

```

In [2]: # Fixed imports (added missing ones)
import re
import math
from datetime import datetime
import torch
import torch.nn as nn
import torch.optim as optim
import numpy as np
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.metrics import roc_auc_score, accuracy_score, precision_score, recall_
import matplotlib.pyplot as plt
from torch.utils.data import Dataset, DataLoader, random_split
from tqdm import tqdm
from torch.nn.utils import clip_grad_norm_
from transformers import BertModel, BertTokenizer, AutoTokenizer, AutoModel
from torch.optim import AdamW
from torch.optim.lr_scheduler import ReduceLROnPlateau
import torch.cuda.amp

# Set random seeds for reproducibility
torch.manual_seed(42)
np.random.seed(42)

# 1. Enhanced Data Processing - Fixed missing parenthesis and improved structure
def load_and_preprocess_data(csv_path):
    df = pd.read_pickle(csv_path)
    df['feat_1024'] = df['feat_1024'].apply(lambda x: np.array(x))

    structured_cols = ['bun', 'calcium', 'creatinine', 'glucose', 'magnesium', 'sod

    # Improved missing value handling
    for col in structured_cols:
        df[col] = pd.to_numeric(df[col], errors='coerce')
        df[f'{col}_missing'] = df[col].isna().astype(float) # Missingness flags
        df[col] = df[col].fillna(0)

    scaler = StandardScaler()
    df[structured_cols] = scaler.fit_transform(df[structured_cols])

    # Add temporal features if available
    if 'charttime' in df:
        try:
            df['hour_of_day'] = pd.to_datetime(df['charttime']).dt.hour
            structured_cols.append('hour_of_day')
        except:
            print("Could not parse charttime for hour_of_day feature")

    df['mortality_label'] = pd.to_numeric(df['mortality_label'], errors='coerce').a

    class_counts = df['mortality_label'].value_counts()
    print(f"Class distribution: {class_counts.to_dict()}")
    print(f"Percentage of positive samples: {class_counts.get(1, 0) / len(df) * 100

```

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        return df, structured_cols + [f'{col}_missing' for col in structured_cols]

# 2. Enhanced Dataset Class - Fixed regex pattern and text cleaning
class MultimodalDataset(Dataset):
    def __init__(self, df, structured_cols, tokenizer, max_length=512):
        self.df = df
        self.structured_cols = structured_cols
        self.tokenizer = tokenizer
        self.max_length = max_length
        self.section_pattern = re.compile(
            r'(IMPRESSION|ASSESSMENT|DIAGNOSIS|DISCHARGE SUMMARY):(.*)?(?=\n[A-Z]{2,3})'
            re.IGNORECASE | re.DOTALL
        )

    def __len__(self):
        return len(self.df)

    def _clean_text(self, text):
        text = str(text)
        # 1. Extract clinical sections
        sections = self.section_pattern.findall(text)
        clean_text = ' '.join([s[1].strip() for s in sections]) if sections else text

        # 2. Remove boilerplate and de-id artifacts
        clean_text = re.sub(r'\[.*\]', '', clean_text) # Remove [** **] p
        clean_text = re.sub(r'\s+', ' ', clean_text).strip() # Normalize whitespace

        # 3. Prioritize recent info (Last 2048 chars if Long)
        return clean_text[-2048:] if len(clean_text) > 2048 else clean_text

    def __getitem__(self, idx):
        row = self.df.iloc[idx]

        # Image features
        img_feat = torch.tensor(row['feat_1024'], dtype=torch.float32)

        # Text processing
        clean_text = self._clean_text(row['combined_note'])
        text_feat = self.tokenizer(
            clean_text,
            max_length=self.max_length,
            padding='max_length',
            truncation=True,
            return_tensors='pt'
        )

        # Structured data with missingness flags
        struct_data = [float(row[col]) for col in self.structured_cols]
        struct_feat = torch.tensor(struct_data, dtype=torch.float32)

        label = torch.tensor(float(row['mortality_label']), dtype=torch.float32)

        return {
            'img_feat': img_feat,
            'input_ids': text_feat['input_ids'].squeeze(0),
            'struct_data': struct_data,
            'label': label
        }

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        'attention_mask': text_feat['attention_mask'].squeeze(0),
        'struct_feat': struct_feat,
        'label': label
    }

```

3. Model Architecture - Fixed dimension mismatches

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class MultimodalFusionModel(nn.Module):
    def __init__(self, bert_model_name='bert-base-uncased', img_dim=1024, struct_dim=12):
        super().__init__()
        self.bert = BertModel.from_pretrained(bert_model_name)
        self.bert_hidden_size = self.bert.config.hidden_size

        self.img_projection = nn.Sequential(
            nn.Linear(img_dim, hidden_dim),
            nn.ReLU(),
            nn.Dropout(dropout_rate)
        )

        # Fixed struct_dim to match actual input (12 = 6 Labs + 6 missing flags)
        self.struct_projection = nn.Sequential(
            nn.Linear(struct_dim, hidden_dim*2),
            nn.ReLU(),
            nn.Dropout(dropout_rate),
            nn.Linear(hidden_dim*2, hidden_dim)
        )

        self.attention = nn.Sequential(
            nn.Linear(self.bert_hidden_size + hidden_dim * 2, hidden_dim),
            nn.Tanh(),
            nn.Linear(hidden_dim, 3),
            nn.Softmax(dim=1)
        )

        self.classifier = nn.Sequential(
            nn.Linear(self.bert_hidden_size + hidden_dim * 2, hidden_dim),
            nn.ReLU(),
            nn.Dropout(dropout_rate),
            nn.Linear(hidden_dim, 1)
        )

    def forward(self, img_feat, input_ids, attention_mask, struct_feat):
        bert_outputs = self.bert(input_ids=input_ids, attention_mask=attention_mask)
        text_embed = bert_outputs.last_hidden_state[:, 0, :]

        img_proj = self.img_projection(img_feat)
        struct_proj = self.struct_projection(struct_feat)

        combined = torch.cat([text_embed, img_proj, struct_proj], dim=1)
        attention_weights = self.attention(combined)

        text_embed = text_embed * attention_weights[:, 0].unsqueeze(1)
        img_proj = img_proj * attention_weights[:, 1].unsqueeze(1)
        struct_proj = struct_proj * attention_weights[:, 2].unsqueeze(1)

        fused = torch.cat([text_embed, img_proj, struct_proj], dim=1)
        return self.classifier(fused).squeeze()

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# [Rest of your code remains the same...]
# 4. Training Utilities (unchanged)
def compute_metrics(y_true, y_pred, threshold=0.5):
    y_pred = np.array(y_pred)
    y_pred_bin = (y_pred >= threshold).astype(int)
    return {
        'auc': roc_auc_score(y_true, y_pred),
        'accuracy': accuracy_score(y_true, y_pred_bin),
        'precision': precision_score(y_true, y_pred_bin, zero_division=0),
        'recall': recall_score(y_true, y_pred_bin, zero_division=0),
        'f1': f1_score(y_true, y_pred_bin, zero_division=0)
    }

def find_optimal_threshold(y_true, y_pred):
    thresholds = np.arange(0.1, 0.9, 0.05)
    best_threshold = 0.5
    best_f1 = 0
    for threshold in thresholds:
        f1 = f1_score(y_true, (y_pred >= threshold).astype(int), zero_division=0)
        if f1 > best_f1:
            best_f1 = f1
            best_threshold = threshold
    return best_threshold

# 5. Training Loop (enhanced)
def train_model(model, train_loader, val_loader, criterion, optimizer, num_epochs=2):
    model = model.to(device)
    history = {'train': [], 'val': []}
    best_f1 = 0.0
    patience = 5
    epochs_without_improvement = 0
    scaler = torch.cuda.amp.GradScaler()
    scheduler = ReduceLROnPlateau(optimizer, 'max', patience=2, factor=0.1)

    for epoch in range(num_epochs):
        model.train()
        train_preds, train_labels = [], []
        train_loss = 0

        for batch in tqdm(train_loader, desc=f"Epoch {epoch+1}/{num_epochs}"):
            optimizer.zero_grad()

            with torch.cuda.amp.autocast():
                outputs = model(
                    batch['img_feat'].to(device),
                    batch['input_ids'].to(device),
                    batch['attention_mask'].to(device),
                    batch['struct_feat'].to(device)
                )
                loss = criterion(outputs, batch['label'].to(device))

            scaler.scale(loss).backward()
            clip_grad_norm_(model.parameters(), clip_value)
            scaler.step(optimizer)
            scaler.update()

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train_loss += loss.item() * batch['img_feat'].size(0)
train_preds.extend(torch.sigmoid(outputs.detach()).cpu().numpy())
train_labels.extend(batch['label'].cpu().numpy())

# Validation phase
model.eval()
val_preds, val_labels = [], []
val_loss = 0

with torch.no_grad():
    for batch in val_loader:
        outputs = model(
            batch['img_feat'].to(device),
            batch['input_ids'].to(device),
            batch['attention_mask'].to(device),
            batch['struct_feat'].to(device)
        )
        loss = criterion(outputs, batch['label'].to(device))

        val_loss += loss.item() * batch['img_feat'].size(0)
        val_preds.extend(torch.sigmoid(outputs).cpu().numpy())
        val_labels.extend(batch['label'].cpu().numpy())

# Calculate metrics
train_loss /= len(train_loader.dataset)
val_loss /= len(val_loader.dataset)

train_metrics = compute_metrics(train_labels, train_preds)
val_metrics = compute_metrics(val_labels, val_preds)
best_threshold = find_optimal_threshold(val_labels, val_preds)
val_metrics_thresh = compute_metrics(val_labels, val_preds, best_threshold)

# Store history
history['train'].append({'loss': train_loss, **train_metrics})
history['val'].append({
    'loss': val_loss,
    **val_metrics,
    'best_threshold': best_threshold,
    **val_metrics_thresh
})

# Update scheduler
scheduler.step(val_metrics['f1'])

# Print metrics
print(f"\nEpoch {epoch+1}/{num_epochs}")
print(f"Train Loss: {train_loss:.4f} | Val Loss: {val_loss:.4f}")
print(f"Val AUC: {val_metrics['auc']:.4f} | Best Threshold: {best_threshold}")
print(f"Val F1: {val_metrics_thresh['f1']:.4f} | Precision: {val_metrics_th")
print(f"Current LR: {optimizer.param_groups[0]['lr']:.2e}")

if val_metrics_thresh['f1'] > best_f1:
    best_f1 = val_metrics_thresh['f1']
    epochs_without_improvement = 0
    torch.save({

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        'model_state_dict': model.state_dict(),
        'threshold': best_threshold,
        'epoch': epoch
    }, "best_multimodal_model.pth")
    print("Saved new best model!")

    return model, history

# 6. Evaluation Function (unchanged)
def evaluate_model(model, loader, threshold, device):
    model.eval()
    preds, labels = [], []

    with torch.no_grad():
        for batch in tqdm(loader, desc="Evaluating"):
            outputs = model(
                batch['img_feat'].to(device),
                batch['input_ids'].to(device),
                batch['attention_mask'].to(device),
                batch['struct_feat'].to(device)
            )
            preds.extend(torch.sigmoid(outputs).cpu().numpy())
            labels.extend(batch['label'].cpu().numpy())

    metrics = compute_metrics(np.array(labels), np.array(preds), threshold)

    print(f"\nEvaluation Results (Threshold={threshold:.2f}):")
    print(f"AUC: {metrics['auc']:.4f}")
    print(f"Accuracy: {metrics['accuracy']:.4f}")
    print(f"Precision: {metrics['precision']:.4f}")
    print(f"Recall: {metrics['recall']:.4f}")
    print(f"F1 Score: {metrics['f1']:.4f}")

    return metrics

# 7. Main Execution (enhanced)
def main():
    device = torch.device("cuda" if torch.cuda.is_available() else "cpu")
    print(f"Using device: {device}")

    # Data Loading
    df, structured_cols = load_and_preprocess_data("final_image_feats.pkl")
    tokenizer = BertTokenizer.from_pretrained('bert-base-uncased')

    # Data splits
    train_df, test_df = train_test_split(df, test_size=0.2, random_state=42, stratify=df['label'])
    train_df, val_df = train_test_split(train_df, test_size=0.25, random_state=42, stratify=train_df['label'])

    print(f"\nData splits:")
    print(f"Train: {len(train_df)} samples")
    print(f"Val: {len(val_df)} samples")
    print(f"Test: {len(test_df)} samples")

    # Datasets and DataLoaders
    batch_size = 16

```

```

train_dataset = MultimodalDataset(train_df, structured_cols, tokenizer)
val_dataset = MultimodalDataset(val_df, structured_cols, tokenizer)
test_dataset = MultimodalDataset(test_df, structured_cols, tokenizer)

train_loader = DataLoader(train_dataset, batch_size=batch_size, shuffle=True, pin_
val_loader = DataLoader(val_dataset, batch_size=batch_size, shuffle=False, pin_
test_loader = DataLoader(test_dataset, batch_size=batch_size, shuffle=False, pi

# Handle class imbalance
class_counts = train_df['mortality_label'].value_counts()
pos_weight = torch.tensor([class_counts[0] / class_counts[1]], device=device)
criterion = nn.BCEWithLogitsLoss(pos_weight=pos_weight)

# Model and optimizer
model = MultimodalFusionModel(
    bert_model_name='bert-base-uncased',
    img_dim=1024,
    struct_dim=len(structured_cols)
)

optimizer = AdamW([
    {'params': model.bert.parameters(), 'lr': 2e-5},
    {'params': [p for n, p in model.named_parameters() if 'bert' not in n], 'lr'
], weight_decay=1e-4)

# Training
model, history = train_model(
    model=model,
    train_loader=train_loader,
    val_loader=val_loader,
    criterion=criterion,
    optimizer=optimizer,
    num_epochs=100,
    device=device
)

# Evaluation
checkpoint = torch.load("best_multimodal_model.pth", weights_only=False)
model.load_state_dict(checkpoint['model_state_dict'])
test_metrics = evaluate_model(model, test_loader, checkpoint['threshold'], devi

# Plotting
plt.figure(figsize=(12, 8))
metrics = ['loss', 'auc', 'f1', 'accuracy']
for i, metric in enumerate(metrics, 1):
    plt.subplot(2, 2, i)
    plt.plot([x[metric] for x in history['train']], label='Train')
    plt.plot([x[metric] for x in history['val']], label='Val')
    plt.title(metric.upper())
    plt.xlabel('Epoch')
    plt.legend()
plt.tight_layout()
plt.savefig('training_history.png')
plt.show()

```

```
if __name__ == "__main__":  
    main()
```

Using device: cuda

Class distribution: {0: 1069, 1: 91}

Percentage of positive samples: 7.84%

Data splits:

Train: 696 samples

Val: 232 samples

Test: 232 samples

```
/tmp/ipykernel_3351697/1614006529.py:199: FutureWarning: `torch.cuda.amp.GradScaler  
(args...)` is deprecated. Please use `torch.amp.GradScaler('cuda', args...)` instead.  
d.
```

```
    scaler = torch.cuda.amp.GradScaler()
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(ar  
gs...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
    with torch.cuda.amp.autocast():
```

poch 1/100: 100%|██████████| 44/44 [00:09<00:00, 4.74it/s]

Epoch 1/100

Train Loss: 1.2821 | Val Loss: 1.1041

Val AUC: 0.9483 | Best Threshold: 0.45

Val F1: 0.4167 | Precision: 0.8333 | Recall: 0.2778

Current LR: 2.00e-05

Saved new best model!

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(ar  
gs...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
    with torch.cuda.amp.autocast():
```

poch 2/100: 100%|██████████| 44/44 [00:09<00:00, 4.88it/s]

Epoch 2/100

Train Loss: 0.9795 | Val Loss: 0.6327

Val AUC: 0.9870 | Best Threshold: 0.50

Val F1: 0.8108 | Precision: 0.7895 | Recall: 0.8333

Current LR: 2.00e-05

Saved new best model!

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(ar  
gs...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
    with torch.cuda.amp.autocast():
```

poch 3/100: 100%|██████████| 44/44 [00:08<00:00, 4.89it/s]

Epoch 3/100

Train Loss: 0.5107 | Val Loss: 0.7155

Val AUC: 0.9821 | Best Threshold: 0.20

Val F1: 0.8571 | Precision: 0.8824 | Recall: 0.8333

Current LR: 2.00e-05

Saved new best model!

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(ar  
gs...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
    with torch.cuda.amp.autocast():
```

poch 4/100: 100%|██████████| 44/44 [00:09<00:00, 4.88it/s]

Epoch 4/100
Train Loss: 0.8214 | Val Loss: 1.6218
Val AUC: 0.9813 | Best Threshold: 0.80
Val F1: 0.8824 | Precision: 0.9375 | Recall: 0.8333
Current LR: 2.00e-05
Saved new best model!

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

poch 5/100: 100%|██████████| 44/44 [00:09<00:00, 4.88it/s]

Epoch 5/100
Train Loss: 0.7444 | Val Loss: 4.3257
Val AUC: 0.9782 | Best Threshold: 0.10
Val F1: 0.8000 | Precision: 1.0000 | Recall: 0.6667
Current LR: 2.00e-05

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

poch 6/100: 100%|██████████| 44/44 [00:08<00:00, 4.91it/s]

Epoch 6/100
Train Loss: 1.7820 | Val Loss: 1.0675
Val AUC: 0.9964 | Best Threshold: 0.10
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
Current LR: 2.00e-05
Saved new best model!

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

poch 7/100: 100%|██████████| 44/44 [00:08<00:00, 4.91it/s]

Epoch 7/100
Train Loss: 0.4503 | Val Loss: 1.2231
Val AUC: 0.9971 | Best Threshold: 0.10
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
Current LR: 2.00e-05

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

poch 8/100: 100%|██████████| 44/44 [00:08<00:00, 4.91it/s]

Epoch 8/100
Train Loss: 0.6817 | Val Loss: 3.3882
Val AUC: 0.9966 | Best Threshold: 0.10
Val F1: 0.8387 | Precision: 1.0000 | Recall: 0.7222
Current LR: 2.00e-05

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

poch 9/100: 100%|██████████| 44/44 [00:08<00:00, 4.91it/s]

Epoch 9/100
Train Loss: 0.4349 | Val Loss: 1.2868
Val AUC: 0.9971 | Best Threshold: 0.10
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
Current LR: 2.00e-06

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

poch 10/100: 100%|██████████| 44/44 [00:08<00:00, 4.91it/s]

Epoch 10/100
Train Loss: 0.3793 | Val Loss: 1.2724
Val AUC: 0.9971 | Best Threshold: 0.10
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
Current LR: 2.00e-06

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

poch 11/100: 100%|██████████| 44/44 [00:08<00:00, 4.91it/s]

Epoch 11/100
Train Loss: 0.3765 | Val Loss: 1.2840
Val AUC: 0.9971 | Best Threshold: 0.10
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
Current LR: 2.00e-06

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

poch 12/100: 100%|██████████| 44/44 [00:08<00:00, 4.91it/s]

Epoch 12/100
Train Loss: 0.3469 | Val Loss: 1.2679
Val AUC: 0.9971 | Best Threshold: 0.10
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
Current LR: 2.00e-07

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

poch 13/100: 100%|██████████| 44/44 [00:08<00:00, 4.91it/s]

Epoch 13/100
Train Loss: 0.3965 | Val Loss: 1.2700
Val AUC: 0.9971 | Best Threshold: 0.10
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
Current LR: 2.00e-07

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

poch 14/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]

Epoch 14/100
Train Loss: 0.3574 | Val Loss: 1.2711
Val AUC: 0.9971 | Best Threshold: 0.10
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
Current LR: 2.00e-07

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
    with torch.cuda.amp.autocast():
```

```
poch 15/100: 100%|██████████| 44/44 [00:08<00:00, 4.91it/s]
```

```
Epoch 15/100
```

```
Train Loss: 0.3858 | Val Loss: 1.2784
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-08
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
    with torch.cuda.amp.autocast():
```

```
poch 16/100: 100%|██████████| 44/44 [00:08<00:00, 4.91it/s]
```

```
Epoch 16/100
```

```
Train Loss: 0.4144 | Val Loss: 1.2783
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-08
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
    with torch.cuda.amp.autocast():
```

```
poch 17/100: 100%|██████████| 44/44 [00:08<00:00, 4.91it/s]
```

```
Epoch 17/100
```

```
Train Loss: 0.3588 | Val Loss: 1.2780
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-08
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
    with torch.cuda.amp.autocast():
```

```
poch 18/100: 100%|██████████| 44/44 [00:08<00:00, 4.91it/s]
```

```
Epoch 18/100
```

```
Train Loss: 0.3671 | Val Loss: 1.2778
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
    with torch.cuda.amp.autocast():
```

```
poch 19/100: 100%|██████████| 44/44 [00:08<00:00, 4.91it/s]
```

```
Epoch 19/100
```

```
Train Loss: 0.3333 | Val Loss: 1.2778
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 20/100: 100%|██████████| 44/44 [00:08<00:00, 4.91it/s]
```

```
Epoch 20/100
```

```
Train Loss: 0.3880 | Val Loss: 1.2778
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 21/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 21/100
```

```
Train Loss: 0.3108 | Val Loss: 1.2778
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 22/100: 100%|██████████| 44/44 [00:08<00:00, 4.91it/s]
```

```
Epoch 22/100
```

```
Train Loss: 0.3486 | Val Loss: 1.2778
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 23/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 23/100
```

```
Train Loss: 0.3724 | Val Loss: 1.2778
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 24/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 24/100
```

```
Train Loss: 0.3268 | Val Loss: 1.2778
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 25/100: 100%|██████████| 44/44 [00:08<00:00, 4.91it/s]
```

```
Epoch 25/100
```

```
Train Loss: 0.3608 | Val Loss: 1.2778
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 26/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 26/100
```

```
Train Loss: 0.3604 | Val Loss: 1.2778
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 27/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 27/100
```

```
Train Loss: 0.3880 | Val Loss: 1.2778
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 28/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 28/100
```

```
Train Loss: 0.3307 | Val Loss: 1.2778
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 29/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 29/100
```

```
Train Loss: 0.3460 | Val Loss: 1.2778
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 30/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 30/100
```

```
Train Loss: 0.3499 | Val Loss: 1.2778
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 31/100: 100%|██████████| 44/44 [00:08<00:00, 4.91it/s]
```

```
Epoch 31/100
```

```
Train Loss: 0.3619 | Val Loss: 1.2778
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 32/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 32/100
```

```
Train Loss: 0.3864 | Val Loss: 1.2778
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 33/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 33/100
```

```
Train Loss: 0.3711 | Val Loss: 1.2778
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 34/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 34/100
```

```
Train Loss: 0.3396 | Val Loss: 1.2778
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 35/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 35/100
```

```
Train Loss: 0.3997 | Val Loss: 1.2778
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 36/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 36/100
```

```
Train Loss: 0.3677 | Val Loss: 1.2778
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 37/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 37/100
```

```
Train Loss: 0.3157 | Val Loss: 1.2778
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 38/100: 100%|██████████| 44/44 [00:08<00:00, 4.91it/s]
```

```
Epoch 38/100
```

```
Train Loss: 0.3673 | Val Loss: 1.2778
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 39/100: 100%|██████████| 44/44 [00:08<00:00, 4.91it/s]
```

```
Epoch 39/100
```

```
Train Loss: 0.3671 | Val Loss: 1.2777
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 40/100: 100%|██████████| 44/44 [00:08<00:00, 4.91it/s]
```

```
Epoch 40/100
```

```
Train Loss: 0.3832 | Val Loss: 1.2777
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 41/100: 100%|██████████| 44/44 [00:08<00:00, 4.91it/s]
```

```
Epoch 41/100
```

```
Train Loss: 0.3727 | Val Loss: 1.2777
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 42/100: 100%|██████████| 44/44 [00:08<00:00, 4.91it/s]
```

```
Epoch 42/100
```

```
Train Loss: 0.3305 | Val Loss: 1.2777
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 43/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 43/100
```

```
Train Loss: 0.3545 | Val Loss: 1.2777
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 44/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 44/100
```

```
Train Loss: 0.3556 | Val Loss: 1.2777
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```



```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 45/100: 100%|██████████| 44/44 [00:08<00:00, 4.89it/s]
```

```
Epoch 45/100
```

```
Train Loss: 0.4431 | Val Loss: 1.2777
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 46/100: 100%|██████████| 44/44 [00:08<00:00, 4.91it/s]
```

```
Epoch 46/100
```

```
Train Loss: 0.3798 | Val Loss: 1.2778
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 47/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 47/100
```

```
Train Loss: 0.3492 | Val Loss: 1.2777
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 48/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 48/100
```

```
Train Loss: 0.3870 | Val Loss: 1.2777
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 49/100: 100%|██████████| 44/44 [00:08<00:00, 4.89it/s]
```

```
Epoch 49/100
```

```
Train Loss: 0.3714 | Val Loss: 1.2778
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 50/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 50/100
```

```
Train Loss: 0.3507 | Val Loss: 1.2778
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 51/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 51/100
```

```
Train Loss: 0.3578 | Val Loss: 1.2778
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 52/100: 100%|██████████| 44/44 [00:08<00:00, 4.91it/s]
```

```
Epoch 52/100
```

```
Train Loss: 0.3227 | Val Loss: 1.2778
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 53/100: 100%|██████████| 44/44 [00:08<00:00, 4.91it/s]
```

```
Epoch 53/100
```

```
Train Loss: 0.3543 | Val Loss: 1.2778
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 54/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 54/100
```

```
Train Loss: 0.3411 | Val Loss: 1.2778
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 55/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 55/100
```

```
Train Loss: 0.3827 | Val Loss: 1.2779
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 56/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 56/100
```

```
Train Loss: 0.3210 | Val Loss: 1.2779
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 57/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 57/100
```

```
Train Loss: 0.3383 | Val Loss: 1.2779
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 58/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 58/100
```

```
Train Loss: 0.3560 | Val Loss: 1.2779
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 59/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 59/100
```

```
Train Loss: 0.3429 | Val Loss: 1.2779
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 60/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 60/100
```

```
Train Loss: 0.3556 | Val Loss: 1.2780
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 61/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 61/100
```

```
Train Loss: 0.3588 | Val Loss: 1.2780
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 62/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 62/100
```

```
Train Loss: 0.3820 | Val Loss: 1.2780
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 63/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 63/100
```

```
Train Loss: 0.3812 | Val Loss: 1.2780
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 64/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 64/100
```

```
Train Loss: 0.3497 | Val Loss: 1.2780
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 65/100: 100%|██████████| 44/44 [00:09<00:00, 4.89it/s]
```

```
Epoch 65/100
```

```
Train Loss: 0.4012 | Val Loss: 1.2781
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 66/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 66/100
```

```
Train Loss: 0.3417 | Val Loss: 1.2781
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 67/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 67/100
```

```
Train Loss: 0.3663 | Val Loss: 1.2781
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 68/100: 100%|██████████| 44/44 [00:08<00:00, 4.89it/s]
```

```
Epoch 68/100
```

```
Train Loss: 0.3518 | Val Loss: 1.2782
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 69/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 69/100
```

```
Train Loss: 0.3738 | Val Loss: 1.2782
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 70/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 70/100
```

```
Train Loss: 0.3934 | Val Loss: 1.2782
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 71/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 71/100
```

```
Train Loss: 0.3883 | Val Loss: 1.2782
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 72/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 72/100
```

```
Train Loss: 0.3803 | Val Loss: 1.2783
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 73/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 73/100
```

```
Train Loss: 0.3395 | Val Loss: 1.2783
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 74/100: 100%|██████████| 44/44 [00:08<00:00, 4.89it/s]
```

```
Epoch 74/100
```

```
Train Loss: 0.3502 | Val Loss: 1.2783
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 75/100: 100%|██████████| 44/44 [00:08<00:00, 4.89it/s]
```

```
Epoch 75/100
```

```
Train Loss: 0.3756 | Val Loss: 1.2783
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 76/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 76/100
```

```
Train Loss: 0.3535 | Val Loss: 1.2784
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 77/100: 100%|██████████| 44/44 [00:08<00:00, 4.89it/s]
```

```
Epoch 77/100
```

```
Train Loss: 0.3260 | Val Loss: 1.2784
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 78/100: 100%|██████████| 44/44 [00:08<00:00, 4.89it/s]
```

```
Epoch 78/100
```

```
Train Loss: 0.3859 | Val Loss: 1.2784
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 79/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 79/100
```

```
Train Loss: 0.3320 | Val Loss: 1.2784
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 80/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 80/100
```

```
Train Loss: 0.3802 | Val Loss: 1.2785
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 81/100: 100%|██████████| 44/44 [00:08<00:00, 4.89it/s]
```

```
Epoch 81/100
```

```
Train Loss: 0.3271 | Val Loss: 1.2785
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 82/100: 100%|██████████| 44/44 [00:08<00:00, 4.89it/s]
```

```
Epoch 82/100
```

```
Train Loss: 0.3736 | Val Loss: 1.2785
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 83/100: 100%|██████████| 44/44 [00:08<00:00, 4.89it/s]
```

```
Epoch 83/100
```

```
Train Loss: 0.4024 | Val Loss: 1.2785
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 84/100: 100%|██████████| 44/44 [00:09<00:00, 4.89it/s]
```

```
Epoch 84/100
```

```
Train Loss: 0.3861 | Val Loss: 1.2785
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```



```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 85/100: 100%|██████████| 44/44 [00:09<00:00, 4.89it/s]
```

```
Epoch 85/100
```

```
Train Loss: 0.4018 | Val Loss: 1.2786
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 86/100: 100%|██████████| 44/44 [00:08<00:00, 4.89it/s]
```

```
Epoch 86/100
```

```
Train Loss: 0.3428 | Val Loss: 1.2786
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 87/100: 100%|██████████| 44/44 [00:09<00:00, 4.89it/s]
```

```
Epoch 87/100
```

```
Train Loss: 0.3667 | Val Loss: 1.2786
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 88/100: 100%|██████████| 44/44 [00:08<00:00, 4.89it/s]
```

```
Epoch 88/100
```

```
Train Loss: 0.3519 | Val Loss: 1.2787
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 89/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 89/100
```

```
Train Loss: 0.3649 | Val Loss: 1.2787
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 90/100: 100%|██████████| 44/44 [00:08<00:00, 4.89it/s]
```

```
Epoch 90/100
```

```
Train Loss: 0.3467 | Val Loss: 1.2787
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 91/100: 100%|██████████| 44/44 [00:09<00:00, 4.88it/s]
```

```
Epoch 91/100
```

```
Train Loss: 0.3312 | Val Loss: 1.2788
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 92/100: 100%|██████████| 44/44 [00:08<00:00, 4.89it/s]
```

```
Epoch 92/100
```

```
Train Loss: 0.3902 | Val Loss: 1.2788
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 93/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 93/100
```

```
Train Loss: 0.3265 | Val Loss: 1.2789
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 94/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 94/100
```

```
Train Loss: 0.3282 | Val Loss: 1.2789
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 95/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 95/100
```

```
Train Loss: 0.3502 | Val Loss: 1.2789
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 96/100: 100%|██████████| 44/44 [00:09<00:00, 4.89it/s]
```

```
Epoch 96/100
```

```
Train Loss: 0.3806 | Val Loss: 1.2789
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 97/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 97/100
```

```
Train Loss: 0.3592 | Val Loss: 1.2790
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 98/100: 100%|██████████| 44/44 [00:08<00:00, 4.89it/s]
```

```
Epoch 98/100
```

```
Train Loss: 0.3569 | Val Loss: 1.2790
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
  with torch.cuda.amp.autocast():
```

```
poch 99/100: 100%|██████████| 44/44 [00:08<00:00, 4.90it/s]
```

```
Epoch 99/100
```

```
Train Loss: 0.3485 | Val Loss: 1.2791
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
/tmp/ipykernel_3351697/1614006529.py:210: FutureWarning: `torch.cuda.amp.autocast(args...)` is deprecated. Please use `torch.amp.autocast('cuda', args...)` instead.  
with torch.cuda.amp.autocast():
```

```
poch 100/100: 100%|██████████| 44/44 [00:08<00:00, 4.89it/s]
```

```
Epoch 100/100
```

```
Train Loss: 0.3528 | Val Loss: 1.2791
```

```
Val AUC: 0.9971 | Best Threshold: 0.10
```

```
Val F1: 0.9412 | Precision: 1.0000 | Recall: 0.8889
```

```
Current LR: 2.00e-09
```

```
valuating: 100%|██████████| 15/15 [00:02<00:00, 5.35it/s]
```

```
Evaluation Results (Threshold=0.10):
```

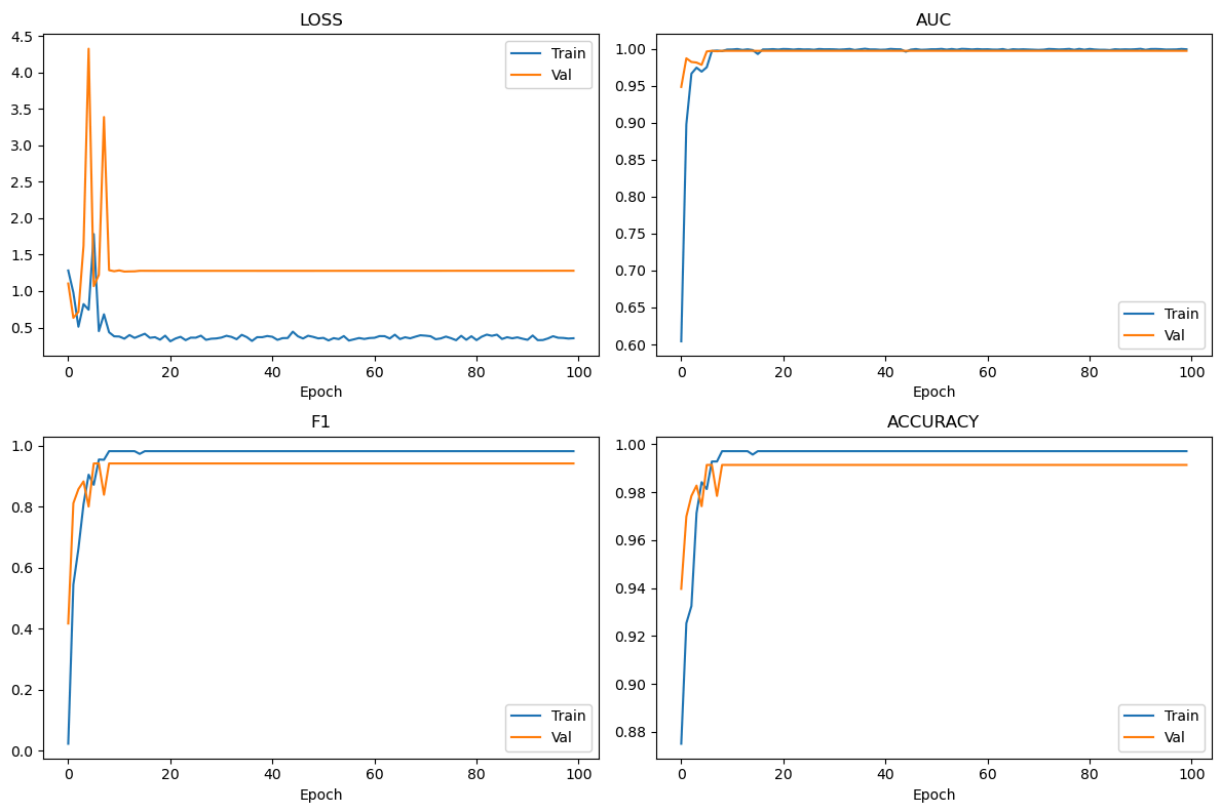
```
AUC: 0.9920
```

```
Accuracy: 0.9828
```

```
Precision: 0.8500
```

```
Recall: 0.9444
```

```
F1 Score: 0.8947
```



```
In [ ]:
```