

# Smart India Hackathon, 2020

**Team Name**      Pyrocrats

**Team Details**      Shreyas Labhsetwar, Soumya Haridas,  
Rutuja Deshpande, Veerasai Subramaniam,  
Riyali Panmand, Piyush Kolte

**Technology Bucket :** Healthcare & Biomedical Devices

**Category :** Software

**Organization :** GE Healthcare

**Problem Statement :** Early Prediction of Sepsis from Clinical Data.



# Problem Statement Description

The goal of this Challenge is the **early detection of sepsis using physiological data**. For the purpose of the Challenge, defined sepsis according to the Sepsis-3 guidelines, i.e., a **two-point change in the patient's Sequential Organ Failure Assessment (SOFA) score** and clinical suspicion of infection (as defined by the ordering of blood cultures or IV antibiotics) (Singer et al., 2016). The **early prediction of sepsis** is potentially life-saving, and challenging participants to **predict sepsis 6 hours before the clinical prediction of sepsis**. Conversely, the **late prediction of sepsis is potentially life-threatening**, and **predicting sepsis in non-sepsis patients (or predicting sepsis very early in sepsis patients) consumes limited hospital resources**. Develop a digital solution that uses **artificial intelligence** to detect patient deterioration before it's too late and trigger notifications to clinicians and care teams. Train healthcare providers and front-line staff to **quickly recognise symptoms to identify sepsis** and treat patients at the earliest. Also, educate preventing infections in health care settings and in the community so that infections that can lead to sepsis can be stopped before they happen.

## What is Sepsis?

**Sepsis is a life-threatening condition** that occurs when the **body's response to infection** causes **tissue damage, organ failure, or death**. In the U.S., nearly **1.7 million** people develop sepsis and **270,000 people die from sepsis each year**; over **one third of people** who die in U.S. hospitals have sepsis (CDC). Internationally, an estimated **30 million people** develop sepsis and **6 million people die from sepsis each year**; an estimated **4.2 million newborns and children** are affected (WHO). Sepsis costs U.S. hospitals more than any other health condition at **\$24 billion (13% of U.S. healthcare expenses) a year**, and a majority of these costs are for sepsis patients that were not diagnosed at admission.



# Need Based Project

Sparse data from India describe the epidemiology of infection rather than sepsis which is a host response to infection. This study describes the epidemiology of sepsis in the Intensive Care Unit (ICU) of an Indian tertiary care hospital.

**Subjects and Methods:** A prospective study conducted between June 2006 and May 2011. All consecutively admitted patients during the 5 year study  $\geq 18$  years of age were included and data obtained from hospital in-patient records. Variables measured were the incidence of severe sepsis, ICU, hospital, and 28-day mortality, the median length of ICU stay, median Acute Physiology and Chronic Health Evaluation II (APACHE II) score, infection site, and microbial profile.

**Results:** There were 4711 admissions during the study with 282 (6.2%, 95% confidence interval 2.3, 13.1) admissions with severe sepsis. ICU mortality, hospital mortality, and 28-day mortality were 56%, 63.6%, and 62.8%, respectively. Predominant infection site was respiratory tract. The most common organisms were Gram-negative microbes. The most common microbe was *Acinetobacter baumannii*. Median APACHE II score on admission was 22 (interquartile range 16–28) and median length of ICU stay was 8 days. Severe sepsis attributable mortality was 85%.

**Conclusion:** Severe sepsis is common in Indian ICUs and is mainly due to Gram-negative organisms. ICU mortality is high in this group and care is resource intensive due to increased length of stay.

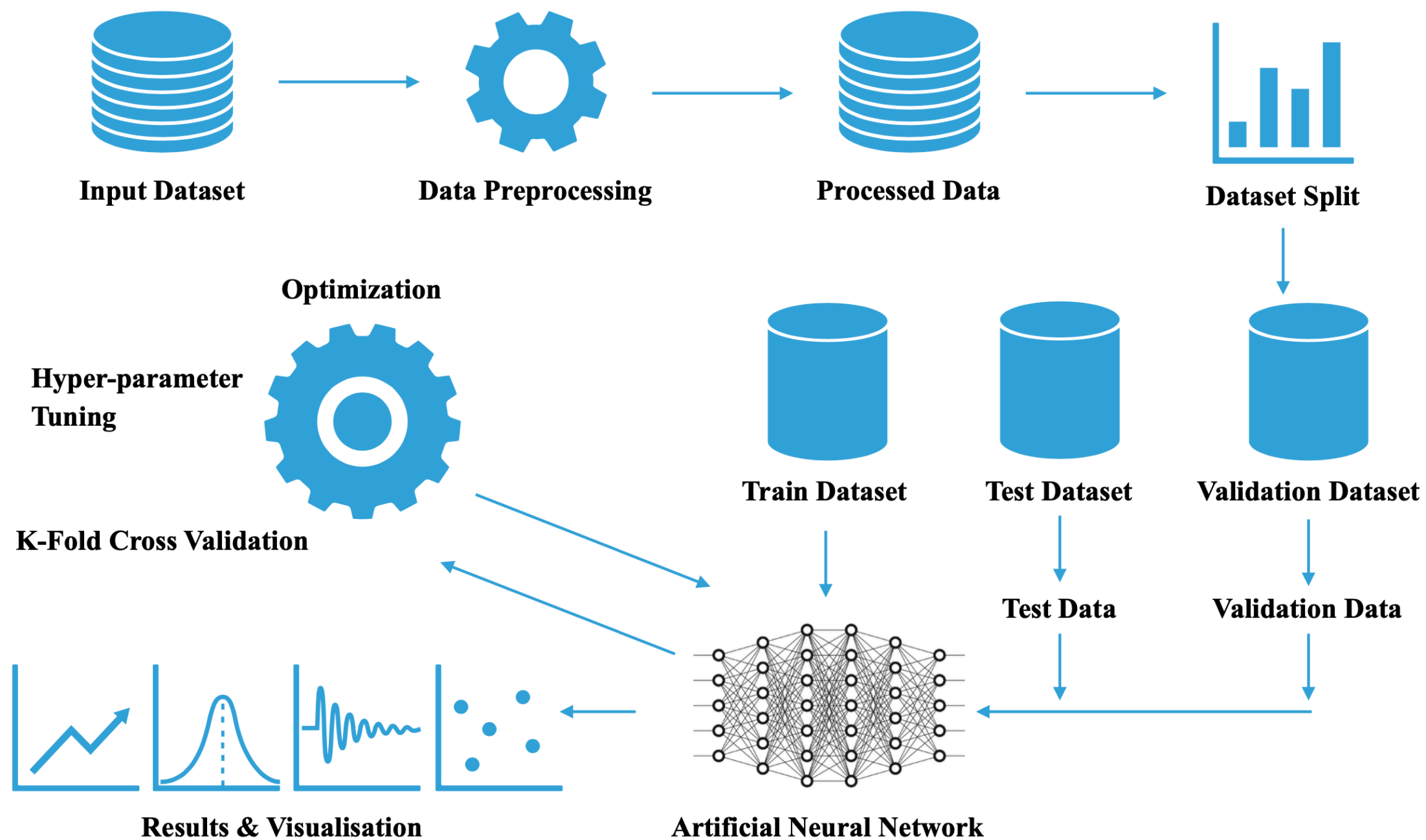
**Citation :** Chatterjee, Sharmila & Bhattacharya, Mahuya & Todi, Subhash Kumar. (2017). Epidemiology of Adult-population Sepsis in India: A Single Center 5 Year Experience. Indian Journal of Critical Care Medicine. 21. 573. 10.4103/ijccm. IJCCM\_240\_17.



# Our Solution



# Control Flow Block Diagram





# Showstopper

## Fully Automated System