

Identify Research Topic

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AGENDA 1

identify research
topics

AGENDA 2

narrow down the
topics

AGENDA 3

examples



Research

is "original investigation undertaken in order to gain knowledge and understanding"

The process of research implies a systematic approach.

It is not invention!

FRANS COENEN
<https://cgi.csc.liv.ac.uk/~frans/Seminars/doingAphdSeminarAI2007.pdf>

A thesis

is a series of related arguments, building one on top of another, that seek to establish a proposition (research question or statement) in such a way that the proposition cannot be (easily) refuted.

Should not simply be an application!

The evaluation of your thesis is the most important part of the process as this is where you establish that your thesis is correct!

FRANS COENEN

<https://cgi.csc.liv.ac.uk/~frans/Seminars/doingAphdSeminarAI2007.pdf>



Selecting a problem

is perhaps one of the hardest problems with doing research

Research is not simply learning about something.

Gathering information to know more about a certain area is different from looking at a body of data and deciding how it contributes to the solution of a problem.

ALEXANDER FERWORN

<https://slideplayer.com/slide/9080637/>

RESEARCH IS NOT THE SIMPLE COMPARISON OF DATASETS

This does not meet the bar of analysis.

Simply gather data and then gathering more data and perhaps showing the data together in table or chart form is often little more than a graphical trick.

CORRELATING DATA SETS IS NOT RESEARCH

Using a statistics to indicate that two data sets are related is simply a calculation.

It does not involve investigation and does not shed light on why the data is related.

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Research problems do not simply result in a "YES" or a "NO" answer.

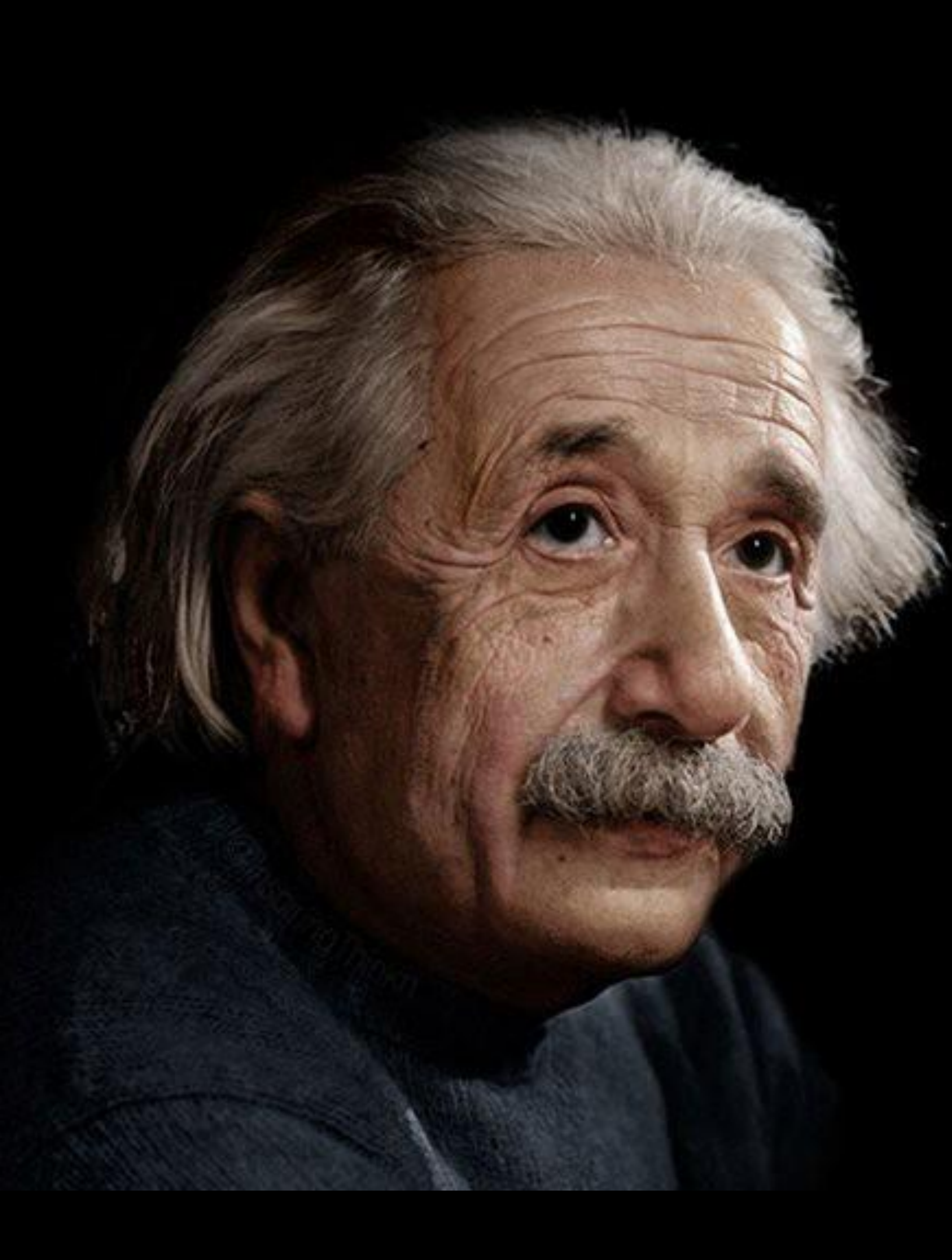
The important concept of why something happens is missing.

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What is a good problem for you?

- Choose something that interests you.
- Think about how much time you have to complete your research.
- Think if you have enough background and time to build more.
- Think of possible availability of data, tools, or other resources.





Imagination is more
important than knowledge.
Knowledge is limited.
Imagination encircles
the world.

Albert Einstein / @InspiringThinkn

A photograph of a hand in a light blue shirt sleeve pointing its index finger at a row of four small, round, light-colored wooden bowls. The bowls are arranged in a horizontal line on a dark, textured surface. The hand is positioned above the bowls, with the index finger pointing directly at the second bowl from the left.

Finding a legitimate problem

- Advisor suggestions
- Suggestions of others
- Replicate research with modifications
- Apply an existing technique to a new domain (or vice versa)
- Address contradiction and ambiguity
- Challenge findings

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To identify your thesis topic



What are my broad areas of interest?

Identify your broad interest areas.



What others have done?

Read past theses.
Study survey papers.
Review the literatures (further research).
Talk to your advisors and lab members.



What are my possible thesis topics?

Narrow down your topics.
Brainstorm, use mind-map, etc. to identify gaps or limitations in previous literatures.
Evaluate each potential topic and make a decision.



What is my research question/statement?

Write your research question or statement clearly, concisely, and concretely, in language that people outside your specific subject area can understand.

Techniques

Brainstorming to narrow your focus.

Step 1

Write down your broad topic.

Step 2

Write down a "specific kind" or "specific aspect" of the topic you identified in step 1.

Step 3

Write down an aspect --such as an attribute or behavior-- of the "specific kind" you identified in step 2.

Step 4

Continue to add levels of specificity as needed to get to a focus that is manageable. However, you may want to begin researching the literature before narrowing further to give yourself the opportunity to explore what others are doing and how that might impact the direction that you take for your own research.

Example 1

- Information Security
- single sign-on authentication
- analyzing
- method

Brainstorming has brought us to focus on methods for analyzing the security of single sign-on authentication.

Example 2

- Information Security
- Protocol
- Handshake protocol

Brainstorming has brought us to focus on the handshake protocol.

Practice

Then, do preliminary research to help you identify a specific research question

data
science

machine
learning

application
specific

What's next

after you have your thesis topic?

Thesis statement

The thesis statement is a refined and succinct set of arguments that define what you will demonstrate or prove in the thesis—it is your position.

Research contribution

Research contribution to knowledge means creating new knowledge based on the previous available knowledge by doing extensive and innovative research.

If you can't explain it **simply**, you
don't understand it well enough.

– Albert Einstein

