Track patient recovery in real-time by processing streaming data

BIOMEDICAL DATA DESIGN

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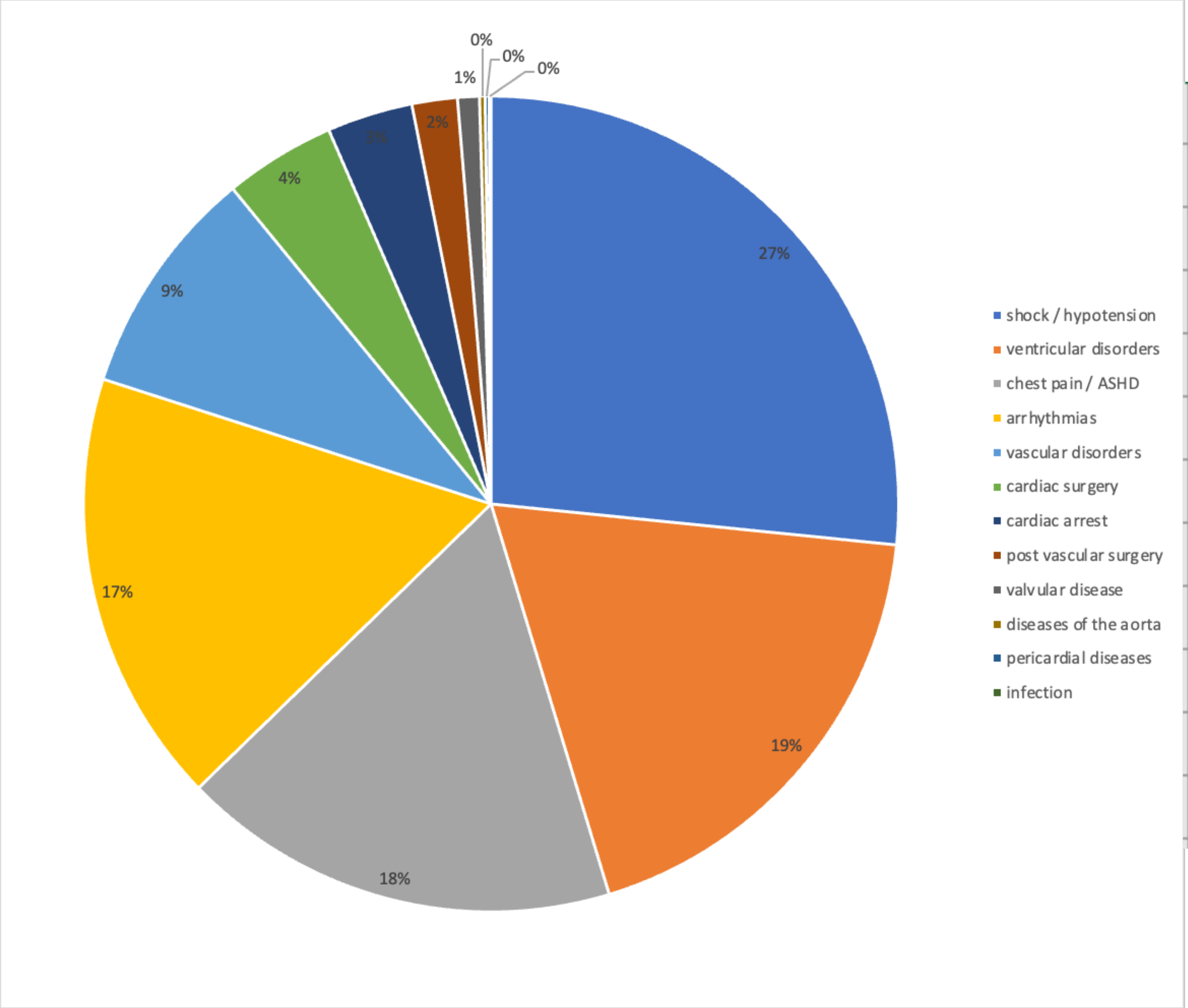
Content

01

Cardiovascular Diseases

01 Cardiovascular Diseases

Main symptoms of the disease：



shock / hypotension	1815
ventricular disorders	1277
chest pain / ASHD	1189
arrhythmias	1174
vascular disorders	622
cardiac surgery	301
cardiac arrest	232
post vascular surgery	123
valvular disease	59
diseases of the aorta	15
pericardial diseases	11
infection	5

01 Cardiovascular Diseases

1.heart rate
2.blood pressure
3.Cardic Output
4.Coronary Artery Blood Flow
5.Body Temperature (BT)
6.Oxygen Saturation
7.Peripheral Capillary Oxygen Saturation (SpO2)
8.Oxygen Saturation (O2sat)
9. C-reactive Protein (CRP)
10. Lipid Profile
11.age,sex,smoke history, etc...

02

EICU Prediction

02 EICU Prediction

Benchmarking deep learning models on large healthcare datasets

Sanjay Purushotham [a 1], Chuizheng Meng [b 1], Zhengping Che [a], Yan Liu [a]

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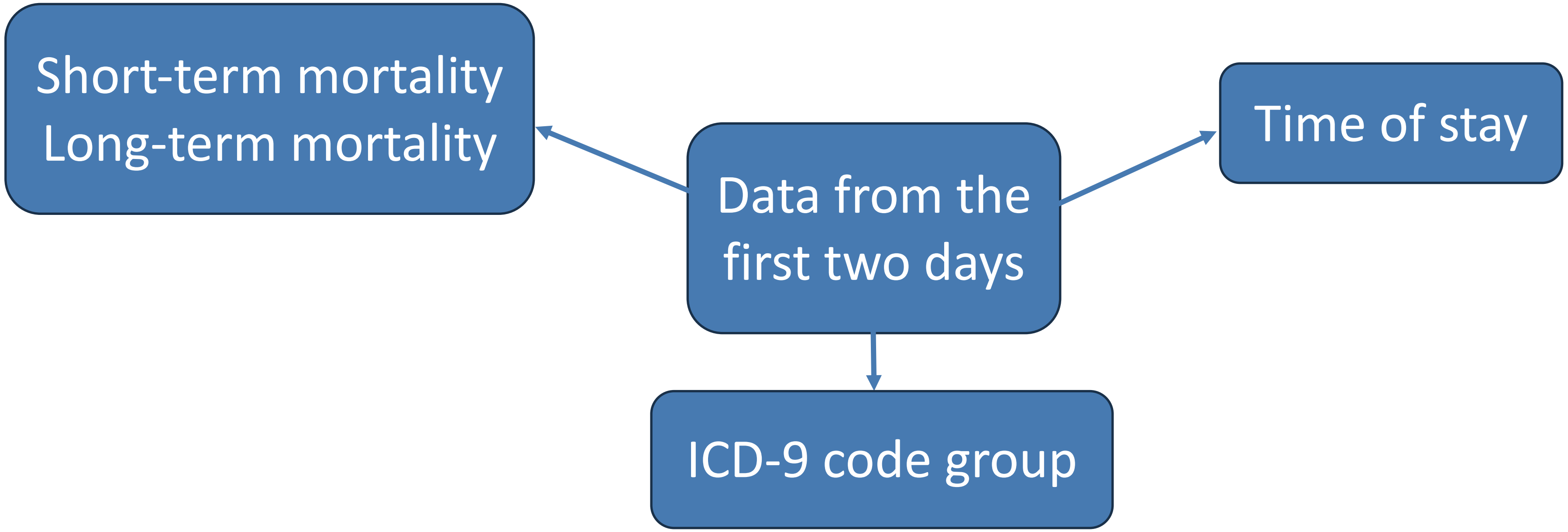

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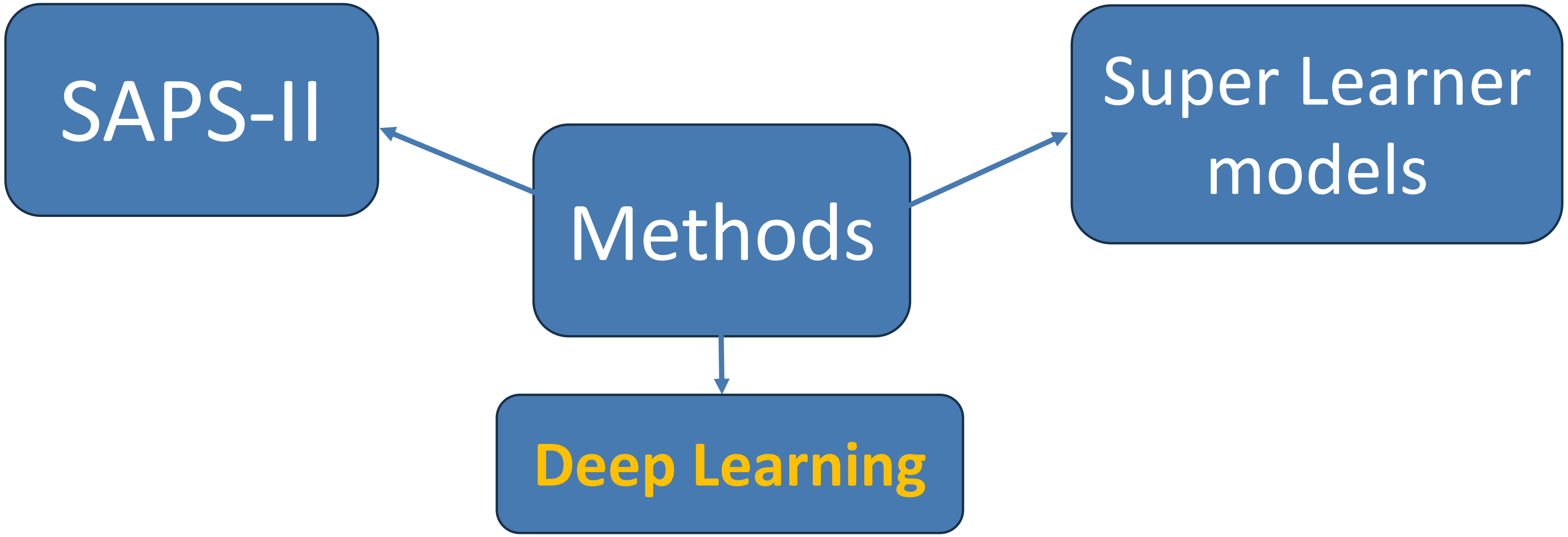

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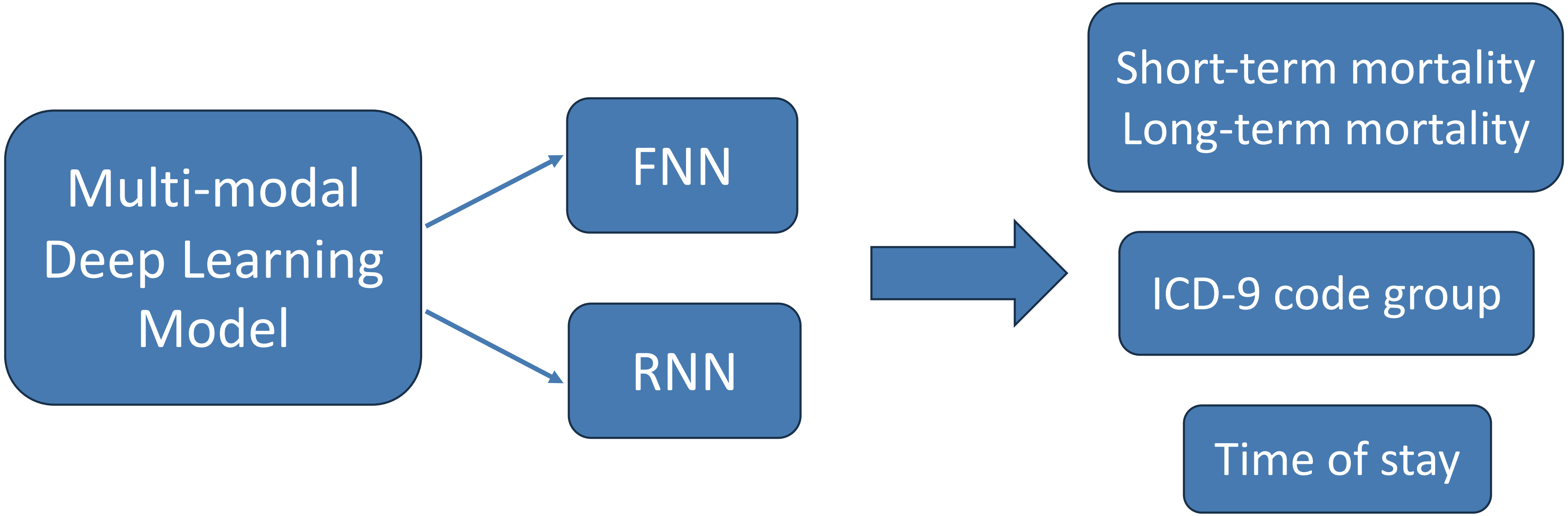


EICU Prediction

Mortality

Method	Algorithm	Feature Set A, 24-h data		Feature Set A, 48-h data	
		AUROC score	AUPRC score	AUROC score	AUPRC score
	SuperLearner-II	**0.8673±0.0045**	**0.4968±0.0097**	0.8595±0.0035	0.4422±0.0200
Deep learning	FFN	0.8496±0.0047	0.4632±0.0074	0.8375±0.0041	0.4090±0.0169
	RNN	0.8544±0.0053	0.4519±0.0145	0.8618±0.0059	0.4458±0.0144
	MMDL	0.8664±0.0056	0.4776±0.0162	**0.8737±0.0045**	**0.4714±0.0176**

ICD-9 code & Time of stay

MMDL > Super Learner models

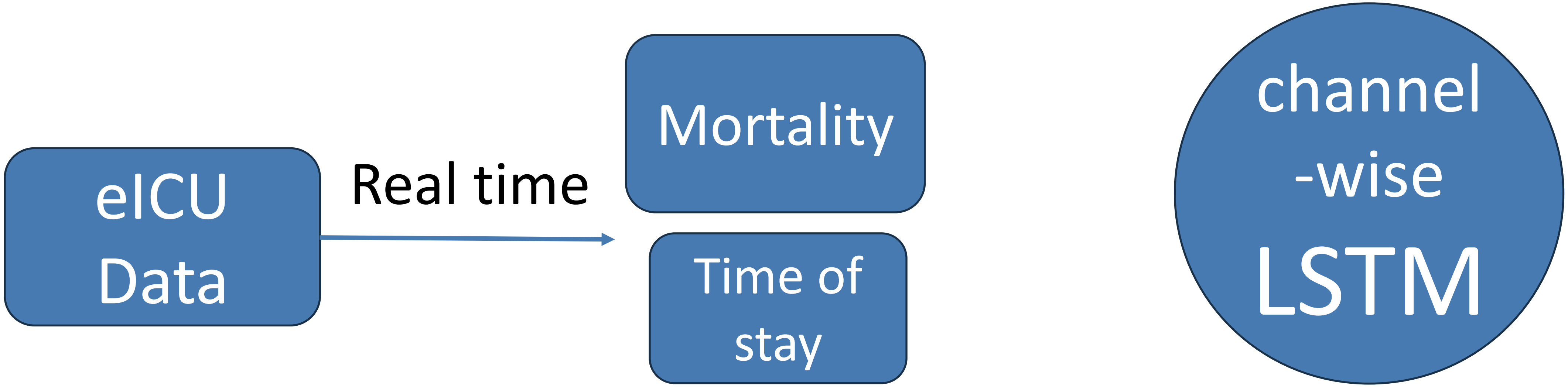
02 EICU Prediction

Analysis | Open Access | Published: 17 June 2019

Multitask learning and benchmarking with clinical time series data

Hrayr Harutyunyan, Hrant Khachatrian, David C. Kale, Greg Ver Steeg & Aram Galstyan

Scientific Data **6**, Article number: 96 (2019) | Cite this article



03

Dataset Analysis

03 Dataset Analysis

vitalPeriodic & vitalAperiodic & nurseCharting

Vital signs → Time series

diagnosis & patient

Patients' information → Labels

03 Dataset Analysis

diagnosisid	patientunitstayid	activeupondischarge	diagnosisoffset	diagnosisstring
4035907	143870	TRUE	10	cardiovascular|chest pain / ASHD|coronary artery disease
3843251	143870	TRUE	10	cardiovascular|post vascular surgery|s/p cartoid endarterectomy
3460672	143870	TRUE	10	cardiovascular|arrhythmias|bradycardia
3717065	151179	FALSE	29	cardiovascular|shock / hypotension|septic shock
4102418	151179	FALSE	120	cardiovascular|shock / hypotension|septic shock
3885168	151179	TRUE	3929	cardiovascular|shock / hypotension|septic shock
4053934	151179	TRUE	3929	cardiovascular|shock / hypotension|hypotension
3850876	151900	FALSE	148	cardiovascular|shock / hypotension|septic shock
3707280	151900	FALSE	939	cardiovascular|shock / hypotension|septic shock
4192192	151900	FALSE	939	cardiovascular|chest pain / ASHD|acute coronary syndrome
3379776	151900	TRUE	2895	cardiovascular|chest pain / ASHD|acute coronary syndrome
3892141	151900	TRUE	2895	cardiovascular|shock / hypotension|septic shock
3678632	152954	FALSE	39	cardiovascular|shock / hypotension|signs and symptoms of sepsis (SIRS)
3977729	152954	FALSE	39	cardiovascular|ventricular disorders|congestive heart failure
4144394	152954	FALSE	219	cardiovascular|shock / hypotension|signs and symptoms of sepsis (SIRS)
3757248	152954	FALSE	219	cardiovascular|ventricular disorders|congestive heart failure

04

Next Step

04 Next Step

1.Extract more meaningful data
1.1 Extraction
1.2 Interpolation, Correction

2.Replicate the deep learning model as baseline and try new models.

References

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Thank you