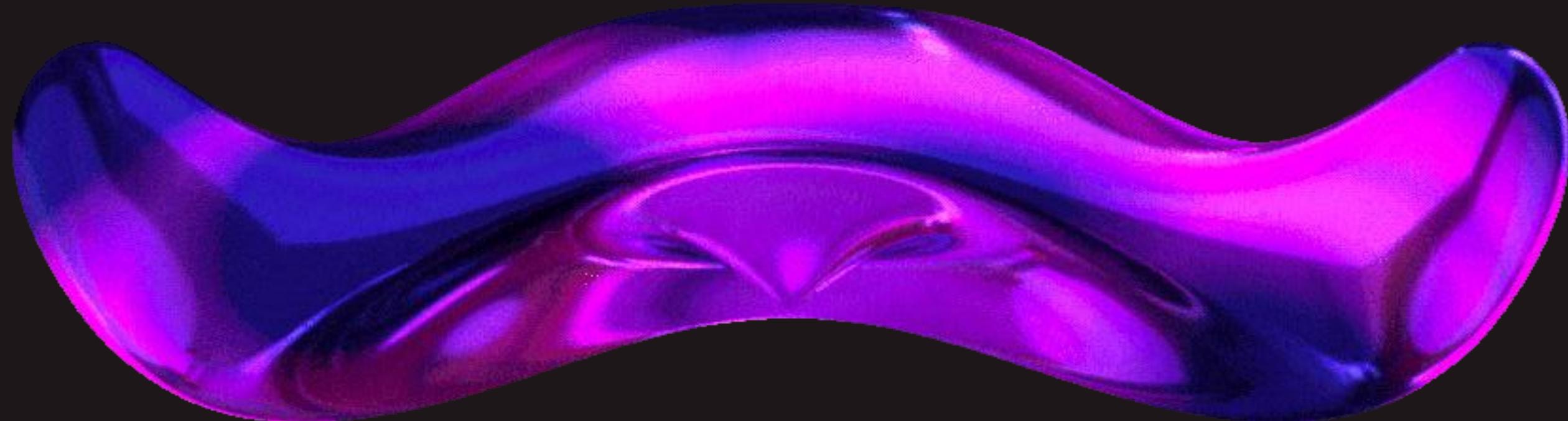


# TAKEAWAY

- Training images takes forever
- Model selection variables
- Model adjustment
- Implementing a model into a frontend  
to be easily utilized



# QUESTIONS



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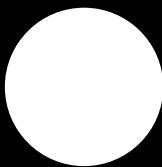
TITLES:  
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HEADERS:  
**INTER**

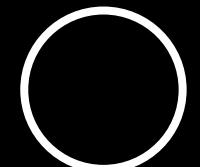
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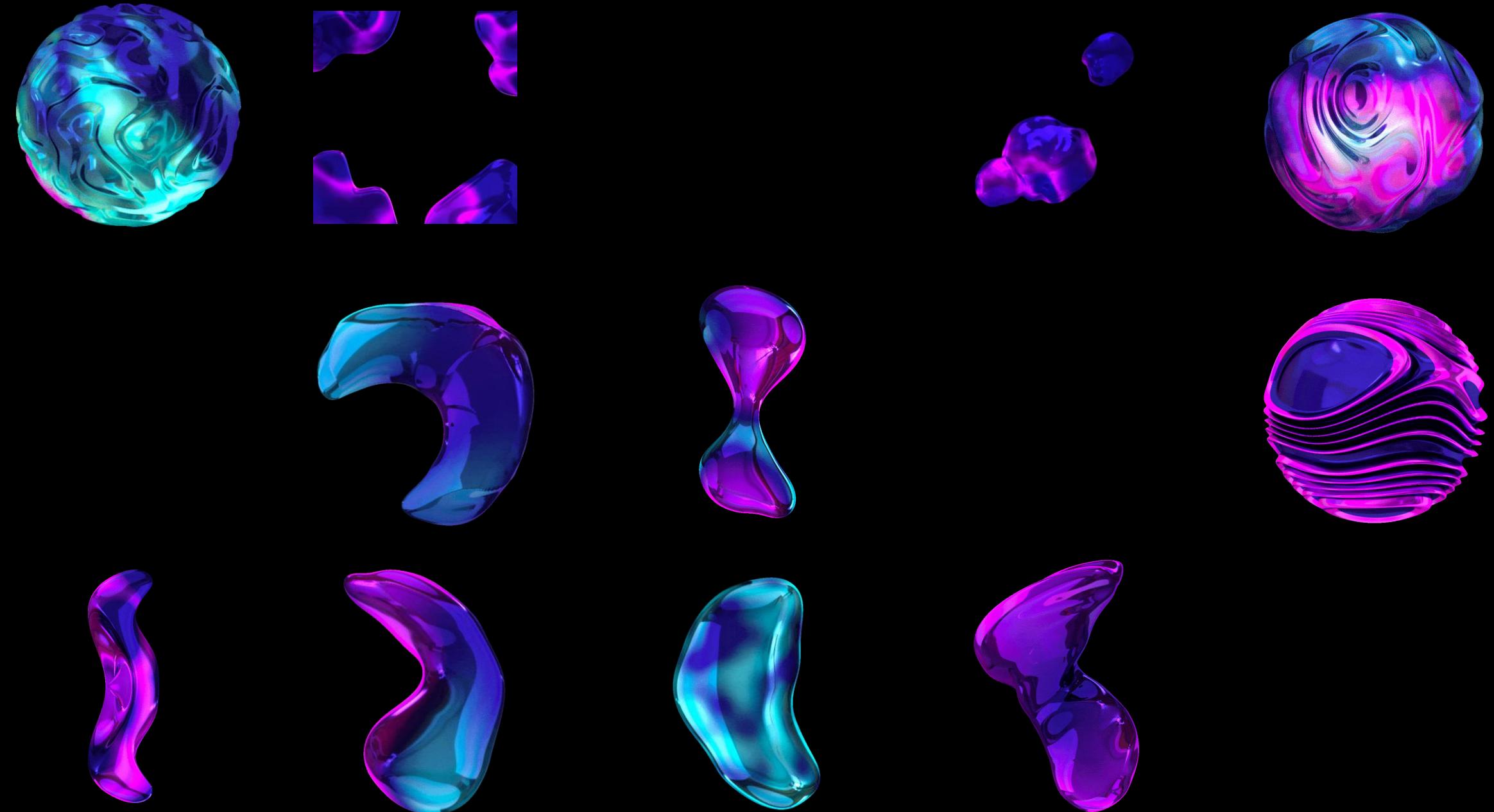


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