Track patient recovery in real-time by processing streaming data

BIOMEDICAL DATA DESIGN

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Content

01

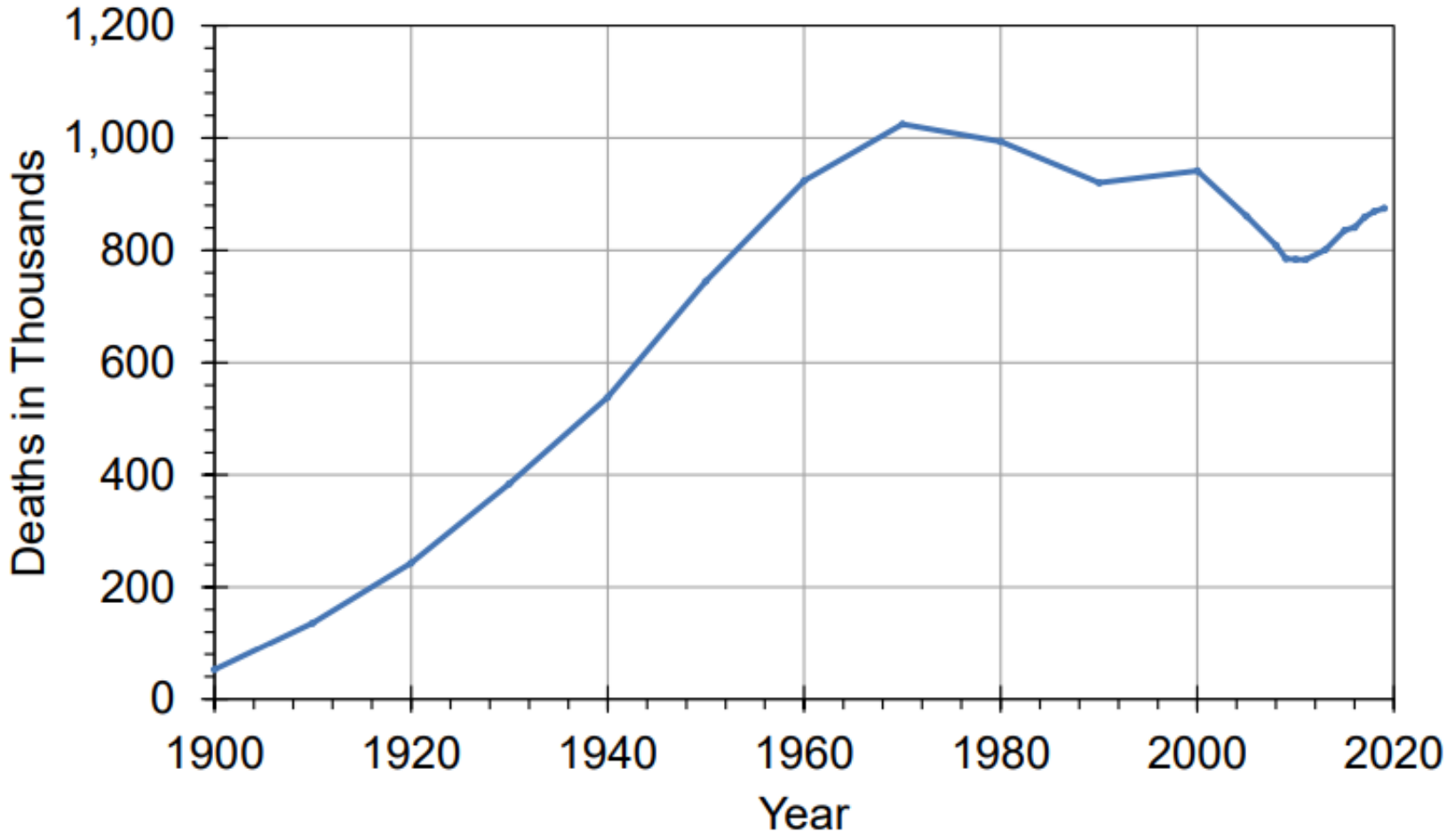
Goal & Literature Review

01

Goal & Literature Review

Why we choose cardiovascular diseases?

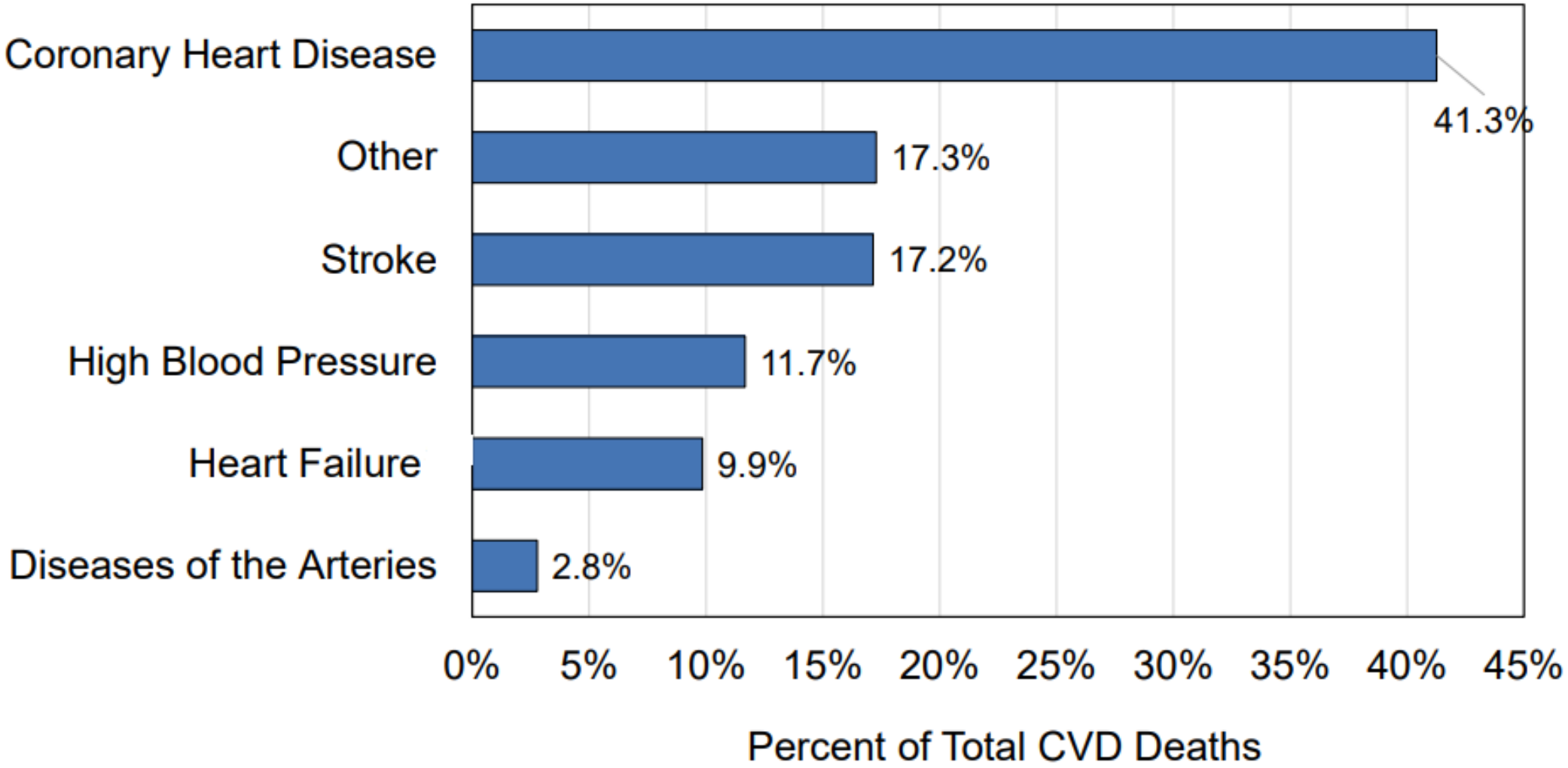
Deaths attributable to cardiovascular disease, US, 1900-2019.



01

Goal & Literature Review

Percentage Breakdown of Cardiovascular Disease Deaths in the United States in 2019



02

Data Preprocessing Code

02

Data Preprocessing Code

	MIMIC III	eICU
Data scale	40,000+	200,000+
Data type	more details like ECG data, medical imaging, surgical information	more monitored information and vital signs
Data Availability and processing difficulty	easier	more complicated

More information on the timeline so the time series information will be more authentic

02 Data Preprocessing Code

Benchmarking deep learning models on large healthcare datasets

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

Show more

```
# # select admissions and all features
createAdmissionList(args)
getItemIdList(args)
filterItemId_input(args)
filterItemId_output(args)
filterItemId_chart(args)
filterItemId_lab(args)
filterItemId_microbio(args)
filterItemId_prescript(args)
processing(args)
collect_mortality_labels(args)
getValidDataset(args)
```

02 Data Preprocessing Code

Benchmarking deep learning models on large healthcare datasets

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Show more

```
# # extract 17 processed features, 17 raw features and 99+ raw features
run_necessary_sqls(args)
get_17_features_processed(args)
get_17_features_raw(args)
get_99plus_features_raw(args)

# # generate time series
get_time_series_sample_17_features_processed(args)
get_time_series_sample_17_features_raw(args)
get_time_series_sample_99plus_features_raw(args)
```

03

Next Step

Thank you

01 Goal & Literature Review

Treatment Method

- Beside making favorable lifestyle modifications, primary regimes for the prevention and treatment of CVDs include **lipid-lowering drugs**, **antihypertensives**, **antiplatelet** and **anticoagulation therapies**.

- **Interventional treatment** is the minimally invasive diagnosis and treatment of diseases under the guidance of medical imaging equipment (angiography, fluoroscopy, CT, MR, B ultrasound, etc.), percutaneous puncture, introduction of puncture needles, special catheters, guide wires and other precision instruments into the body's blood vessels.

- Cardiac Procedures and Surgeries:

Coronary Artery Bypass Grafting (CABG): Used to treat coronary artery disease by bypassing narrowed arteries with new blood vessels.

Valve Repair or Replacement: Repair or replace heart valves, such as mitral valve repair, aortic valve replacement, etc.

Cardiac Pacemaker or Defibrillator Implantation: Used to treat arrhythmias and regulate the heart's rhythm.

01

Goal & Literature Review

Risk Factors

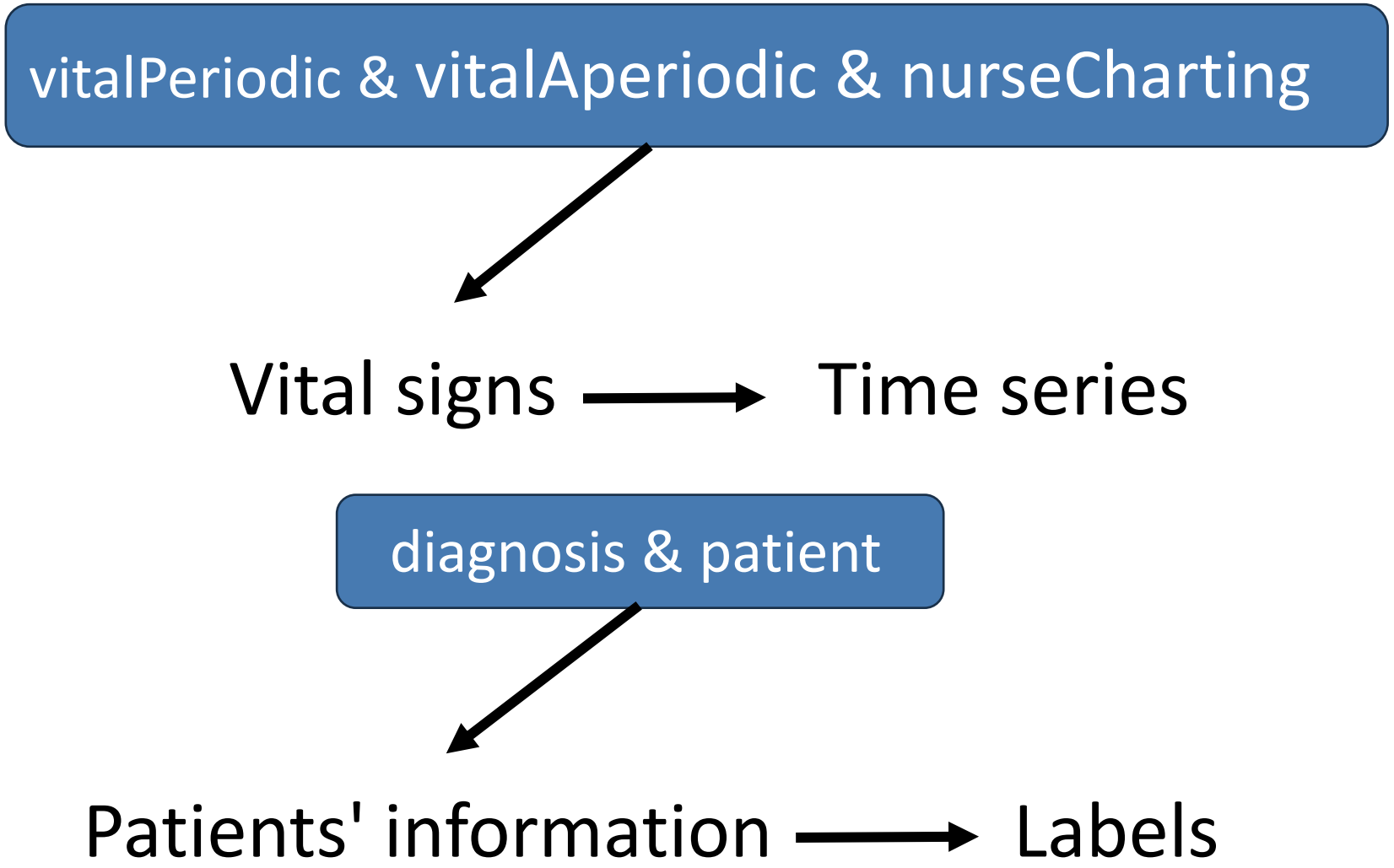
hypertension, hyperlipidemia, and diabetes

smoking, physical inactivity, alcohol abuse, unhealthy diet, obesity

genetic predisposition and family history of cardiovascular disease

high-sensitivity C-reactive protein (hs-CRP), ankle brachial pressure index, lipoprotein subclasses and particle concentration, lipoprotein (a), apolipoproteins AI and B, fibrinogen, leukocyte count, homocysteine, N-terminal pro-B-type natriuretic natriuretic peptide (NT-proBNP), and renal function markers. High blood phosphorus was also associated with risk factor. （as we mentioned in our last PPT）

03 Dataset Analysis



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

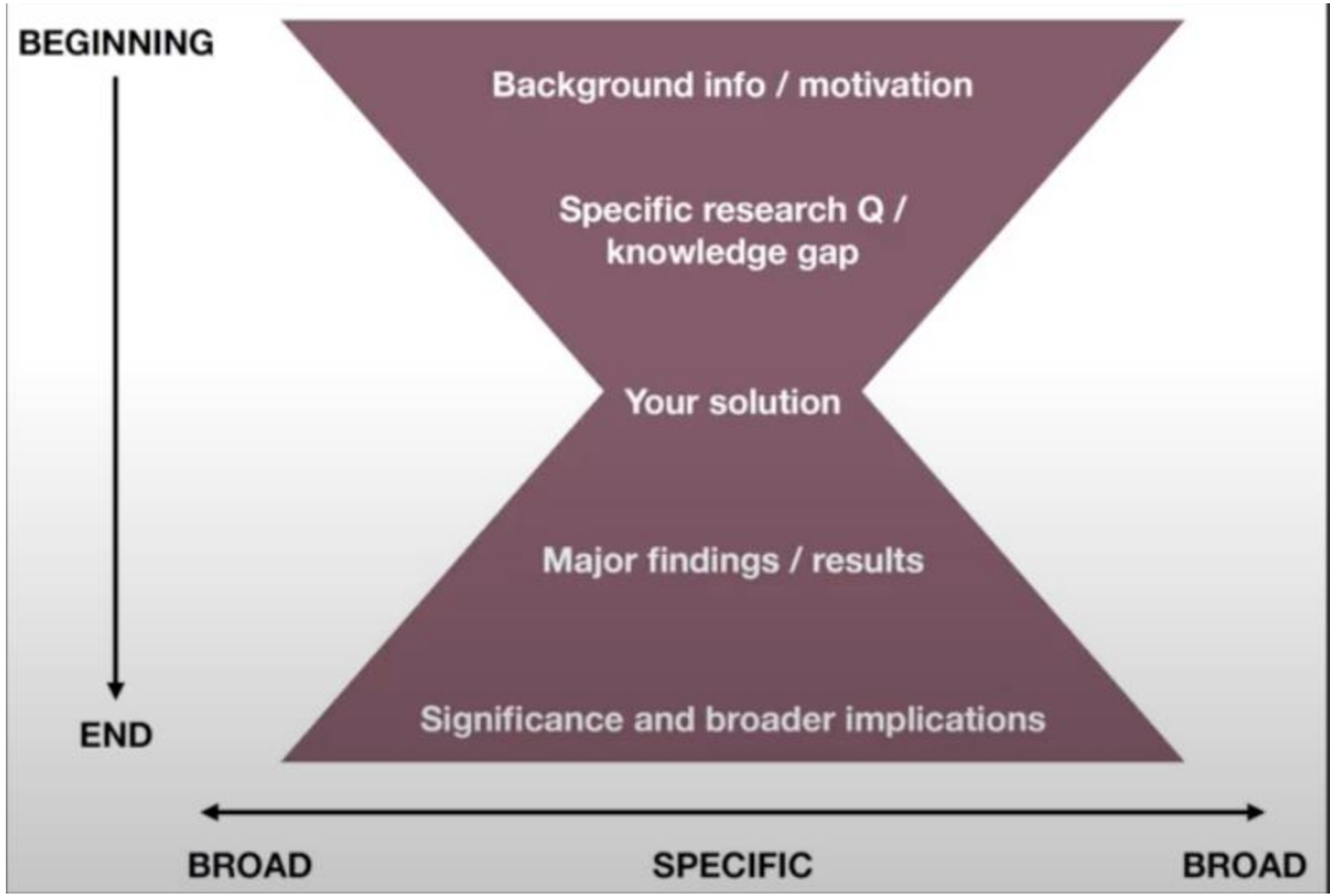
1.Extract more meaningful data
1.1 Extraction
1.2 Interpolation, Correction

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

References

Flora G D, Nayak M K. A brief review of cardiovascular diseases, associated risk factors and current treatment regimes[J]. Current pharmaceutical design, 2019, 25(38): 4063-4084.

Content


BEGINNING
Background info / motivation
Specific research Q / knowledge gap
Your solution
Major findings / results
Significance and broader implications
END
BROAD
SPECIFIC
BROAD

01 Goal & Literature Review

Goal(now)

- Death rate
- Risk of cardiovascular disease
- Date of discharge from hospital

Goal(in the future)

- Predict symptoms that will develop
- How to give treatments

01

Cardiovascular Diseases

1.Overview of cardiovascular disease

2.Why is it important to predict symptoms, how can it help doctors?

3.Why it needs to be real-time?

4.Why we want to make a prediction of best treatment?