

HCAT-FusionNet Training Report

Training Summary

```
{
  "best_validation_metrics": {
    "surv_f1": 0.8392857142857143,
    "rec_f1": 0.9230769230769231,
    "avg_f1": 0.8811813186813187
  },
  "final_evaluation_metrics": {
    "survival": {
      "acc": 0.7931034482758621,
      "f1": 0.8392857142857143,
      "auc": 0.8115468409586056,
      "report": {
        "Class 0": {
          "precision": 0.8461538461538461,
          "recall": 0.6111111111111112,
          "f1-score": 0.7096774193548387,
          "support": 36.0
        },
        "Class 1": {
          "precision": 0.7704918032786885,
          "recall": 0.9215686274509803,
          "f1-score": 0.8392857142857143,
          "support": 51.0
        }
      },
      "accuracy": 0.7931034482758621,
      "macro avg": {
        "precision": 0.8083228247162673,
        "recall": 0.7663398692810457,
        "f1-score": 0.7744815668202765,
        "support": 87.0
      },
      "weighted avg": {
        "precision": 0.8018002348132365,
        "recall": 0.7931034482758621,
        "f1-score": 0.7856546956936279,
        "support": 87.0
      }
    },
    "recurrence": {
      "acc": 0.9693877551020408,
      "f1": 0.9230769230769231,
      "auc": 0.9876314162028447,
      "report": {
        "Class 0": {
          "precision": 0.9625,
          "recall": 1.0,
          "f1-score": 0.9808917197452229,
```

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```
"support": 77.0
},
"Class 1": {
  "precision": 1.0,
  "recall": 0.8571428571428571,
  "f1-score": 0.9230769230769231,
  "support": 21.0
},
"accuracy": 0.9693877551020408,
"macro avg": {
  "precision": 0.98125,
  "recall": 0.9285714285714286,
  "f1-score": 0.951984321411073,
  "support": 98.0
},
"weighted avg": {
  "precision": 0.9705357142857143,
  "recall": 0.9693877551020408,
  "f1-score": 0.968502834744873,
  "support": 98.0
}
}
},
"hyperparameters": {
  "clinical": "/content/embeddings/clinical_embedding_512.h5",
  "semantic": "/content/embeddings/text_semantic_embeddings_512.h5",
  "temporal": "/content/embeddings/temporal_embedding_512.h5",
  "pathological": "/content/embeddings/pathological_embedding_512.h5",
  "spatial": "/content/embeddings/spatial_embeddings_512.h5",
  "outdir": "hpo_output",
  "epochs": 50,
  "batch": 32,
  "lr": 0.00025286502226367095,
  "device": "cuda",
  "val_fraction": 0.2,
  "seed": 42,
  "weight_decay": 0.00020373951370313982,
  "early_stop_patience": 12,
  "d_model": 512,
  "n_heads": 8,
  "n_global_layers": 2,
  "dropout": 0.3269584341511003,
  "use_advanced_imputation": true,
  "n_impute_iterations": 3,
  "alpha_surv": 1.0,
  "alpha_rec": 1.0,
  "alpha_con": 0.10961999351921693,
  "alpha_kl": 0.023521123165215325,
  "alpha_impute": 0.22453367671295005,
  "use_contrastive": false,
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```
"moddrop": 0.1,  
"emb_noise": 0.05,  
"optimize_hyperparams": true,  
"n_trials": 75,  
"hf_repo_id": "ragunath-ravi/hcat-fusionnet",  
"hf_token": "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"  
},  
"history_summary": {  
  "epochs_run": 25,  
  "final_train_loss": 0.09617286097062261,  
  "best_avg_f1_epoch": 13  
}  
}
```

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Final Evaluation Metrics

Survival Metrics:

```
{
  "Class 0": {
    "precision": 0.8461538461538461,
    "recall": 0.6111111111111112,
    "f1-score": 0.7096774193548387,
    "support": 36.0
  },
  "Class 1": {
    "precision": 0.7704918032786885,
    "recall": 0.9215686274509803,
    "f1-score": 0.8392857142857143,
    "support": 51.0
  },
  "accuracy": 0.7931034482758621,
  "macro avg": {
    "precision": 0.8083228247162673,
    "recall": 0.7663398692810457,
    "f1-score": 0.7744815668202765,
    "support": 87.0
  },
  "weighted avg": {
    "precision": 0.8018002348132365,
    "recall": 0.7931034482758621,
    "f1-score": 0.7856546956936279,
    "support": 87.0
  }
}
```

Recurrence Metrics:

```
{
  "Class 0": {
    "precision": 0.9625,
    "recall": 1.0,
    "f1-score": 0.9808917197452229,
    "support": 77.0
  },
  "Class 1": {
    "precision": 1.0,
    "recall": 0.8571428571428571,
    "f1-score": 0.9230769230769231,
    "support": 21.0
  },
  "accuracy": 0.9693877551020408,
  "macro avg": {
    "precision": 0.98125,
    "recall": 0.9285714285714286,
    "f1-score": 0.951984321411073,

```

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```
"support": 98.0
},
"weighted avg": {
  "precision": 0.9705357142857143,
  "recall": 0.9693877551020408,
  "f1-score": 0.968502834744873,
  "support": 98.0
}
}
```

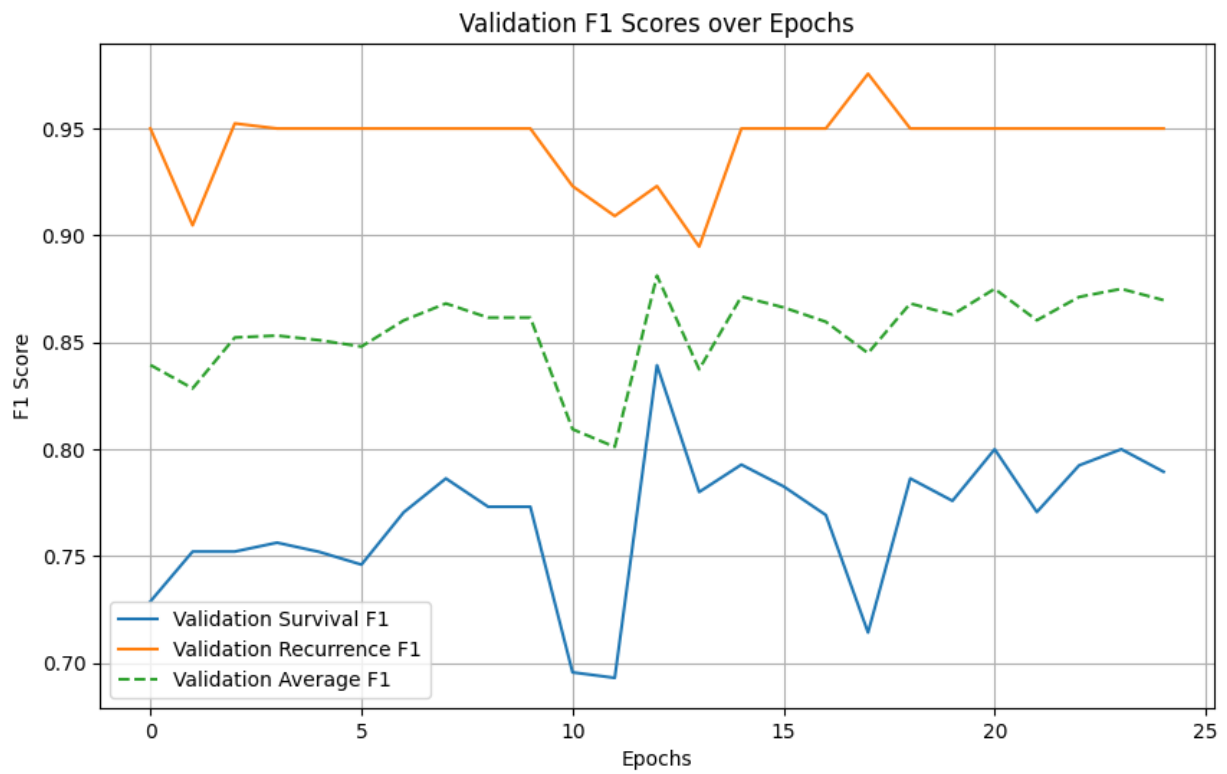
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Training Loss



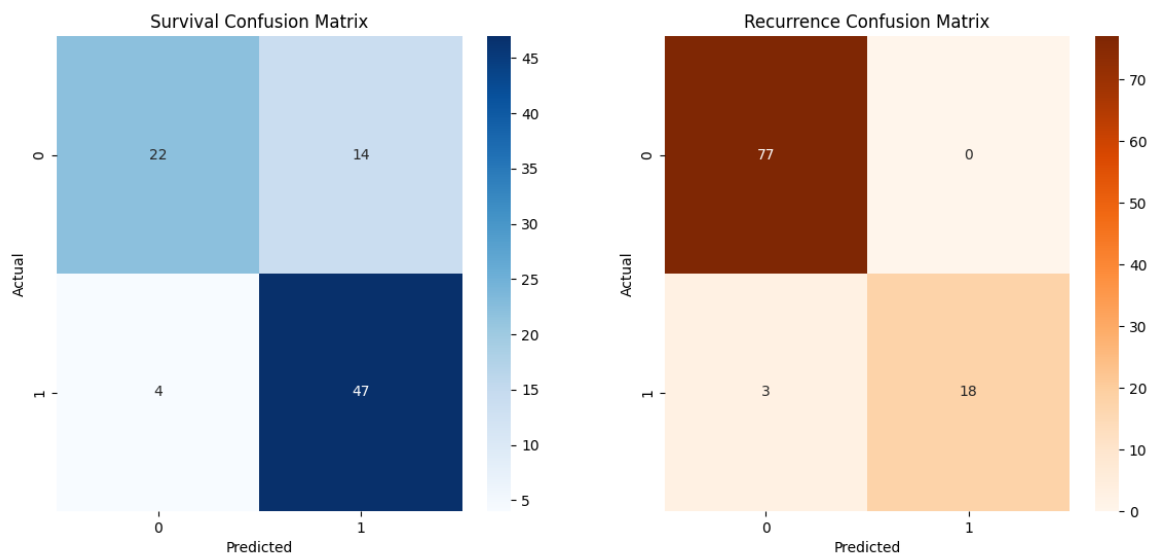
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Validation F1 Scores



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Confusion Matrices



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ROC Curves

