EKSPERIMENTALNI RAD: DETEKCIJA SANTI LEDA POMOĆU CNN-A

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UVOD

Cilj: Razvoj sustava za raniju detekciju santi leda i upozorenje posade

Implementirane tri jednostavne CNN arhitekture

Fokus na evaluaciju i izbor najboljeg modela za prevenciju nesreća

ANALIZA PODATAKA

Skup podataka sadrži slike dimenzija: ***75x75x3***

Klase:

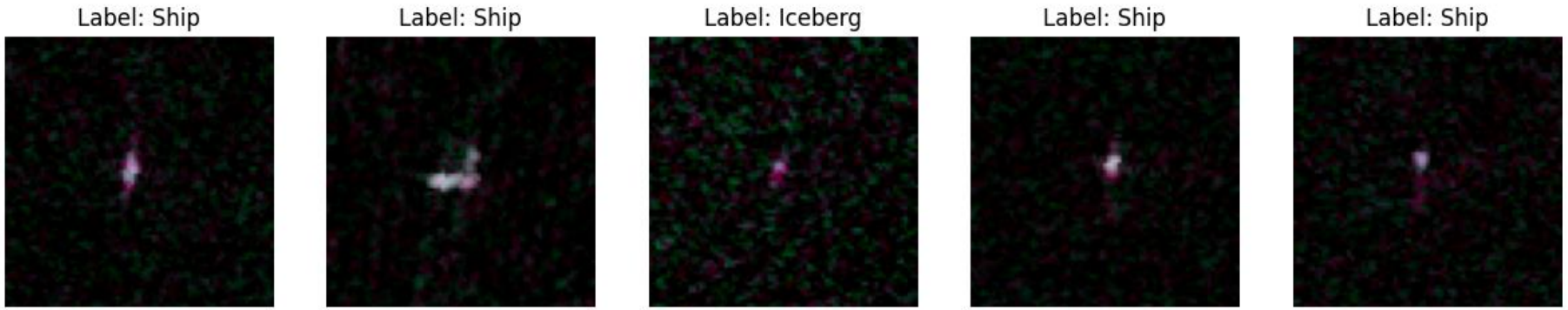
- 0 – Brod
- 1 – Santa Leda

Trening podaci: 2001 brodova, 2112 santi leda.

- Split na: X_train, X_test, Y_train, Y_test -> 3113:1000

Validacijski podaci: 51 brod, 49 santi leda

ANALIZA PODATAKA



IMPLEMENTACIJA CNN MODELA

SimpleCNN_v1
- Jedan konvolucijski sloj (8 filtera, kernel 3x3)

SimpleCNN_v2
- Dva konvolucijska sloja (32 i 64 filtera)

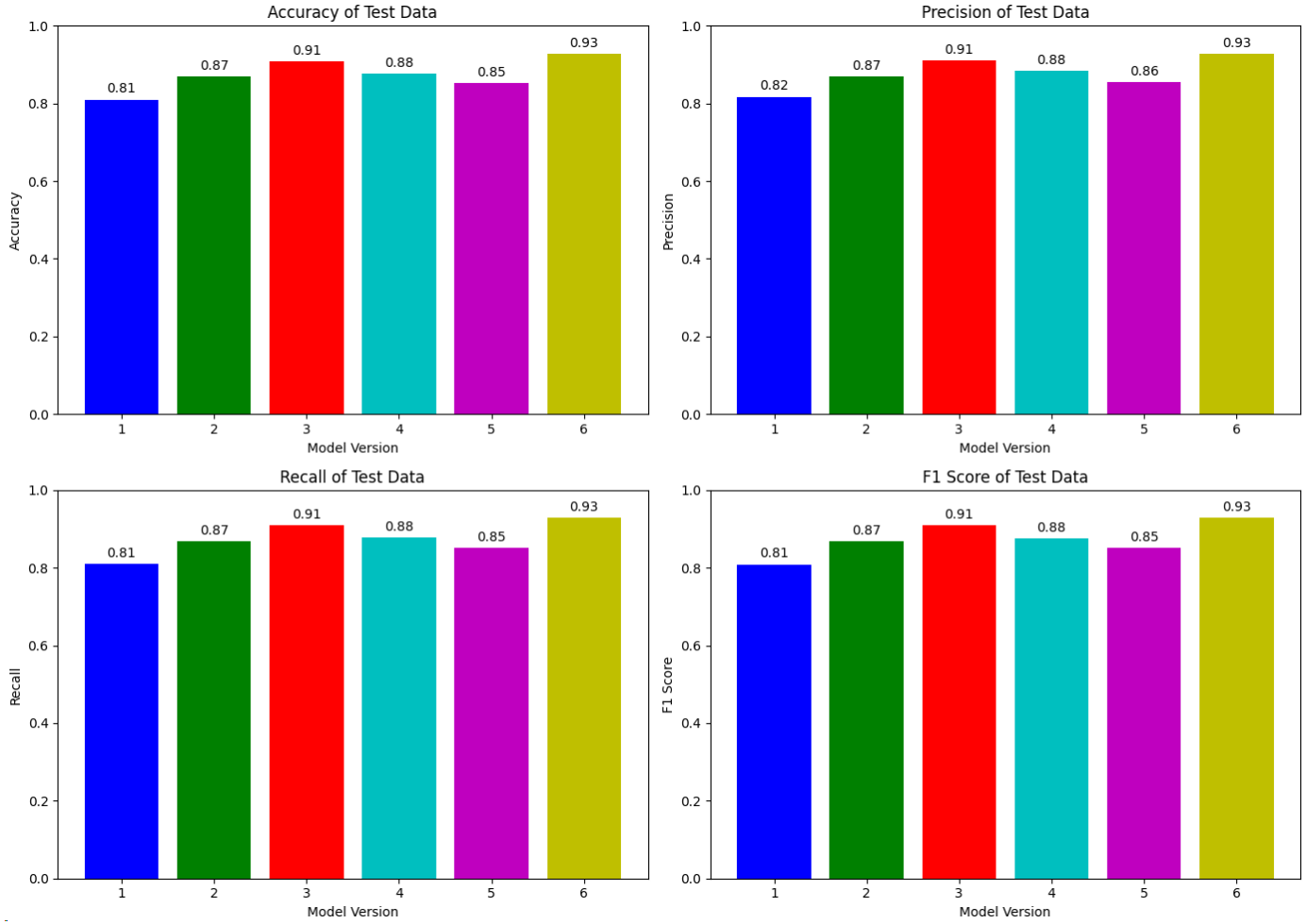
SimpleCNN_v3
- Tri konvolucijska sloja (32, 64 i 128 filtera)

SimpleCNN_v4
- Tri konvolucijska sloja (32, 64 i 128 filtera)
- Dropout sloj -> 30%

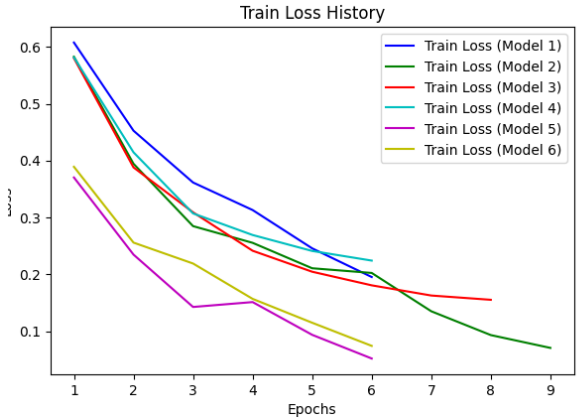
ResNet
- Pred trenirani ResNet-18 model

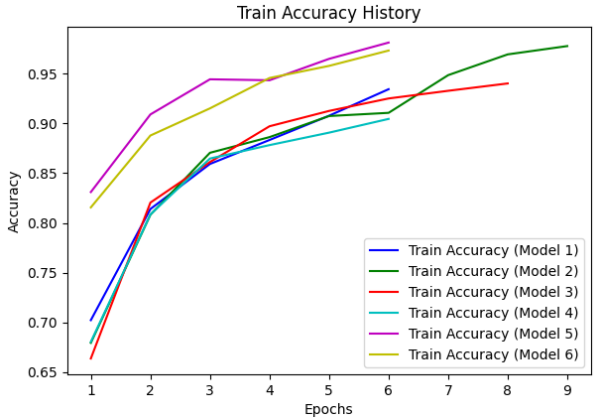
EfficientNet
- Pred trenirani EfficientNet-B0 model

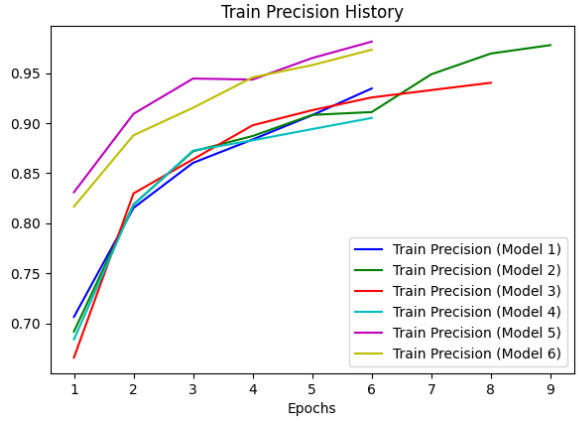
EVALUACIJA

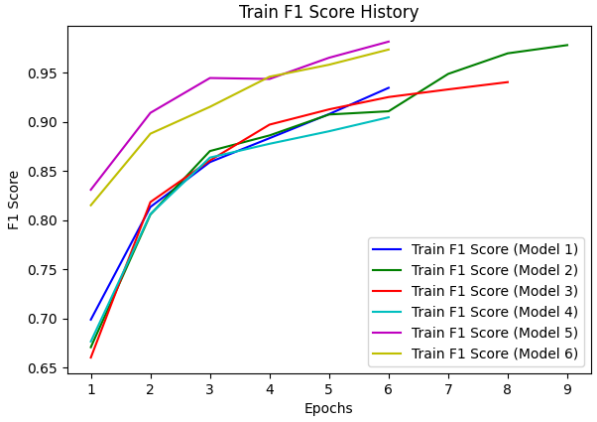

Accuracy of Test Data
Accuracy
Model Version
0.81
0.87
0.91
0.88
0.85
0.93
Precision of Test Data
Precision
Model Version
0.82
0.87
0.91
0.88
0.86
0.93
Recall of Test Data
Recall
Model Version
0.81
0.87
0.91
0.88
0.85
0.93
F1 Score of Test Data
F1 Score
Model Version
0.81
0.87
0.91
0.88
0.85
0.93

EVALUACIJA

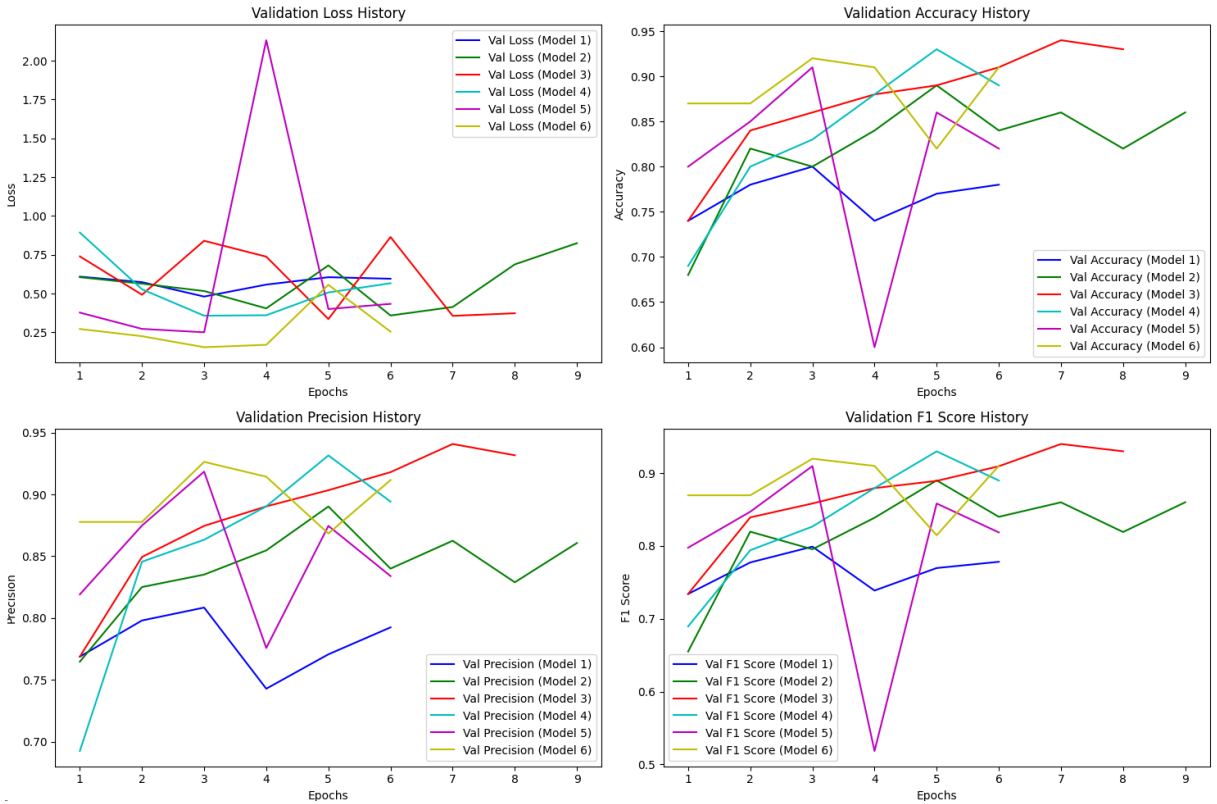

Train Loss History
Train Loss (Model 1)
Train Loss (Model 2)
Train Loss (Model 3)
Train Loss (Model 4)
Train Loss (Model 5)
Train Loss (Model 6)
Epochs


Train Accuracy History
Accuracy
Train Accuracy (Model 1)
Train Accuracy (Model 2)
Train Accuracy (Model 3)
Train Accuracy (Model 4)
Train Accuracy (Model 5)
Train Accuracy (Model 6)
Epochs

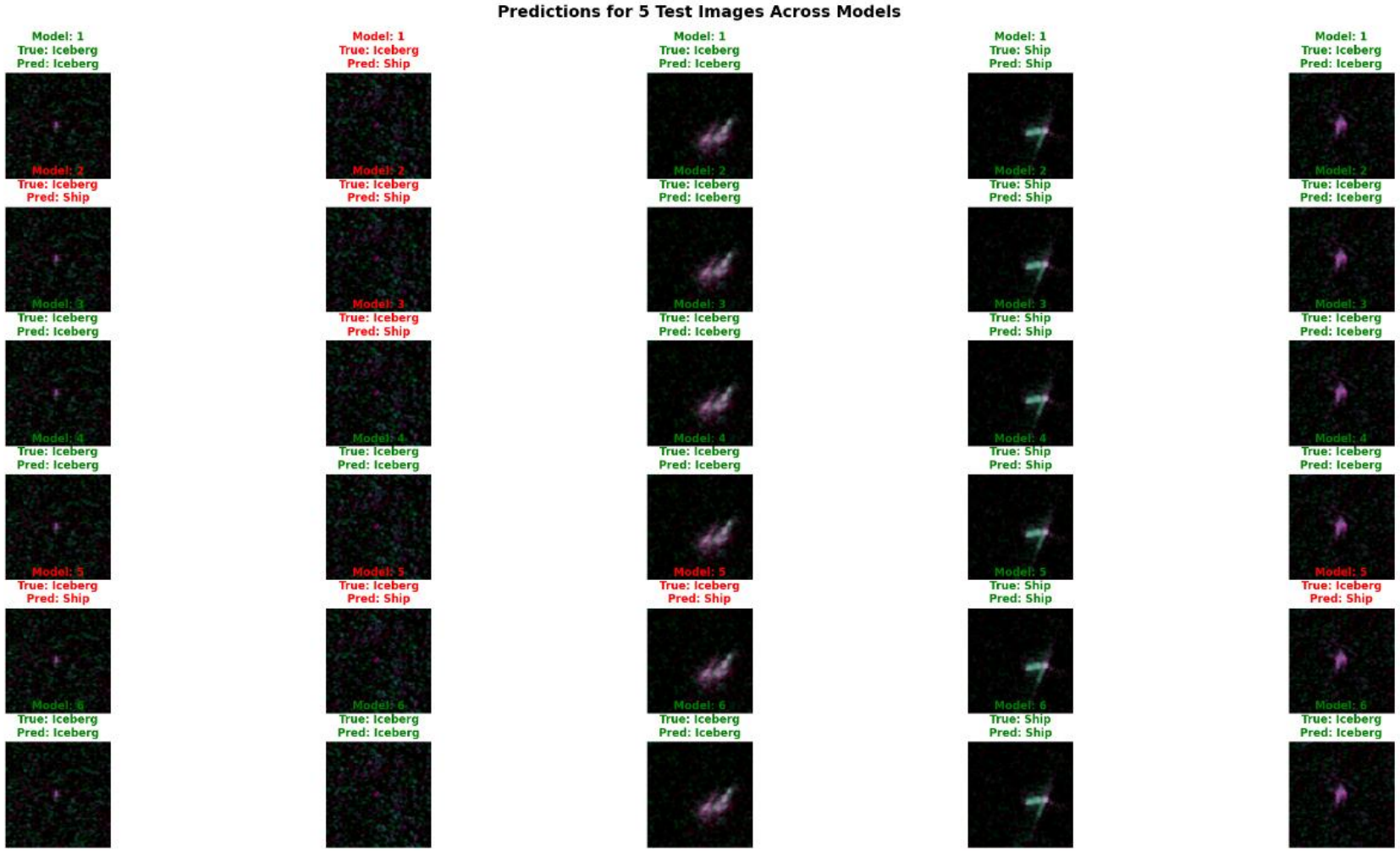

Train Precision History
Train Precision (Model 1)
Train Precision (Model 2)
Train Precision (Model 3)
Train Precision (Model 4)
Train Precision (Model 5)
Train Precision (Model 6)
Epochs

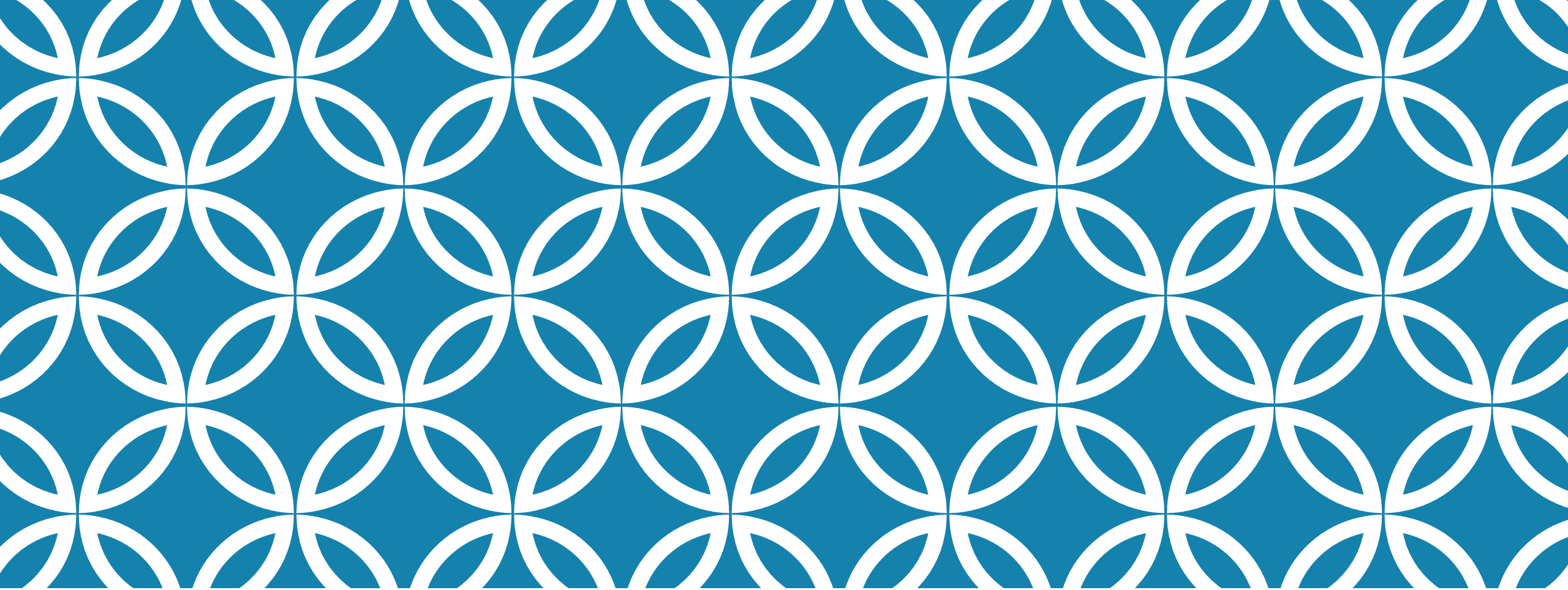

Train F1 Score History
F1 Score
Train F1 Score (Model 1)
Train F1 Score (Model 2)
Train F1 Score (Model 3)
Train F1 Score (Model 4)
Train F1 Score (Model 5)
Train F1 Score (Model 6)
Epochs

EVALUACIJA


Validation Loss History
Loss
Epochs
Val Loss (Model 1)
Val Loss (Model 2)
Val Loss (Model 3)
Val Loss (Model 4)
Val Loss (Model 5)
Val Loss (Model 6)
Validation Accuracy History
Accuracy
Epochs
Val Accuracy (Model 1)
Val Accuracy (Model 2)
Val Accuracy (Model 3)
Val Accuracy (Model 4)
Val Accuracy (Model 5)
Val Accuracy (Model 6)
Validation Precision History
Precision
Epochs
Val Precision (Model 1)
Val Precision (Model 2)
Val Precision (Model 3)
Val Precision (Model 4)
Val Precision (Model 5)
Val Precision (Model 6)
Validation F1 Score History
F1 Score
Epochs
Val F1 Score (Model 1)
Val F1 Score (Model 2)
Val F1 Score (Model 3)
Val F1 Score (Model 4)
Val F1 Score (Model 5)
Val F1 Score (Model 6)

REZULTATI


Predictions for 5 Test Images Across Models
Model: 1
True: Iceberg
Pred: Iceberg
Model: 2
True: Iceberg
Pred: Ship
Model: 3
True: Iceberg
Pred: Iceberg
Model: 4
True: Iceberg
Pred: Iceberg
Model: 5
True: Iceberg
Pred: Ship
Model: 6
True: Iceberg
Pred: Iceberg
Model: 1
True: Iceberg
Pred: Ship
Model: 2
True: Iceberg
Pred: Ship
Model: 3
True: Iceberg
Pred: Ship
Model: 4
True: Iceberg
Pred: Iceberg
Model: 5
True: Iceberg
Pred: Ship
Model: 6
True: Iceberg
Pred: Iceberg
Model: 1
True: Iceberg
Pred: Iceberg
Model: 2
True: Iceberg
Pred: Iceberg
Model: 3
True: Iceberg
Pred: Iceberg
Model: 4
True: Iceberg
Pred: Iceberg
Model: 5
True: Iceberg
Pred: Ship
Model: 6
True: Iceberg
Pred: Iceberg
Model: 1
True: Ship
Pred: Ship
Model: 2
True: Ship
Pred: Ship
Model: 3
True: Ship
Pred: Ship
Model: 4
True: Ship
Pred: Ship
Model: 5
True: Ship
Pred: Ship
Model: 6
True: Ship
Pred: Ship
Model: 1
True: Iceberg
Pred: Iceberg
Model: 2
True: Iceberg
Pred: Iceberg
Model: 3
True: Iceberg
Pred: Iceberg
Model: 4
True: Iceberg
Pred: Iceberg
Model: 5
True: Iceberg
Pred: Ship
Model: 6
True: Iceberg
Pred: Iceberg



HVALA NA PAŽNJI