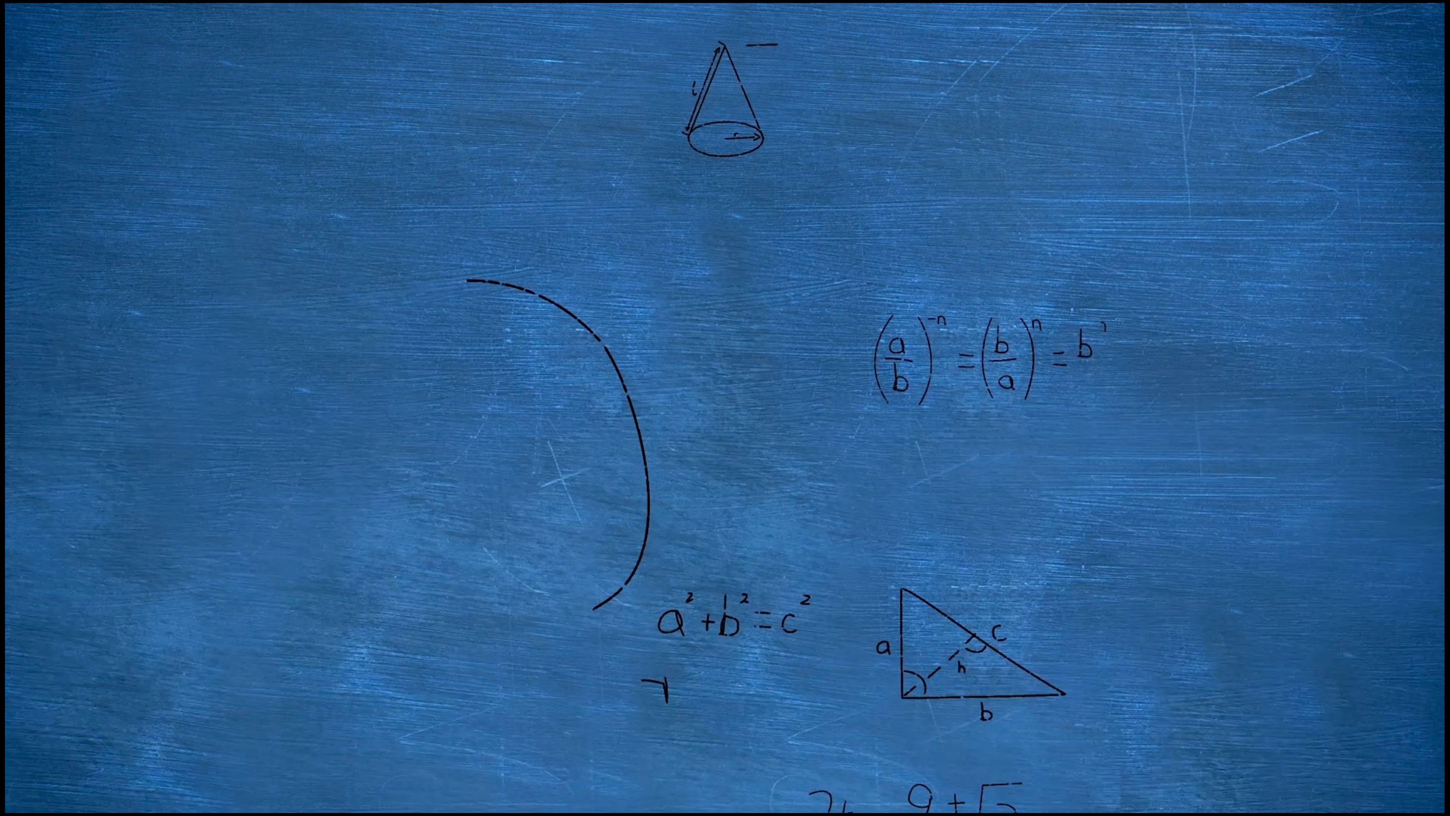
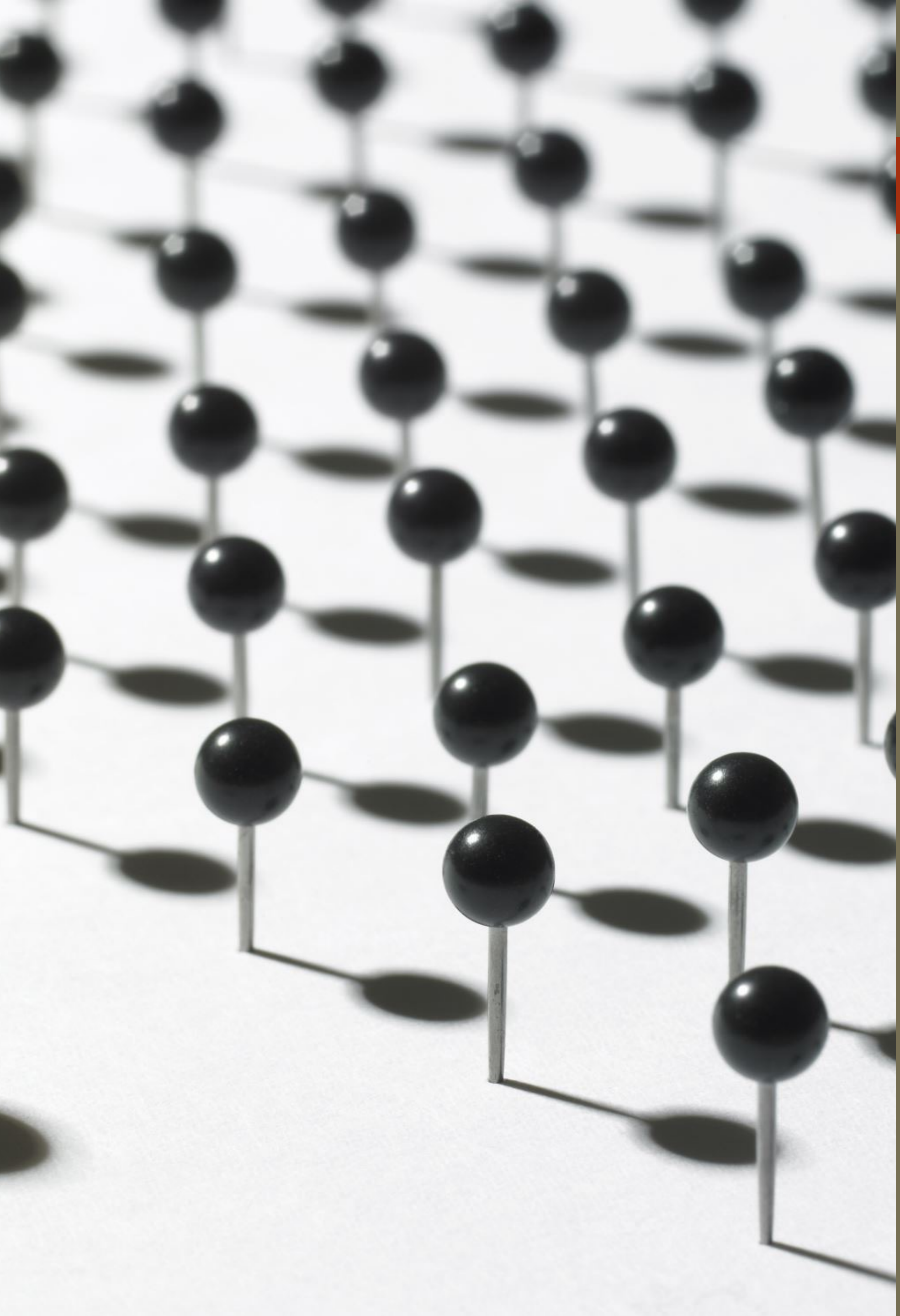


Algorithmic Thinking

Sermkiat Lolak, M.D

Promise

- Understand concept of Computational thinking
- Able to adapt the concept to real practice, through an example



Algorithm

- sequence of instructions that one must perform in order to solve a well-formulated problem.
- Computation / Maths./ Cook-book

What is computational thinking? (Algorithmic Thinking)

- Approaching a complex problem in a systematic manner
- Creating and describing a solution to a problem

Techniques

- Decomposition
- Pattern recognition / Generalization
- Abstraction
- Algorithms
- Logical Reasoning
- Evaluation

Problem

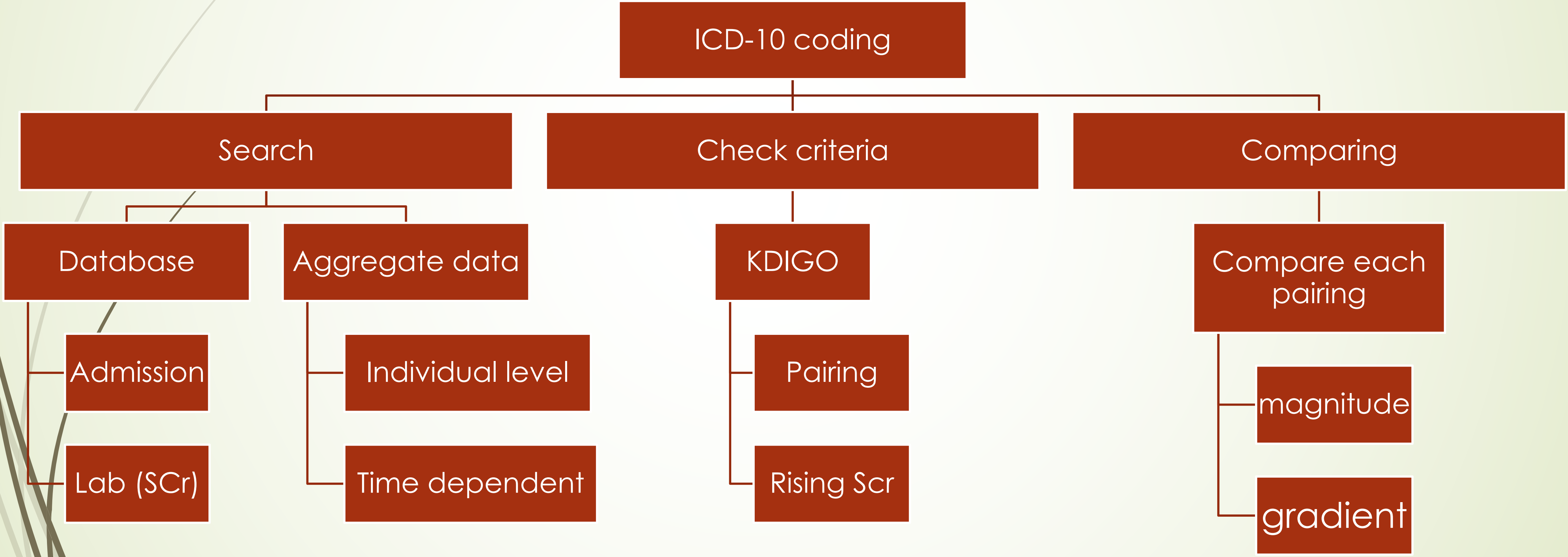
- Teach robot to eat banana

  and oranges

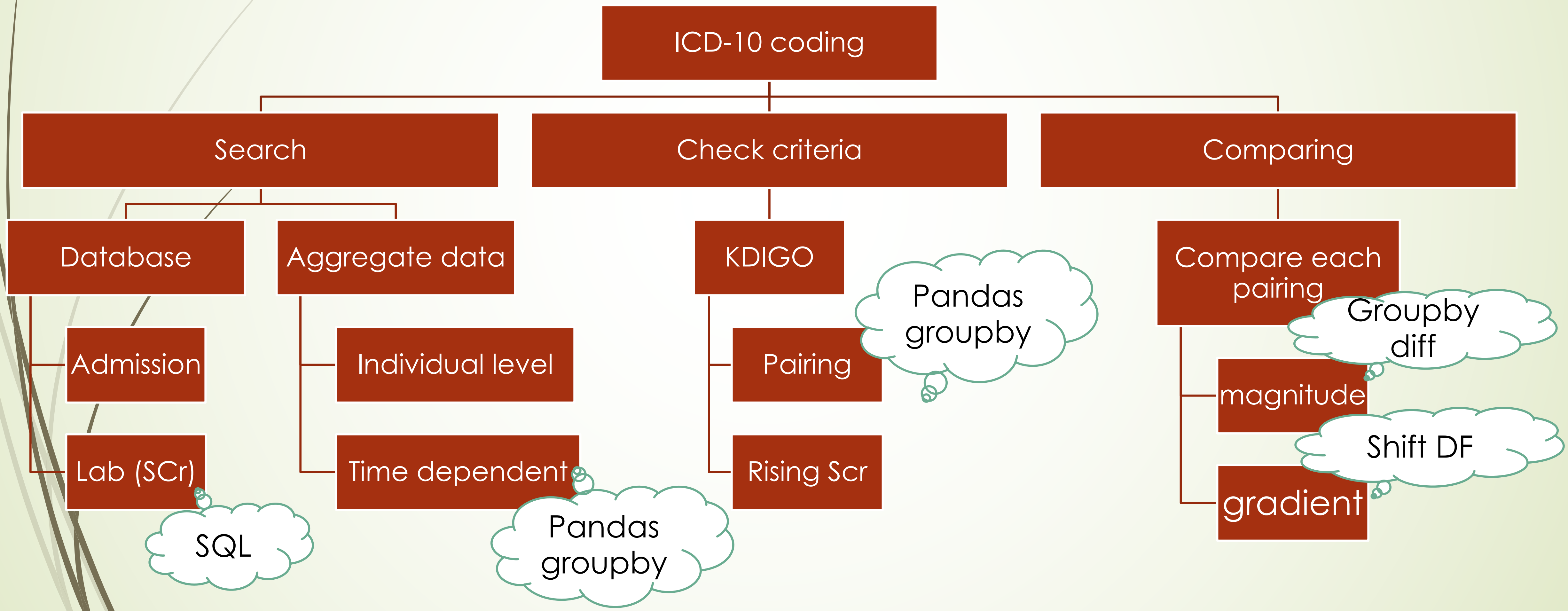
Problem

- Coding Acute Renal Failure (N17) from KDIGO criteria by searching through EHR
- High precise of ICD10 code

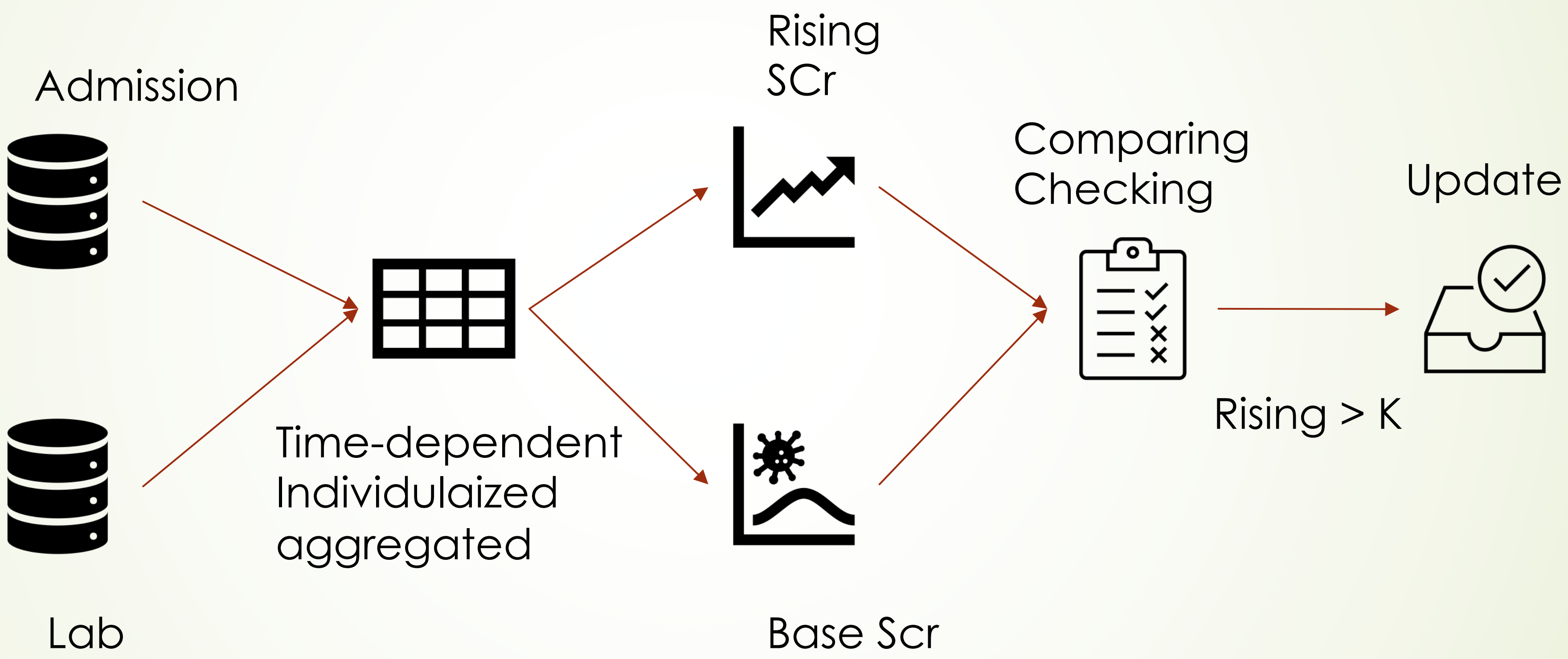
Decomposition



Pattern recognization



Abstraction



Algorithms

- Query admission period (Date) and Cr 7 days before and during admission
  - With SCrDate1-Admission < 30 AND
  - SCr Date2 - SCrDate1 < 30
- Mapping consecutive pair Scr values from 48 hours – 7 days apart
- Choose pair with minimum time different and maximum values different
- Compute percent different and change per hour
- IF Scr different ratio > 200 % OR > 4mg/dL : N17.93
- IF Scr different ratio 100-199% during 7 days : N17.92
- IF Scr different ratio 50-99% OR different > 0.3 mg/dL in 48 hrs : N17.91

Logical Reasoning

- SELECT HN, AdmitDate, CrDate, Cr FROM Admission
- SELECT Cr

  WHERE AdmitDate-CrDate <=7 OR

  AdmitDate < CrDate < DischargeDate
- Groupby('HN')['Cr']:
  - Slice 2 < CrDate(diff) <30
- Groupby('HN')['Cr']:
  - IF Cr > 4 OR abs(Cr(diff)/Cr) >2 : ICD10 == N17.93
  - ELIF CrDate(diff) <7 AND (1 < abs(Cr(diff)/Cr) < 1.99) : ICD 10 == N17.92
  - ELIF CrDate(diff) <2 AND abs(Cr(diff)) > 0.3 OR 0.5 < abs(Cr(diff)/Cr) < 0.99 : ICD 10 == N17.91
  - ELSE N17

Evaluation

- Checking accuracy
- Improving :
  - Speed
  - BigO
  - list comprehension
  - Lazy load
  - Less tools , high performance library

Contribution

- Adapt computation thinking to solve problem ,even in daily life

- More effective, less time consuming "Work smart"
  - Automated
  - Repeating pieces