



*Images: Courtesy: Wikipedia*

## **Tomographic Reconstruction**

**Supervisors: Ajit Rajwade, Sharat Chandran, Imants Svalbe (Monash)**

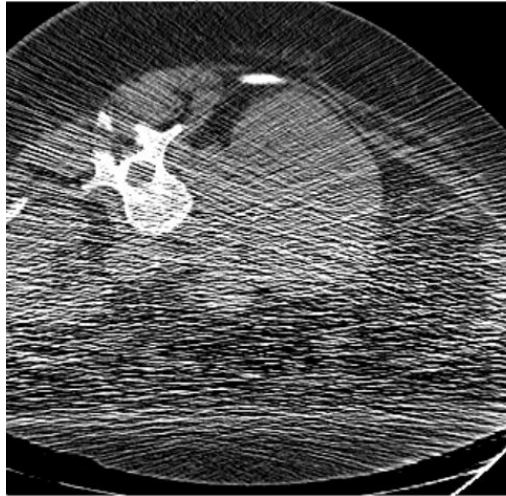
# Problems!

- Machine-related
- Process Model-related
- Human-related

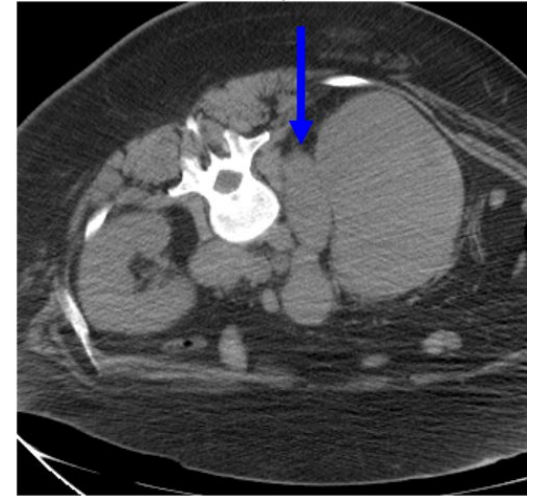
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low dose



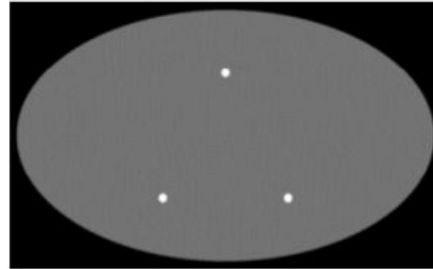
high dose



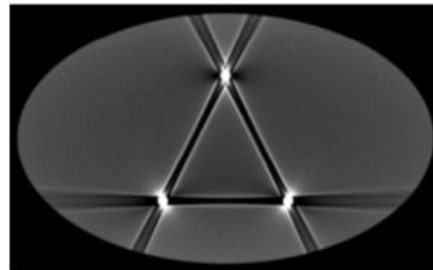
*Image Source: "CT artifacts: Causes and reduction techniques"  
-F Edward Boas & Dominik Fleischmann*

# Problems!

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**ideal**

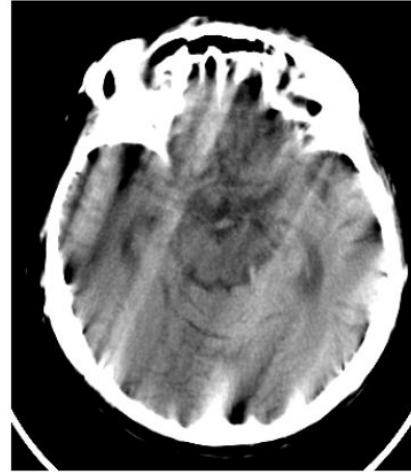


**actual**

*Image Source: "CT artifacts: Causes and reduction techniques"  
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**streaks and blur  
due to motion**

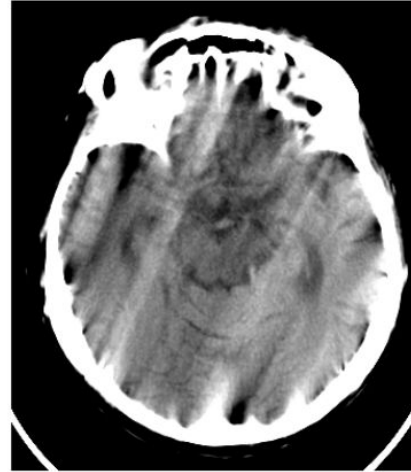
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# Problems!

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- Model Process-related
- **Human-related**



**Thesis focus**



**streaks and blur  
due to motion**

*Image Source: "CT artifacts: Causes and reduction techniques"  
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# Thesis Goal---

- **Develop intelligent algorithms that will compensate for human related errors.**

## How?

- Can I model the unwanted motion artifacts?
- Can I use some implicit redundant information?
- Can I instruct machine to take measurements with better protocols?

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Without compromising much on radiation exposure and speed.



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Without compromising much on radiation exposure and speed.

## Techniques used:

Compressive sensing, optimization, image and signal processing.

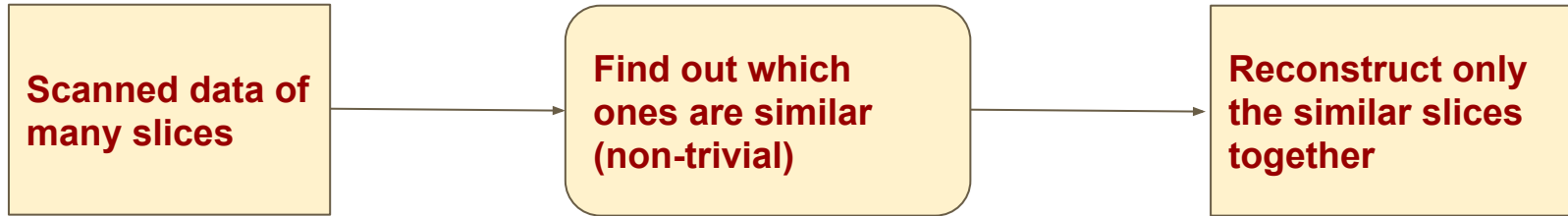
# Detecting similarity...

**Slice:** a cross-section of a 3D volume

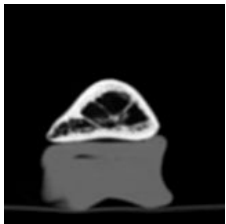
- When we **club similar** slices, we **re-use the information**
- When we **separate dis-similar** slices, we **avoid interference**
- When we deal with **individual** slices, it's sub-optimal

# Detecting similarity...

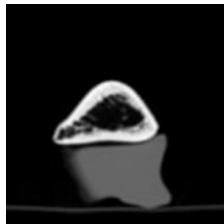
**Slice:** a cross-section of a 3D volume



**m1**



**m2**



**m3**



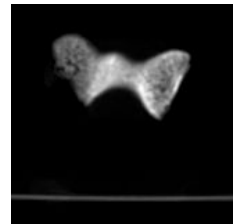
**m4**



**m5**

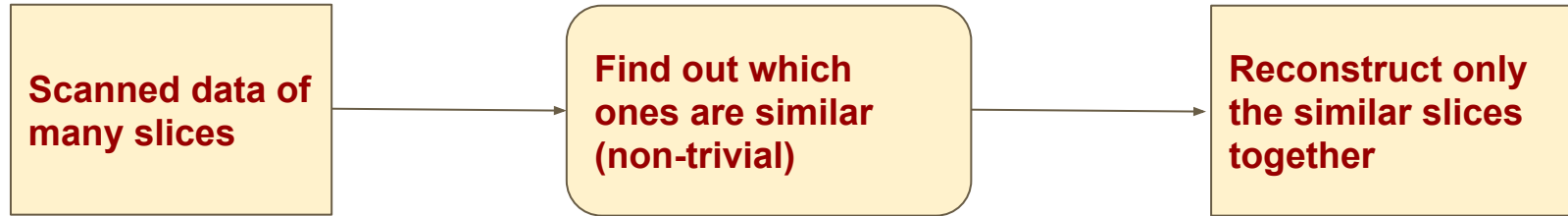


**m6**

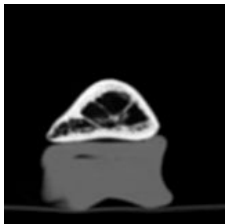


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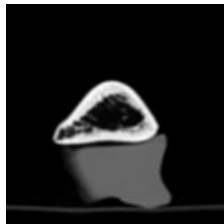
**Slice:** a cross-section of a 3D volume



m1



m2



m3



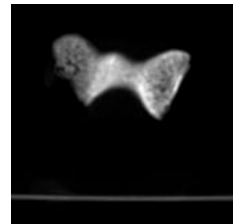
m4



m5

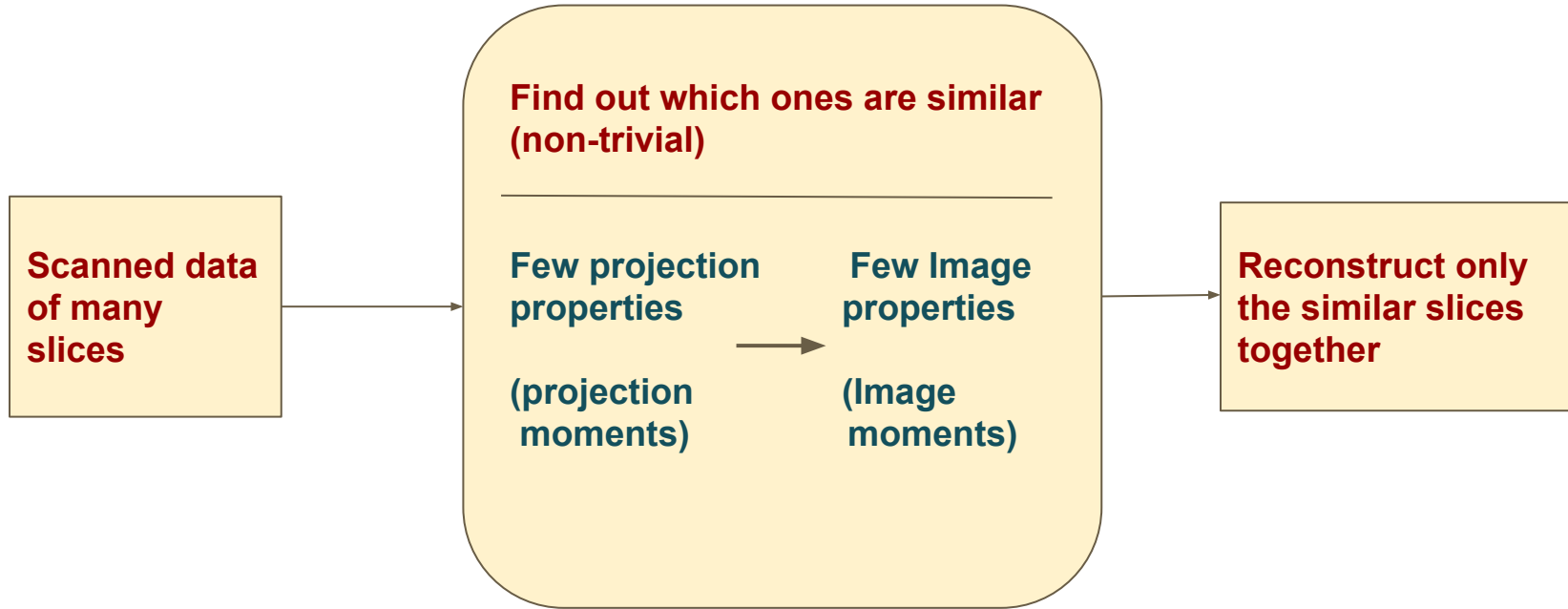


m6



# Detecting similarity...

**Slice:** a cross-section of a 3D volume



**Thank you !**