Business Analysis and Communication

Research Methodology

Agenda

- Fundamentals of Research
- Steps Involved in Research
- Organization of Thesis / Journal
- Choice of Journal
- Conference Vs Journal Publications
- Publication Ethics

Fundamentals of Research

Objective of Research

- **Research** is a careful and detailed **study** of a particular problem or concern, using scientific methods.
- Find out the reality and facts which is unknown and which has not been exposed
- **Research objectives** divide research aim into several parts and address each part separately.
- Research aim specifies WHAT needs to be studied and research objectives comprise a number of steps that address HOW research aim will be achieved.

Characteristics of Research

- The research should focus on priority problems
- The research should be systematic
- The research should be logical
- The research should be reductive
- The research should be replicable
- The research should be generative
- The research should be action-oriented
- The research should follow an integrated multidisciplinary approach
- The research must be relatively simple, timely, and time-bound, employing a comparatively simple design
- The research must be as much cost-effective as possible
- The results of the research should be presented/documented properly, so that anyone can access and understand easily.

Types of Research

- Descriptive Vs Analytical
- Applied Vs Fundamental
- Quantitative Vs Qualitative
- Conceptual vs. Empirical

Steps Involved in Research Process

Identifying the Research Problem

- Identify a broader problem
- Understand the Theory and Practical
- Learn more about the problem
- Narrow-down the problem

Literature Survey

- Narrow your topic and select papers accordingly.
- Search for literature.
- Read the selected articles thoroughly and evaluate them.
- Organize the selected papers by looking for patterns and by developing subtopics.
- Develop a thesis or purpose statement.
- Write the paper.
- Review your work.

Research Hypothesis

- Hypothesis is derived from the research problem, literature review and conceptual framework.
- Hypothesis is to be tested therefore it should be very specific and limited to the piece of research. It sharpens the researcher's thinking and focus on the important facts of the problem.
- Hypothesis formulation could be done by using the following approaches:
    - (a) Discussions with colleagues and experts about the research problem, its source, cause and the objectives in search of a solution;
    - (b) Assessment of data and records,
    - (c) Evaluation of similar previous studies in the area similar problems;
    - (d) Personal investigation which involves original field survey

Research Design

- The purpose of research design is refers as general procedure that you choose to combine the various components of the study in a consistent and logical way.

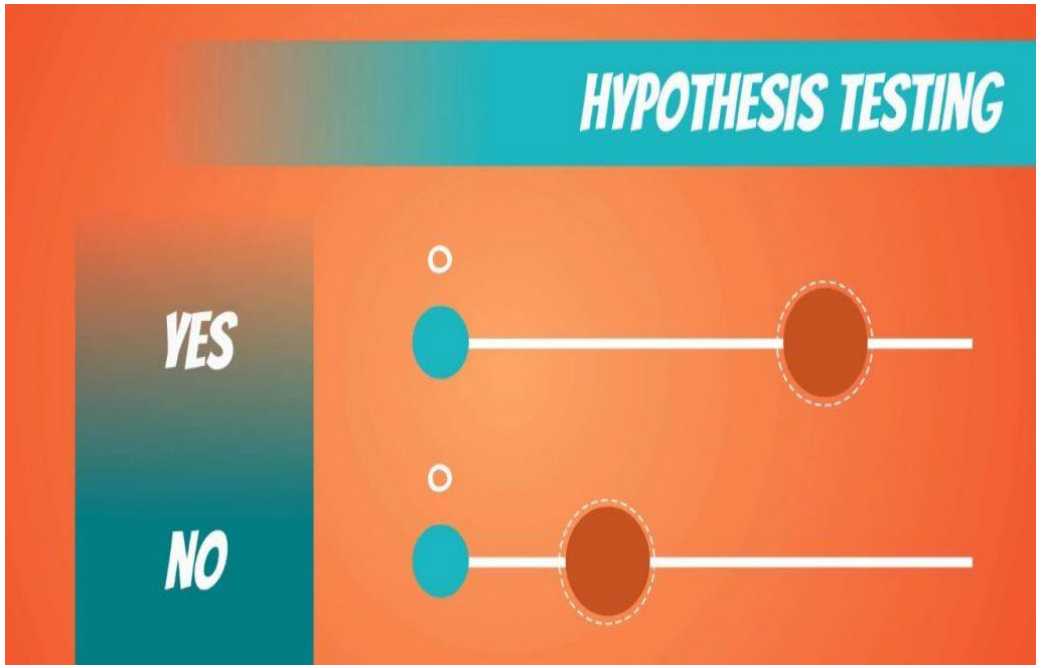
- Research design decides how the research materials will be collected. One or more research methods, for example, experiment, survey, interview, etc are chosen depending on the research objectives

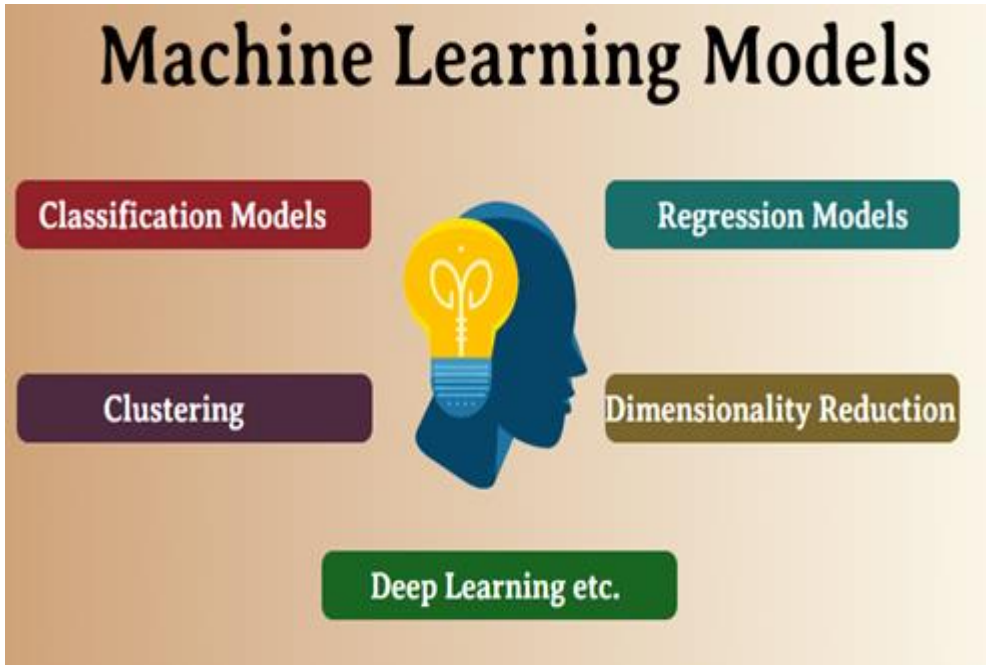
Data Collection

- **Data collection** is the process of **gathering** and measuring information on variables of interest, in an established systematic fashion.
- Enables one to answer stated **research** questions, test hypotheses, and evaluate outcomes.
- Regardless of the field of study or preference for defining data (quantitative, qualitative), accurate data collection is essential to maintaining the integrity of research.
- Data can be BAD but not FAKE

Data Analysis

Hypothesis testing / Model building





Generalization, Interpretation and Report

- Inferring the Model
- Solution to Business Problem
- Document the research findings

Research Methodology for Data Science

Open for Discussion – Share your thoughts

Organization of Journal / Thesis

ABSTRACT writing

- Initial few lines of the abstract must focus on the main objective of the research.
- The next few lines focus on the need of this research
- The third section of the abstract need to talk about how this work is different from other works reported in the literature.
- The fourth section of the abstract should talk about the proposed methodology for the research problem
- The final section should focus on expected outcomes and performance measures (This could be replaced with an actual results once the research problem is solved)

Introducing the scope of the Research

- Introduction to the broad problem domain
- What pushes you to choose this research
- General application of this research
- Why and How part of this research (Briefly)
- Detail literature survey need to be carried-out before writing the Introduction and even abstract.

Documenting Literature Survey

- Understanding the other works published in the area related to this research/project
- Different concepts/Theories/Algorithms related to this research/project
- Merits and Demerits of different techniques that applied on this research idea.
- Finalize the research objective statement and propose the methodology for the research problem
- Explore the availability of data from different sources.
- Identify the tools, programming languages and hardware support required.

Materials and Methods

- In an editorial for the American Journal of Roentgenology, James Provenzale says, “One of the more common reasons for rejection of a manuscript is that the reviewers cannot fully understand how the study was conducted.”

- Begin writing the Materials and Methods while you are performing your experiments.
- Start with general information that applies to the entire manuscript and then move on to specific experimental details.
- Match the order in which methods are described to the order of the results that were generated using those methods.
- Always include citations for procedures that have been described previously.
- Discuss the algorithms in detail (Try to come up with modified algo with your innovation)
- Avoid discussing the pros and cons of certain methods or results of any kind.

- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4548564/

Results, Discussion and Conclusion

- RESULTS are the presentation of data and hence findings or investigations.
- DISCUSSION provides the explanation and interpretation of results or findings by comparing with the findings in prior studies.
- CONCLUSION is to write the output of the work/ investigations in summarized form.
- Some of the common reasons the results and discussion sections might cause reviewers to reject a manuscript are:
    - confusing tables or figures
    - inconsistent or inaccurate data
    - potential variables that are not reported
    - over interpretation/under interpretation of the results

Appendix and Reference

- An appendix contains supplementary material that is not an essential part of the text itself but which may be helpful in providing a more comprehensive understanding of the research problem
- It is an information that is too cumbersome to be included in the body of the paper.

- Always cite all the papers which you have referred for your research
- Reference formats:
  - MLA
  - APA
  - Chicago
  - Harvard
  - Vancouver

Choice of Journal

Types of Journal

- UGC approved Journal
- Google Scholar indexed Journal
- Scopus Indexed Journal
- Web of Science Journal
- SCI / SCIE

Journal Metrics and Citation

- Impact Factor
- H Index
- SJR

Conference Vs Journal Publication

- Find the correct conference through speakers and organizers
- Don’t simply trust even if it is IEEE conference
- Try to avoid paid Journals

Publication Ethics

- Plagiarism
- Self-Plagiarism
- Reference
- Projecting correct numbers