



VIT[®]

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

CHENNAI

**Faculty Development Program (FDP) on
"Transforming Healthcare with Data Science:
A Hands-On Training Program"
24th March to 7th April 2025.**

Healthcare Data Science

An Introduction



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Real-time Applications of AI & Data Science in Healthcare

About Me



WORK EXPERIENCE

Current

HoD, M.Sc. Data Science(VITOL) , [Link](#)
Associate Professor, SCOPE
Vellore Institute of Technology, Chennai.

Past

Senior Assistant Professor,
SCSE, SASTRA University.



Areas of Interest

- Natural Language Processing
- Machine Learning
- Data Analytics



ACHIEVEMENTS

NASSCOM

- Certified Master Trainer, Associate Analytics



EDUCATION

- PhD, CSE, VIT Chennai.
- M.Tech, CSE, JNTU, Hyderabad.
- B.Tech, CSE, JNTU, Hyderabad.




CONTACT INFO

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Why Healthcare Data Science?

In your opinion, what is the most critical aspect of nation-building?

- A.  Quality Education & Skill Development
- B.  Scientific Research & Technological Advancement
- C.  Strong Governance & Policy-Making
- D.  Economic Growth & Job Creation
- E.  Sustainable Infrastructure & Urban Development
- F.  Social Equity & Inclusivity
- G.   Accessible Healthcare & Public Health

Why Healthcare Data Science?

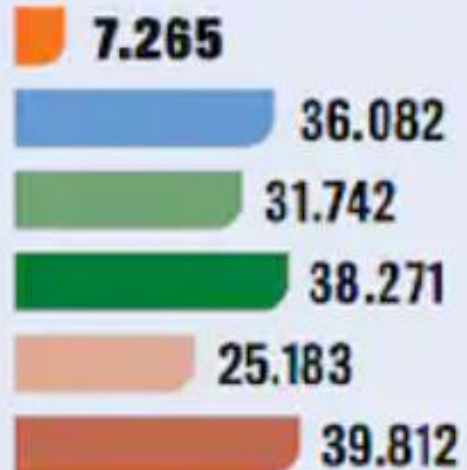
United Nations Sustainable Development Goals: Together we can make “Sustainable Future”



Where India stands on Healthcare

DOCTOR-PATIENT RATIO

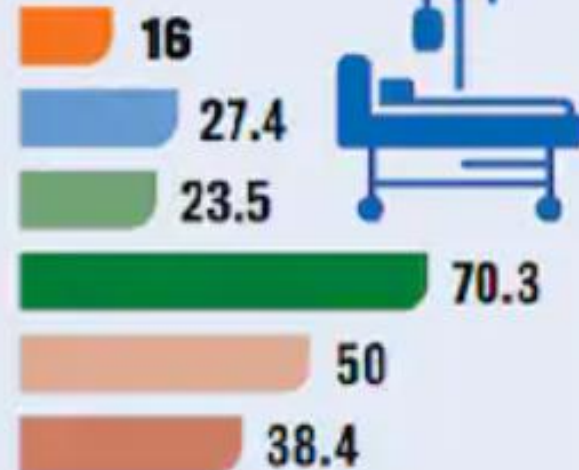
Allopathic doctors per 10,000 population



Source: WHO

HOSPITAL BED-PATIENT RATIO

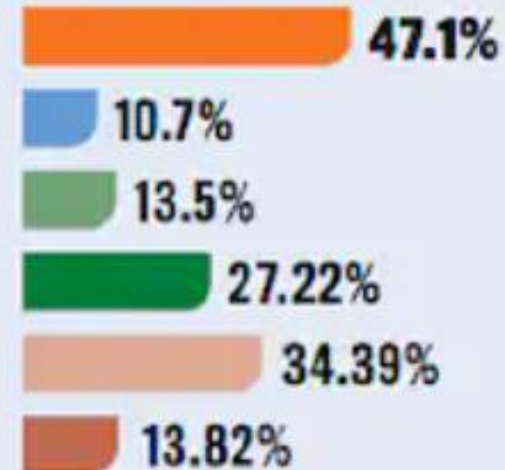
Beds per 10,000 population



Source: WHO

OUT-OF-POCKET EXPENDITURE

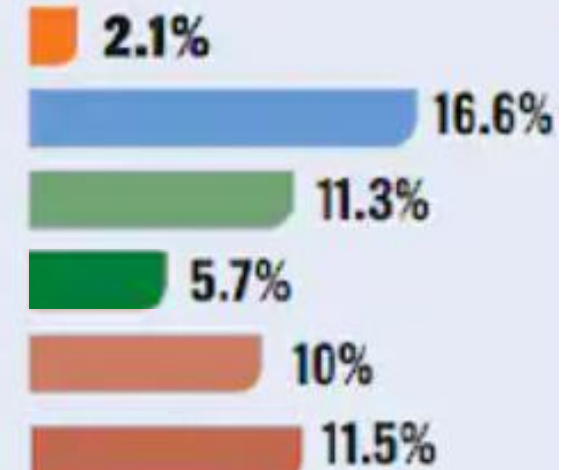
Share in current health expenditure



Source: World Bank

PUBLIC HEALTH EXPENDITURE

Share in current GDP

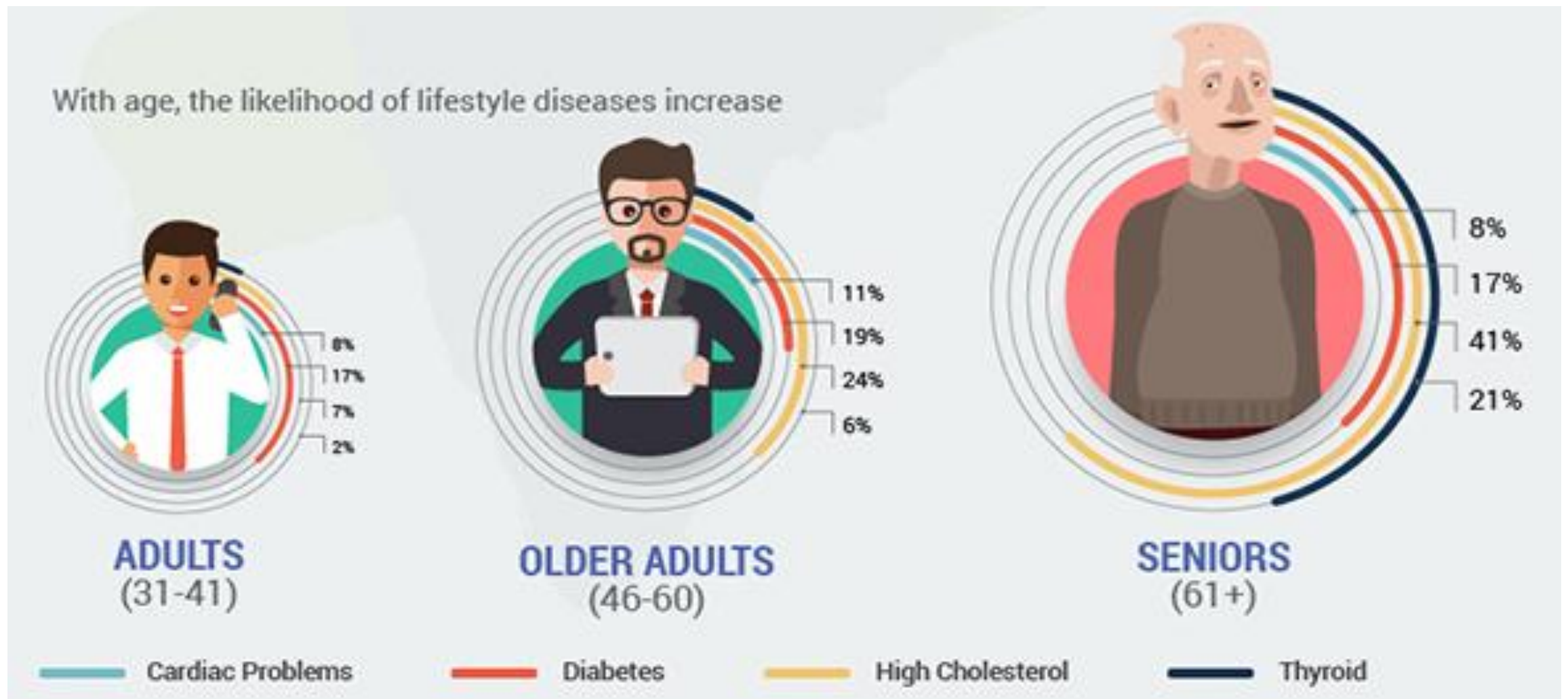


Source: Statista

INDIA USA UK RUSSIA CHINA AUSTRALIA

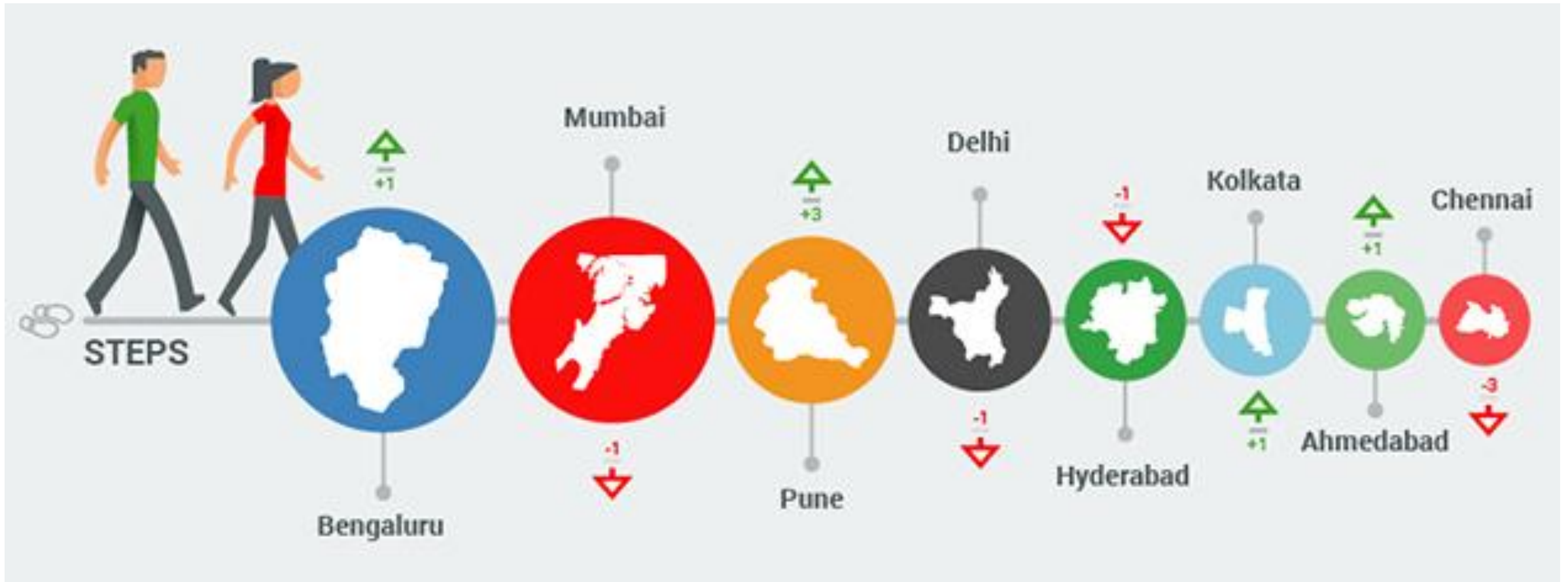
Source: [Health | For India to get better - India Today](#)

Where India stands on fitness



Source: [India fitness stats](#)

Where India stands on fitness



Source: [India fitness stats](#)

Where India stands on fitness



Source: [India fitness stats](#)

Where India stands on fitness

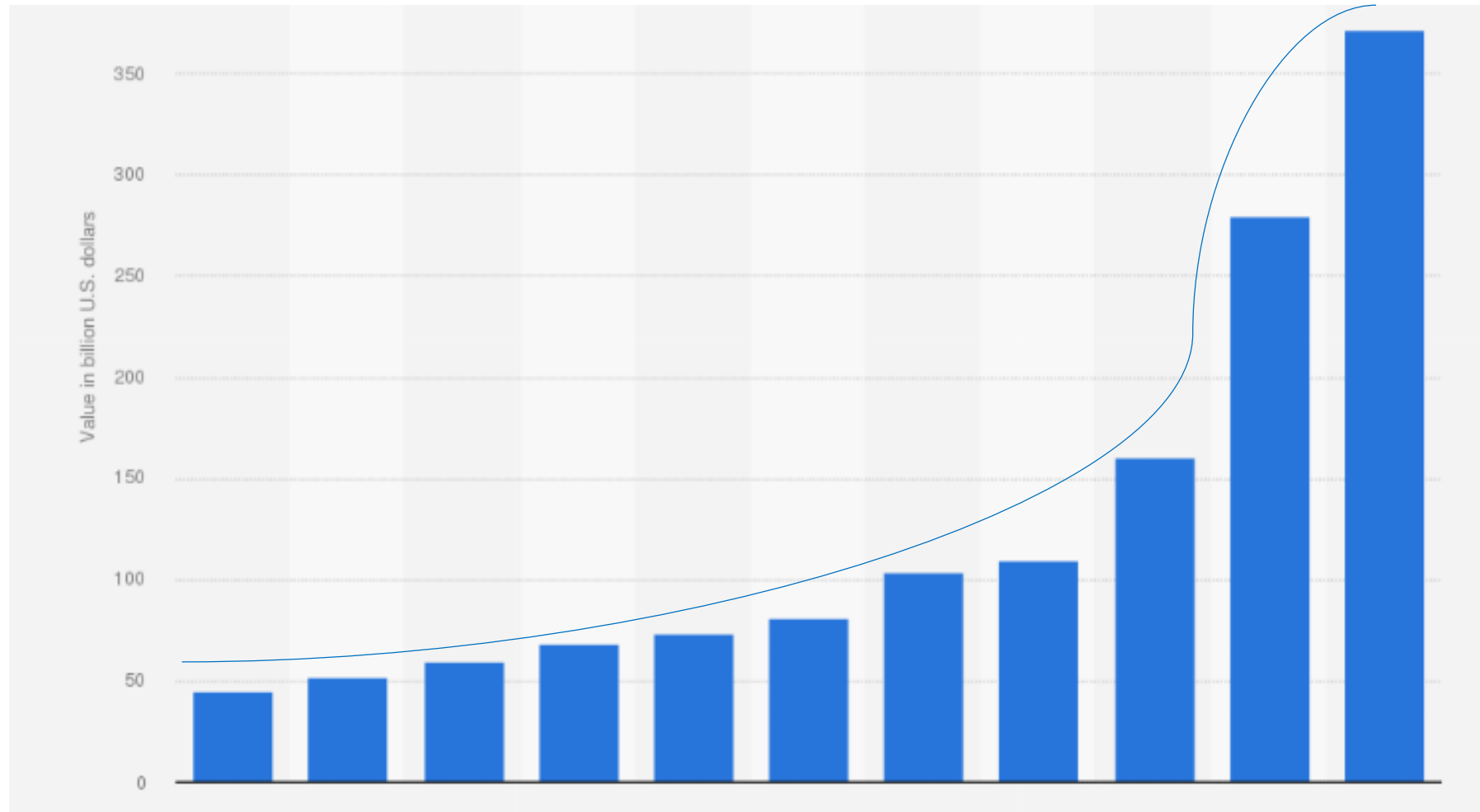
HYDERABAD & CHENNAI SLEEP THE LEAST

Pune still has the highest Sleep count



Source: [India fitness stats](#)

Growth of Healthcare Sector in India from 2008 to 2023



Source: [India Healthcare Sector Growth](#)

What is Healthcare?



It is the improvement
or
maintenance of health



What is Data Science?

Data science is a field of study and practice that's focused on obtaining insights from data.



What is Data Science?

It is a **multidisciplinary** approach that combines principles and practices from the various fields to analyze large amounts of data.

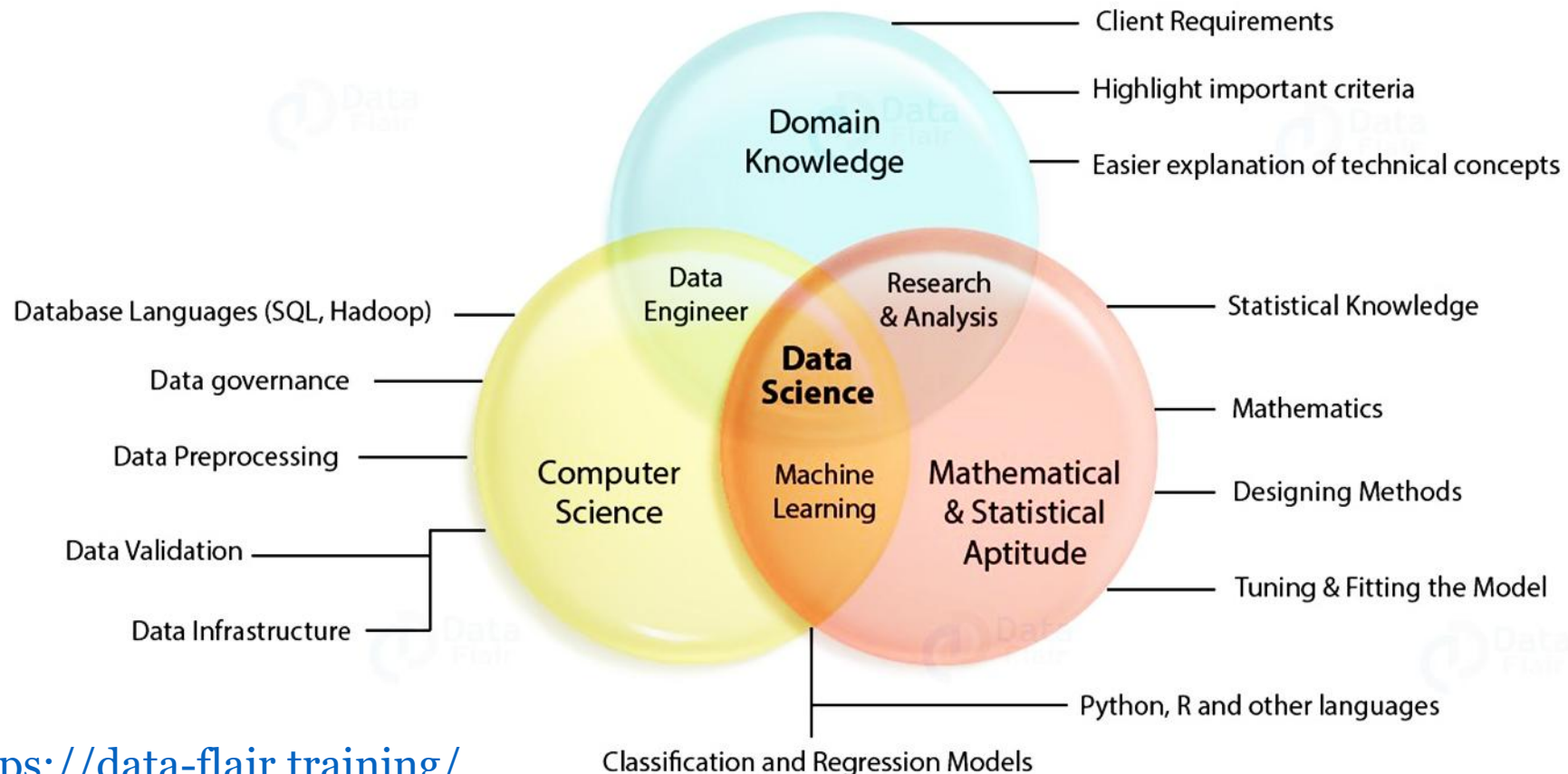


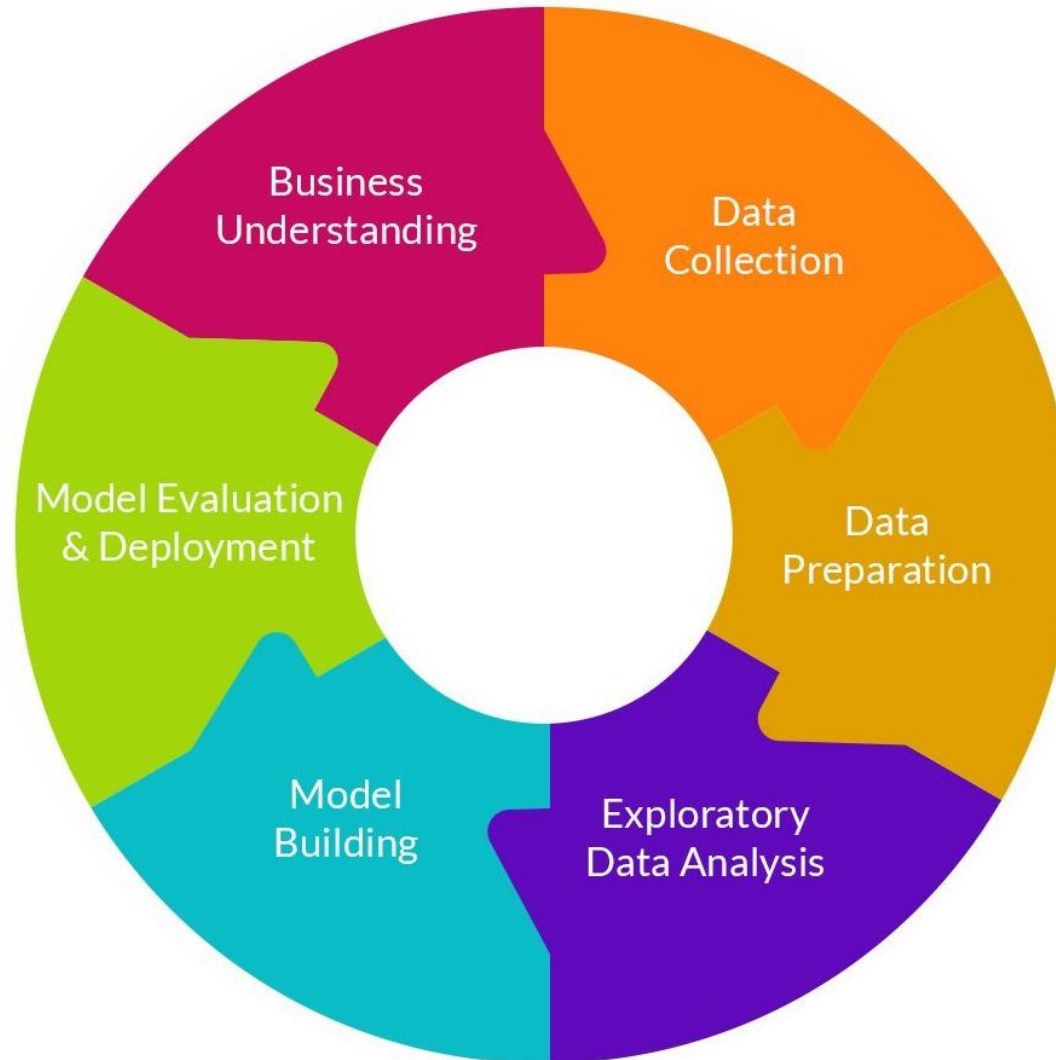
Image Source: <https://data-flair.training/>

What is Data Science?

Data Science is omnipresent



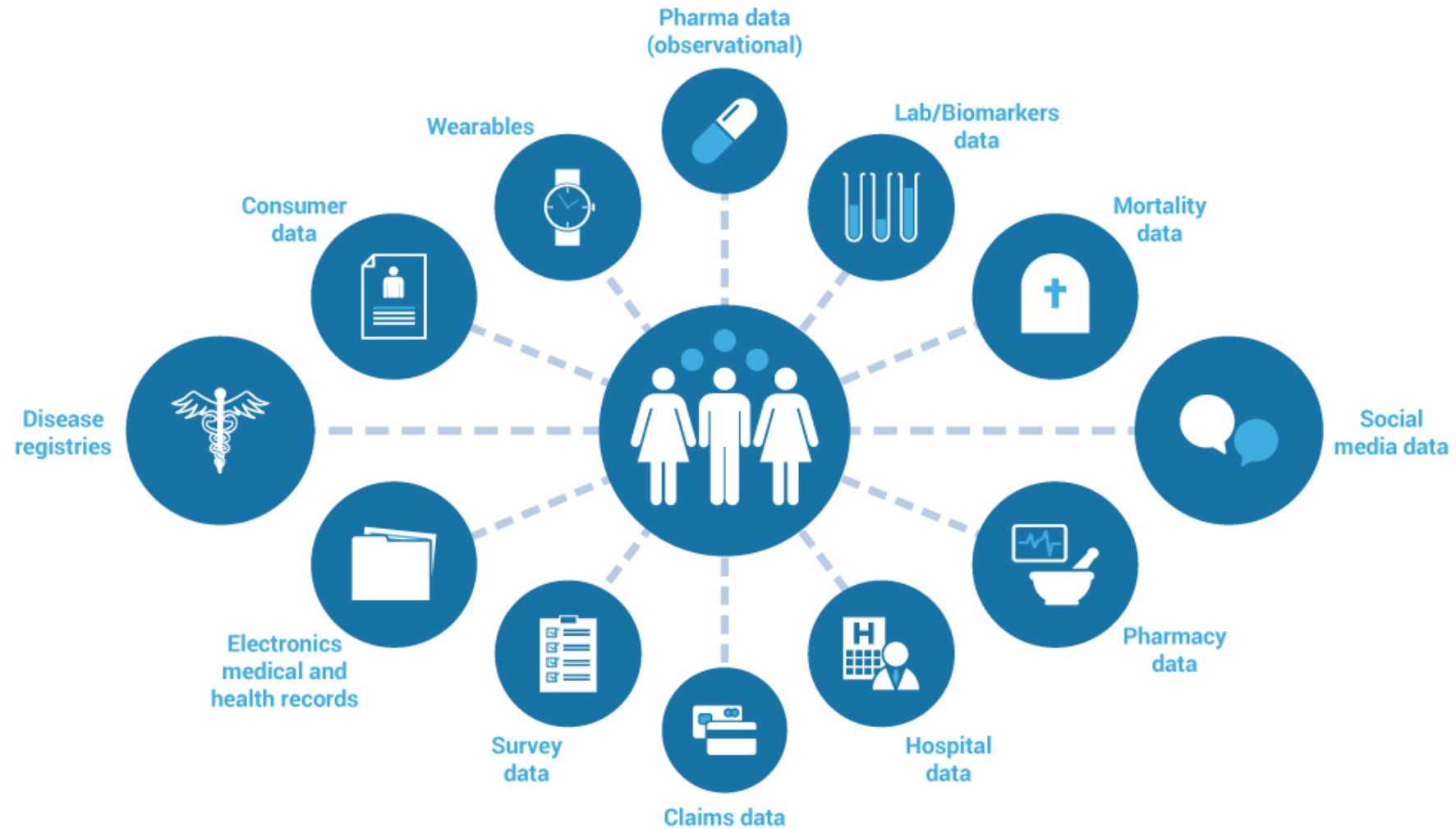
What is Data Science Process or Life Cycle



What is Healthcare Data Science?

Healthcare Data Science is the application of data science techniques to **analyze** and **interpret** healthcare data. It combines **medical knowledge**, **statistics**, **machine learning**, and **artificial intelligence** to improve patient outcomes, optimize healthcare operations, and support medical research.

Healthcare Data Sources



Healthcare Data Science - Challenges

✚ Diversity in Data Analysis Techniques

- Various data types require different analytical methods.
- Integrating diverse data sources poses challenges.
- Combining multiple data types provides deeper insights.

Healthcare Data Science - Challenges



Interdisciplinary Challenges

- Advances come from multiple fields like data mining & medical research.
- Computer scientists lack domain-specific medical knowledge.
- Medical professionals have limited exposure to data analytics.
- Collaboration is essential for meaningful progress.

Healthcare Data Science - Challenges



Bridging the Gap Between Research & Practice

- Data scientists may develop models without real-world relevance.
- Practical problem-solving must align with medical needs.
- Bringing diverse expertise together enhances healthcare analytics.

Healthcare Data Science - Challenges

Healthcare Data Privacy & Accessibility

- Medical data is highly sensitive and protected by laws (e.g., HIPAA).
- Medical researchers have natural access; computer scientists face barriers.
- Collaboration, privacy safeguards, and ethical data-sharing are crucial.

Types of healthcare analytics?



Descriptive

Explains what happened.



Diagnostic

Explains why it happened.



Predictive

Forecasts what might happen.



Prescriptive

Recommends an action based on the forecast.

Benefits of Data Science in Healthcare



Early Disease Detection



Personalized Medicine



Medical Imaging Analysis



Electronic Health Records (EHR) Optimization



Operational Efficiency

Benefits of Data Science in Healthcare



Drug Discovery & Development



Wearable Health Monitoring



Outbreak Prediction & Management



Fraud Detection & Prevention



Enhanced Patient Experience

Novel and impactful AI applications in healthcare



AI-Powered Drug Repurposing



Neuro-Symbolic AI for Diagnosis



AI-Generated Digital Twins



Swarm Intelligence for Epidemic Prediction



Quantum AI in Genomics

Novel and impactful AI applications in healthcare

 AI-Powered Organoid Drug Testing

 Brain-Computer Interface (BCI)

 AI-Augmented Surgical Navigation

 Synthetic Data for AI Training

 Emotion AI for Mental Health

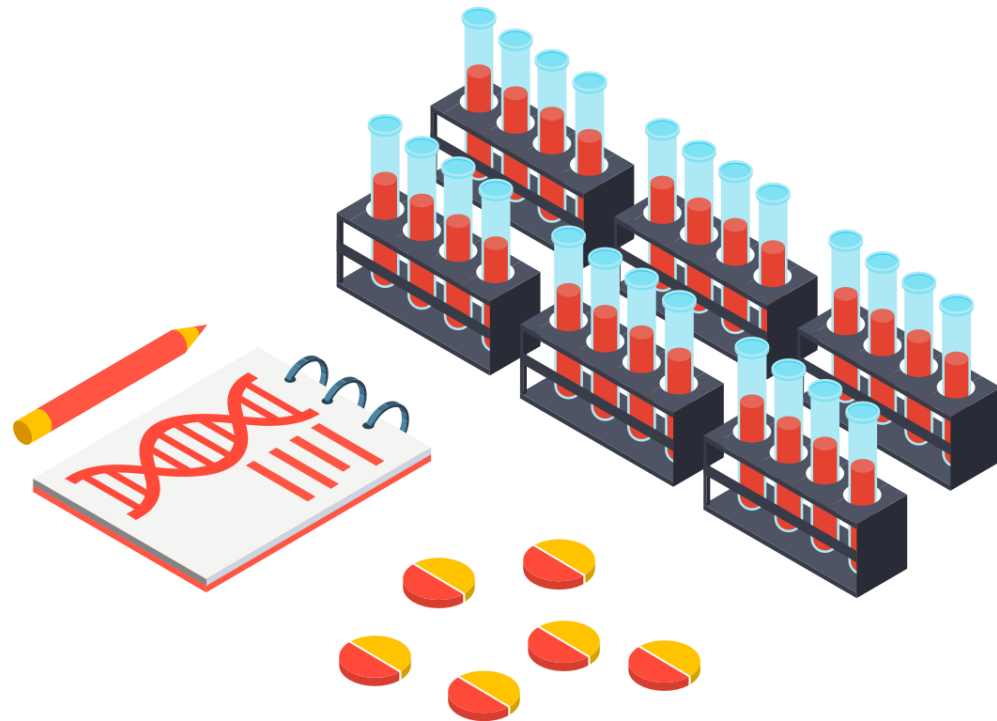
Real-time Applications of AI & Data Science in Healthcare

Qure.ai

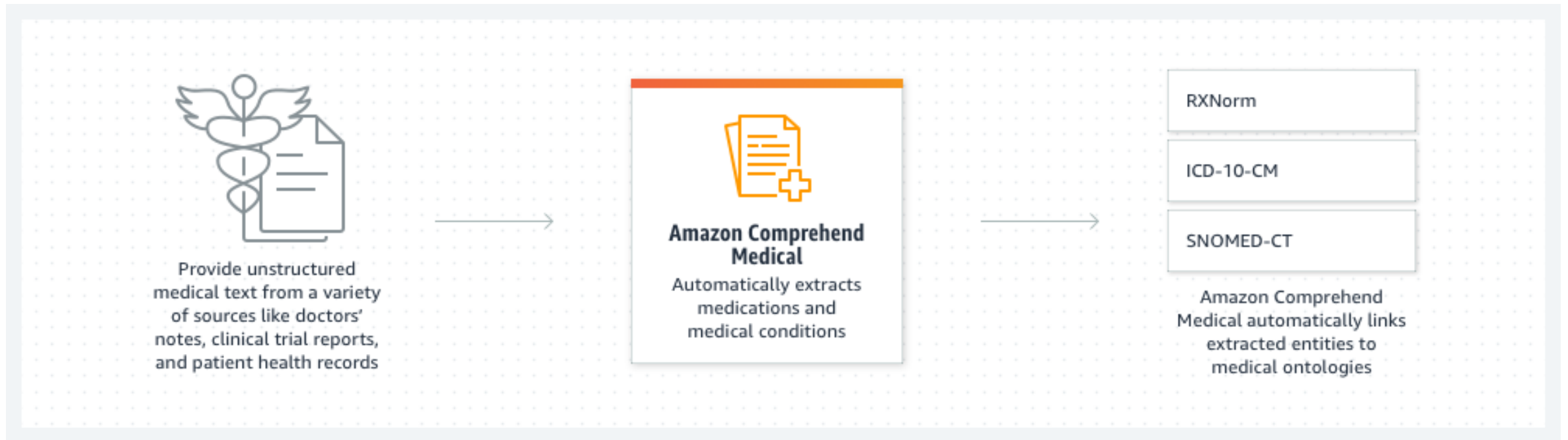


Real-time Applications of AI & Data Science in Healthcare

Deep Genomics



Real-time Applications of AI & Data Science in Healthcare



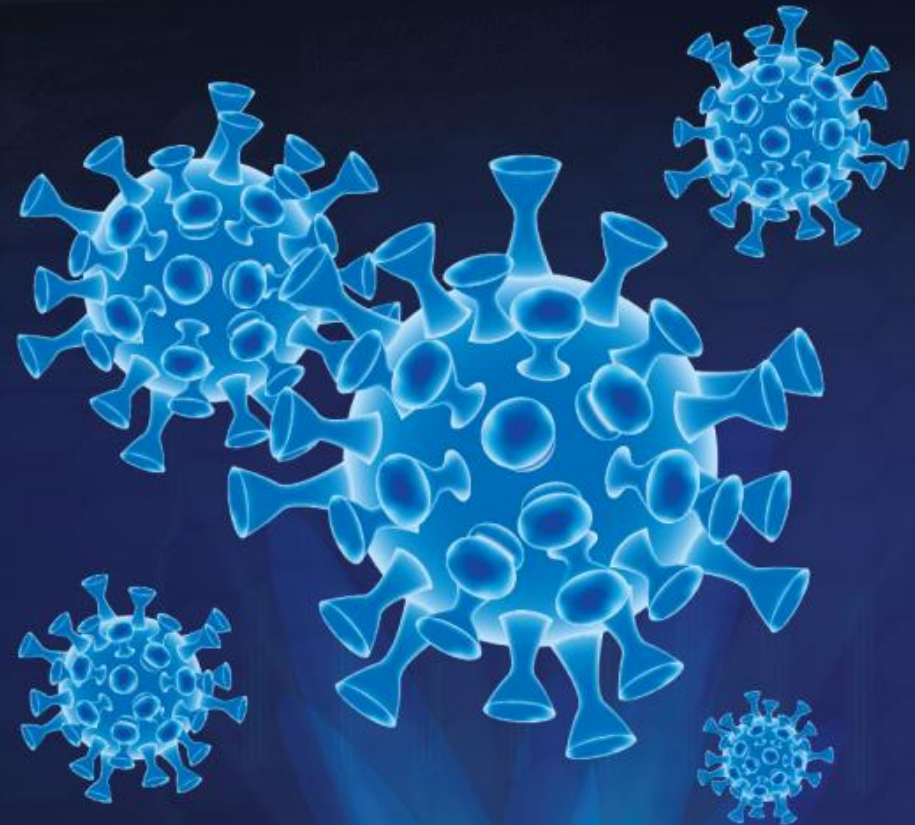
Real-time Applications of AI & Data Science in Healthcare



Real-time Applications of AI & Data Science in Healthcare



How **BlueDot**
Predicted
Coronavirus Using
**Artificial
Intelligence (AI)?**



Real-time Applications of AI & Data Science in Healthcare



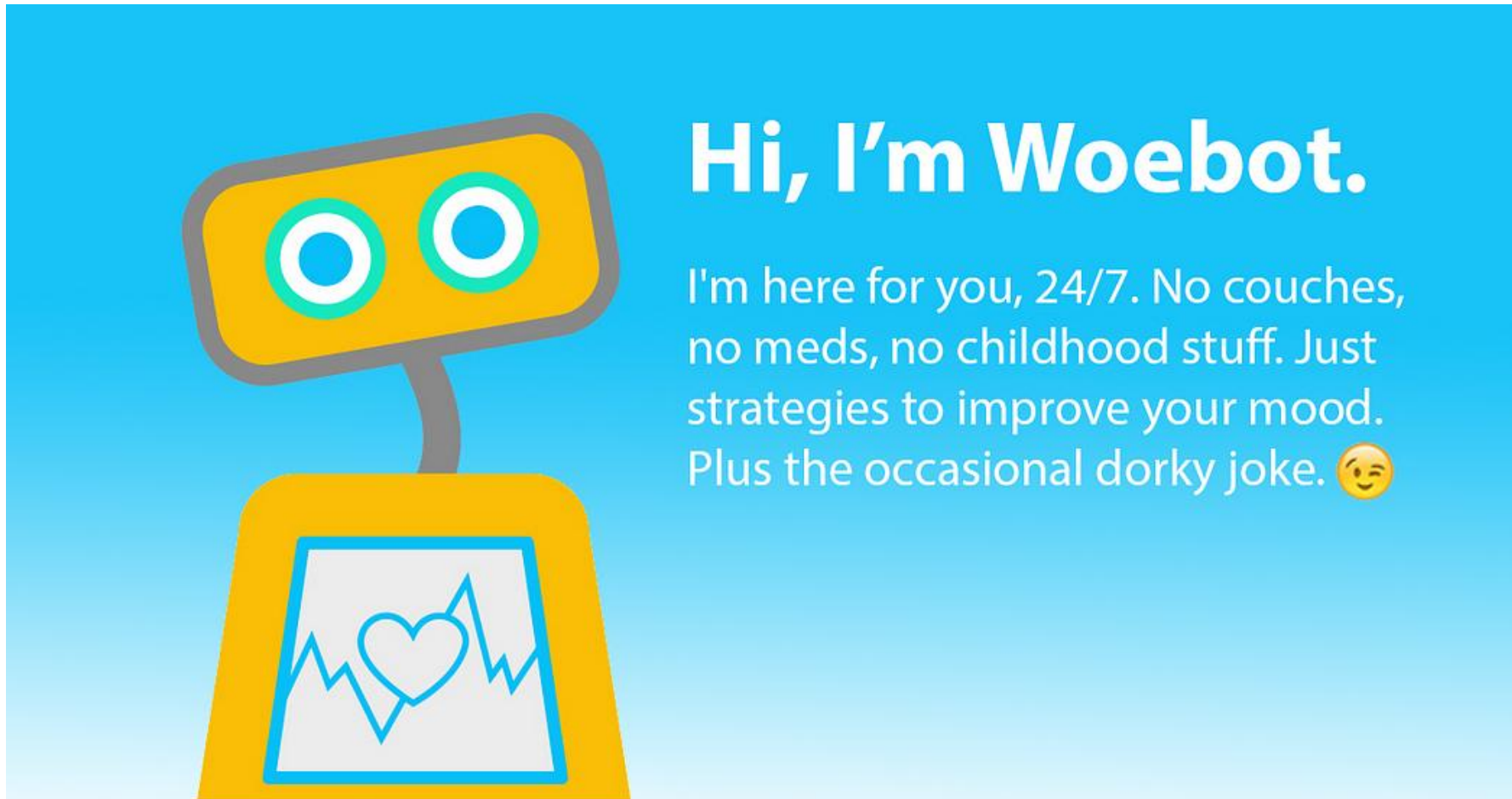
Real-time Applications of AI & Data Science in Healthcare



Real-time Applications of AI & Data Science in Healthcare



Real-time Applications of AI & Data Science in Healthcare



Thank You!