Presentation by : Turmys Nur

# DAMS DETECTION

BDA-2203

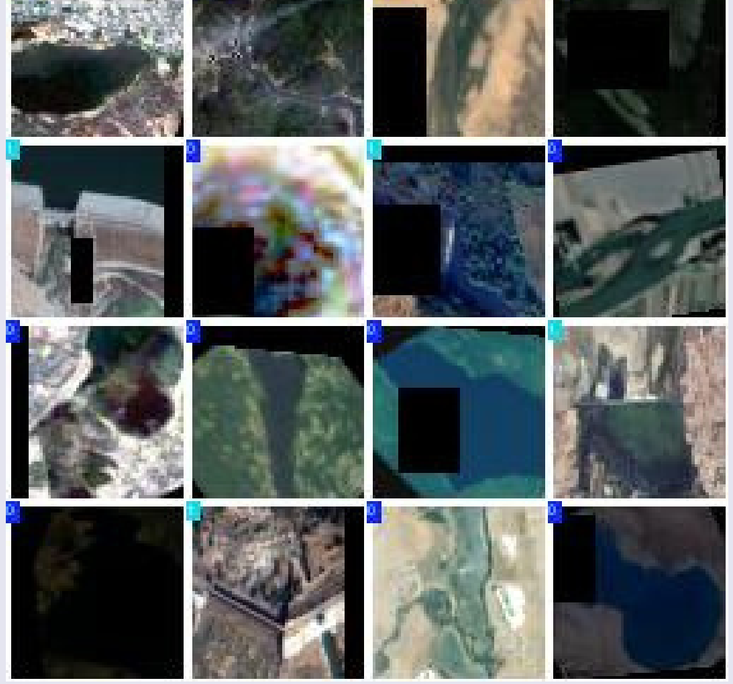
# PROJECT VISION AND GOALS

Creation of an algorithm for image classification of dams, which will be further integrated with Google Earth Engine to analyze and monitor objects in satellite images.

# PRODUCT DESCRIPTION

Dams need to be categorized, as there is insufficient data in Kazakhstan to accurately assess their condition and performance. This is particularly important in the context of the recent floods in Russia, which showed how critical it is to have timely information on the condition of hydraulic structures in order to prevent disasters and minimize risks to the population and infrastructure.

# DATA



**Data source:**

Images captured from the Roboflow platform.

**Data preprocessing:**

- **Data Augmentation:** Various transformations (horizontal flip, contrast change, rotation, blurring, random cropping) were used to enhance the model.

Pictures were categorized into Positive (positive examples) and Negative (negative examples).

**Separation into training and validation samples was performed.**

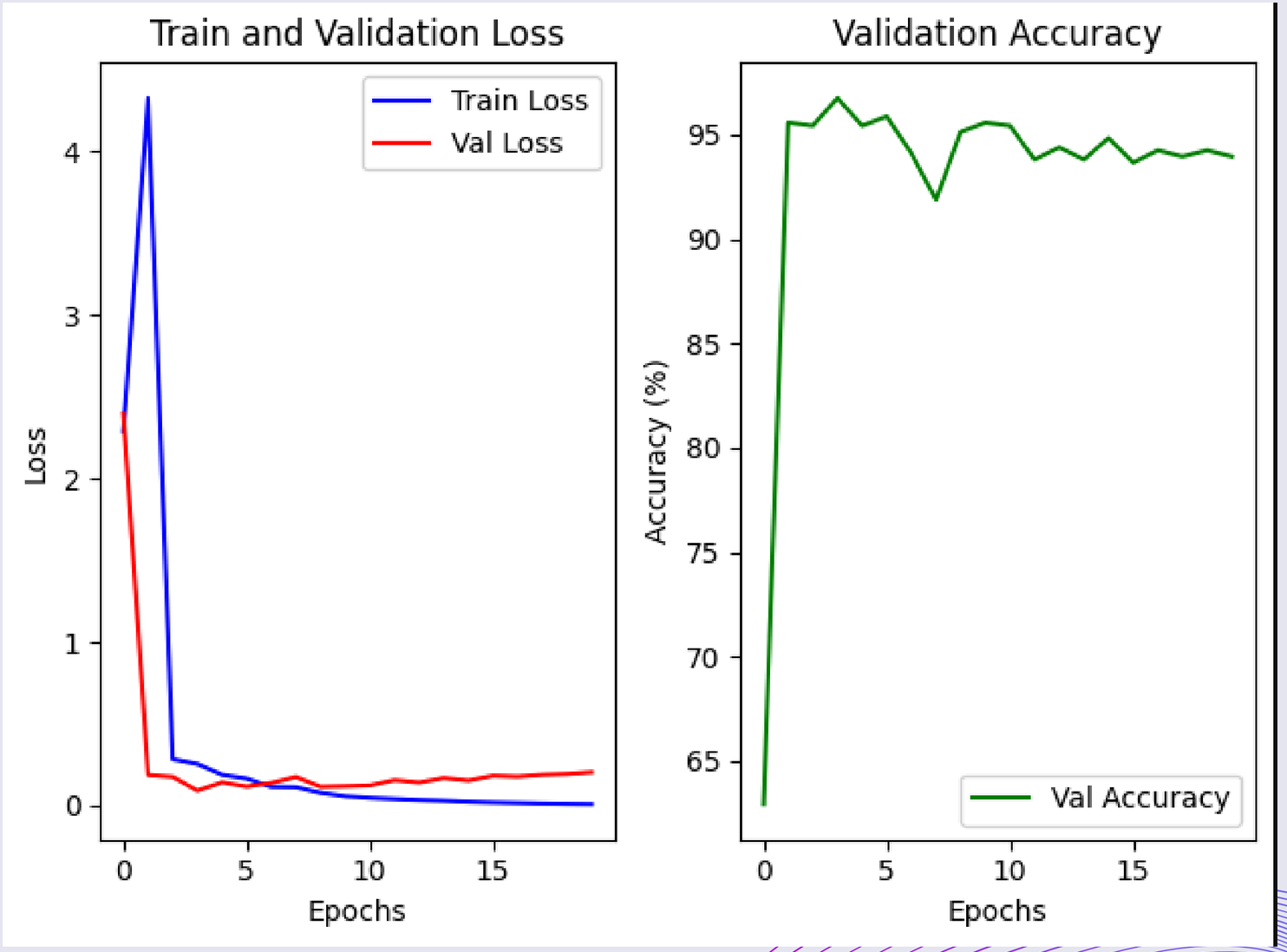
# MODEL

- Simple convolutional neural network (CNN):

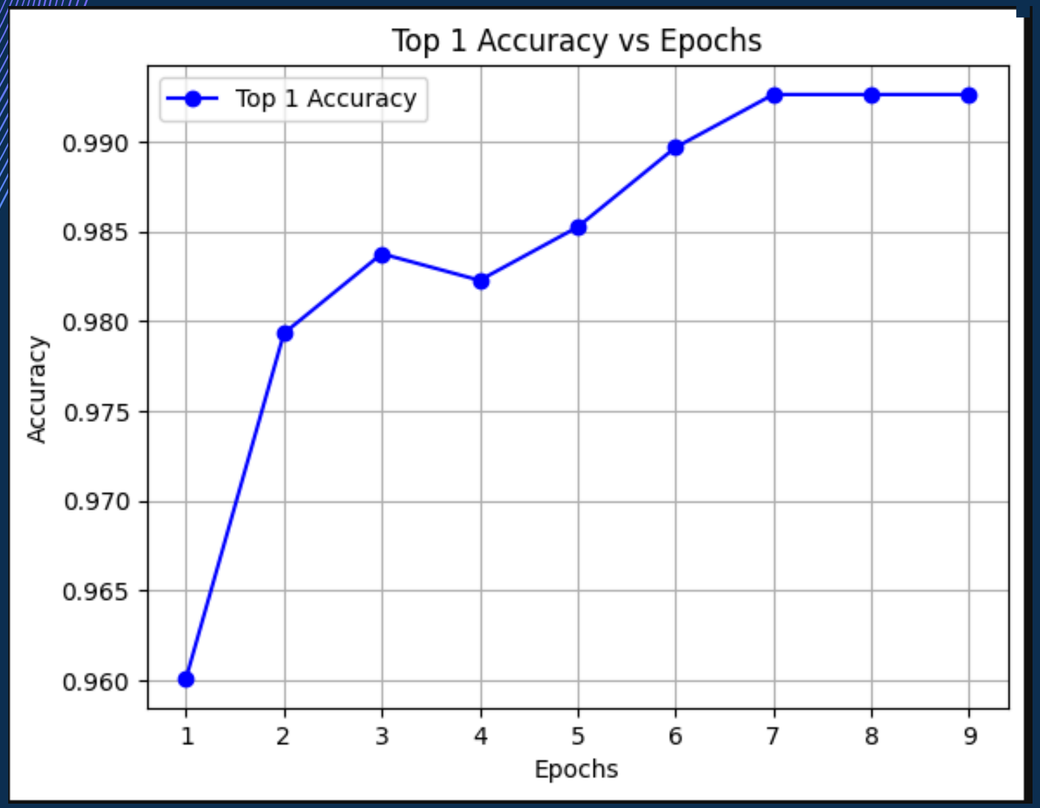
The basic architecture of the model uses a single convolutional layer with maximum pooling and fully connected layers.
Dropout is added to prevent overtraining and improve the generalization ability of the model.

```python
class SimpleCNN(nn.Module):
    def __init__(self, num_classes):
        super(SimpleCNN, self).__init__()
        self.conv1 = nn.Conv2d(3, 16, kernel_size=3, stride=1, padding=1)
        self.pool = nn.MaxPool2d(2, 2)
        self.fc1 = nn.Linear(16 * 112 * 112, num_classes)

    def forward(self, x):
        x = self.pool(F.relu(self.conv1(x)))
        x = x.view(x.size(0), -1)
        x = self.fc1(x)

        return x
```

# TRAINING


Train and Validation Loss
Train Loss
Val Loss
Loss
Epochs
Validation Accuracy
Val Accuracy
Accuracy (%)
Epochs

# USING YOLOV8:




# RESULTS

In this work, a simple model for binary classification was developed to achieve high accuracy. The results showed that the accuracy of the model is comparable to that of more complex background models such as YOLOv8.

However, several problems were identified:

Insufficient amount and variety of data for a more accurate model.
The model does not account for complex geometric shapes of objects, which limits its ability to accurately classify in complex situations.

# THANK YOU