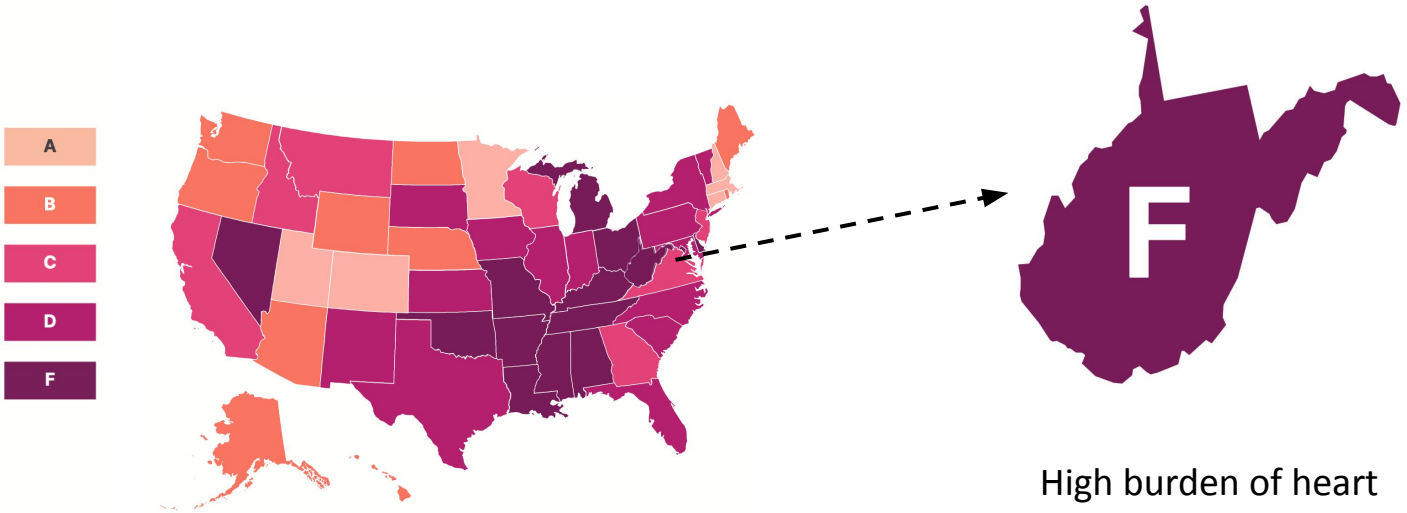
Even 5 seconds feels long…

… what about **weeks** or even **months** for a heart test?

The Problem: Heart Disease Burden in Rural America

West Virginia has the highest age-adjusted heart disease mortality rate in the US



High burden of heart disease in West Virginia

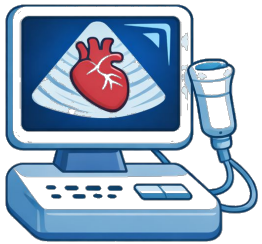
Can AI Estimate Ejection Fraction (EF) from a 12-Lead ECG?

EF = percentage of blood pumped per heartbeat · Key indicator for heart failure diagnosis

VS

Echocardiography

(Gold Standard)



- ✖ Expensive
- ✖ Requires specialists
- ✖ Limited in rural areas
- ✖ Long wait times

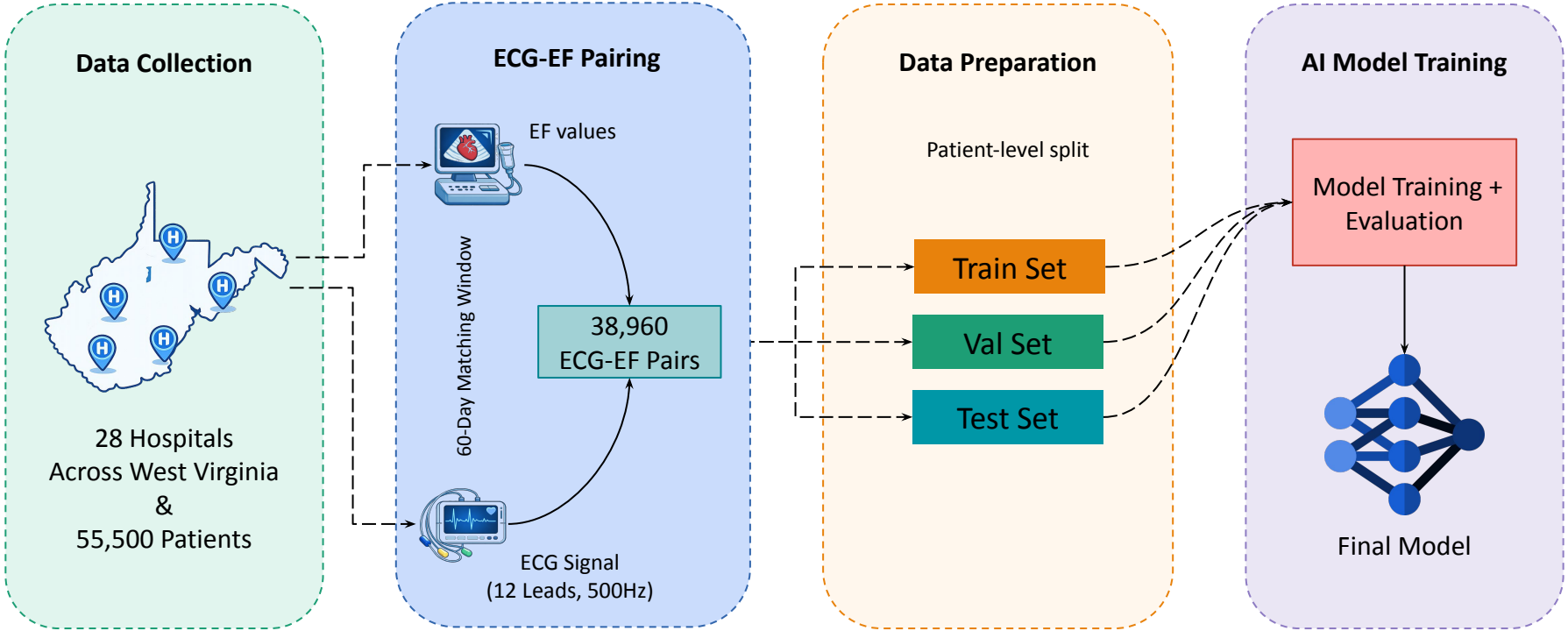
12-Lead Electrocardiograms (ECGs)

- ✔ Cheap
- ✔ Quick
- ✔ No specialists required
- ✔ Widely Available

“AI analysis for ejection fraction estimation from 12-lead ECG”

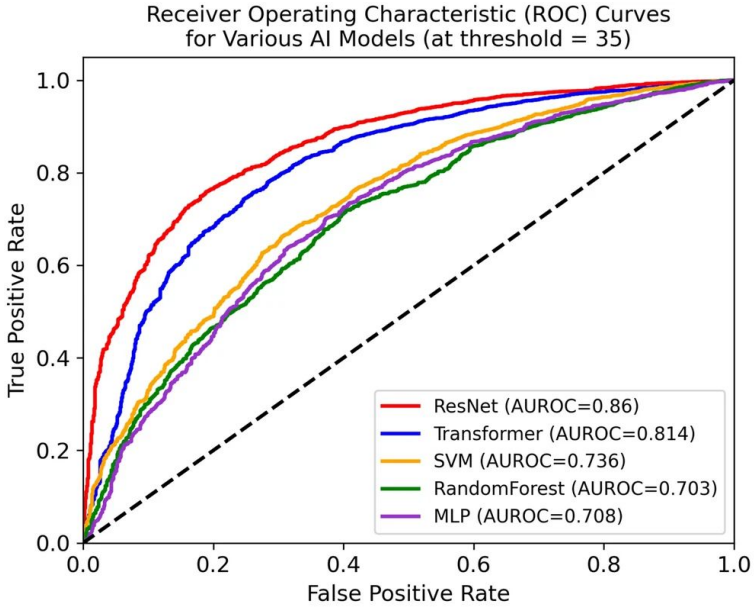
Study Design — Rural Appalachia Pipeline

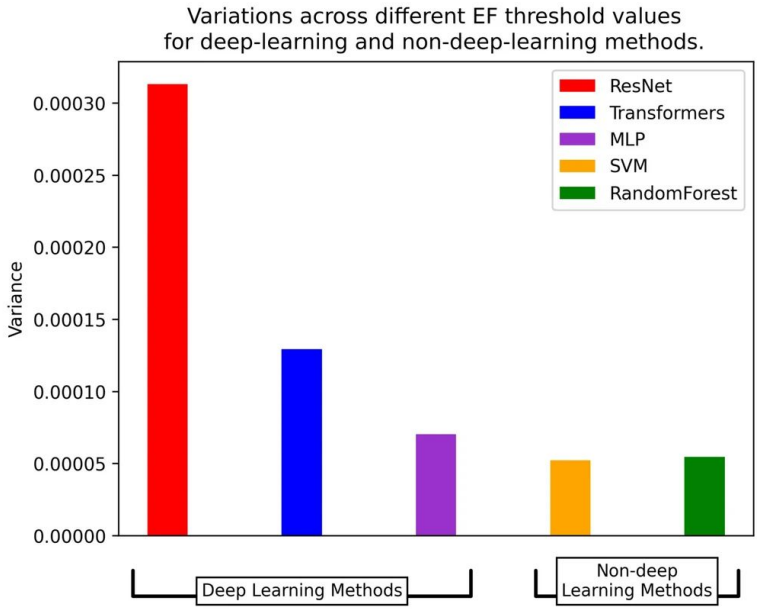
55,500 patients · 28 West Virginia Hospitals · 38,960 ECG-EF pairs



What We Found — AI Can Reliably Estimate EF from ECG

Deep learning outperforms traditional ML · ResNet achieves AUROC ~0.86



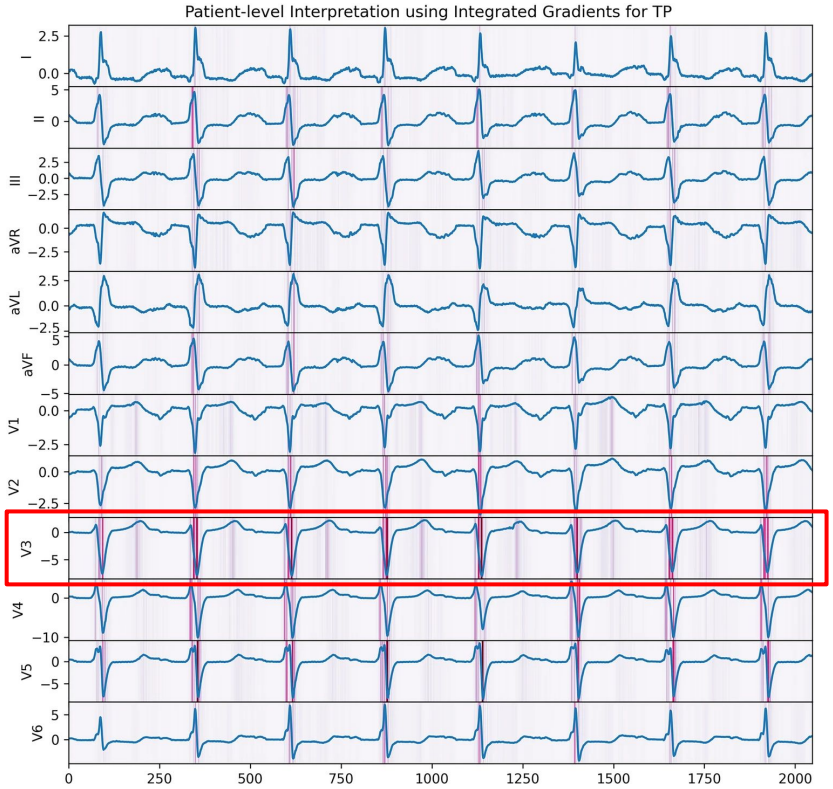


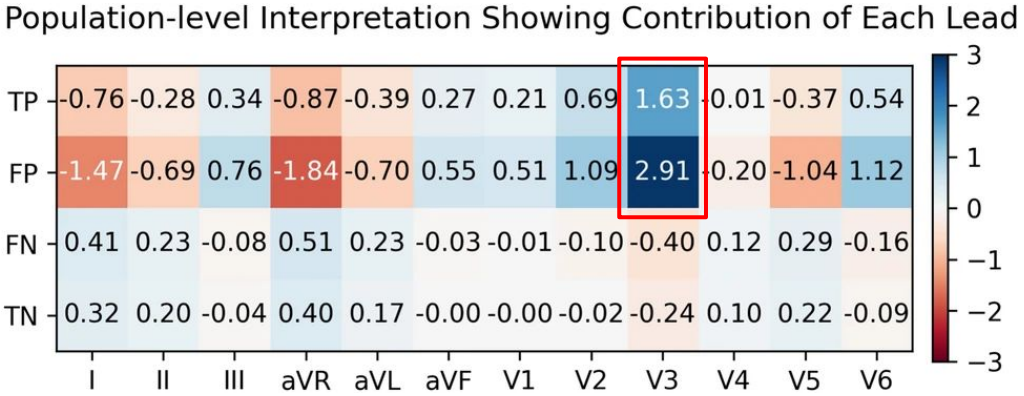
Key Finding

Deep learning models (ResNet, Transformer) significantly outperform classical ML for ECG-based EF estimation

Can We Interpret the Results? — Model Explainability

Which ECG leads and which time regions drive AI predictions?





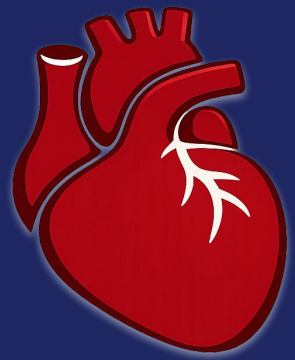
- V3 (a chest lead) shows the highest contribution across TP and FP categories
- Integrated gradients highlight the QRS complex and ST segment as primary time regions

“

Our hearts never stop working —

so why should people have

to wait for a heart test?



AI analysis for ejection fraction estimation from 12-lead ECG

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