

Research Ethics in relation to AI-assisted Adaptive Technology for mental health treatment

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scientific oath

*I acknowledge that I am a part of an international community of researchers. I will practise my activities in line with the **recognised standards** for good research practice. I shall conduct my research in an **honest** and **truthful** way and show respect for humans, animals, and nature. I shall use my knowledge and skills to the best of my **judgement** for the good of humanity and **for sustainable development**. I shall **not allow interests based on ideology, religion, ethnicity, prejudice, or material advantages** to overshadow my ethical responsibility as a researcher.*

What am I doing?

Clinical Approach

Facial Expression

Vocal Cues

- Frequency of Smile
- Dampened Facial Expression
- Avoiding Eye Contact
- Using Short Sentence with low intonation
- Using mood terms



PHQ9 BDI MADRAS-S



Use ICT technology for treatment of mental health problems

Clinical Approach + ICT

Facial Expression Vocal Cues

Computer Vision

Dampened Facial Expression

Computer Vision

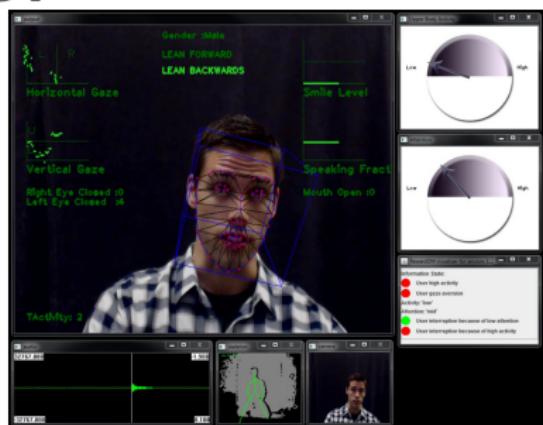
Avoiding Eye Contact

Audio Signal Processing

Using Short Sentence
with low intonation

Using mood terms

- Speech To Text Analysis
- Tone Analysis



PHQ9 BDI MADRAS-S Form Based Evaluation

Image Source: <http://ict.usc.edu/prototypes/simsensei/>

Machine Learning Approach

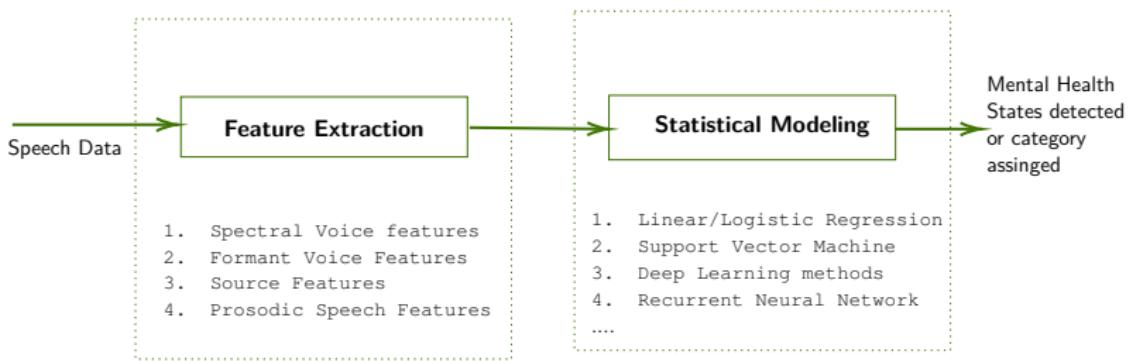


Figure: Generalized ML classifier system or prediction system

Research Methodology

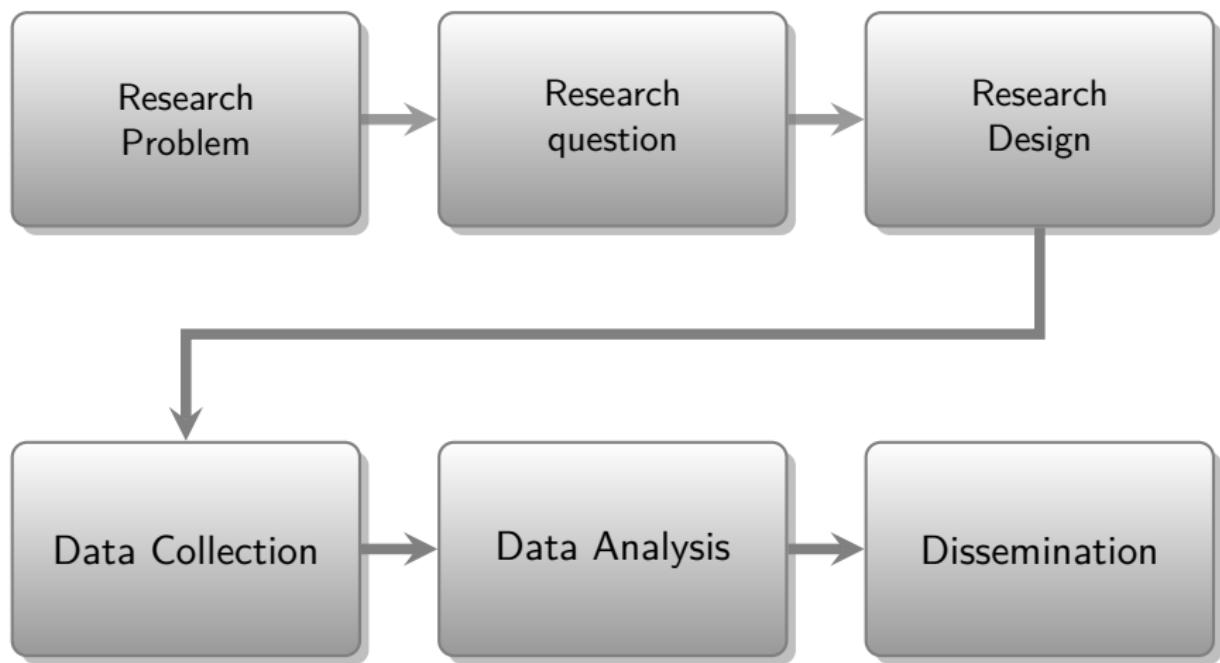
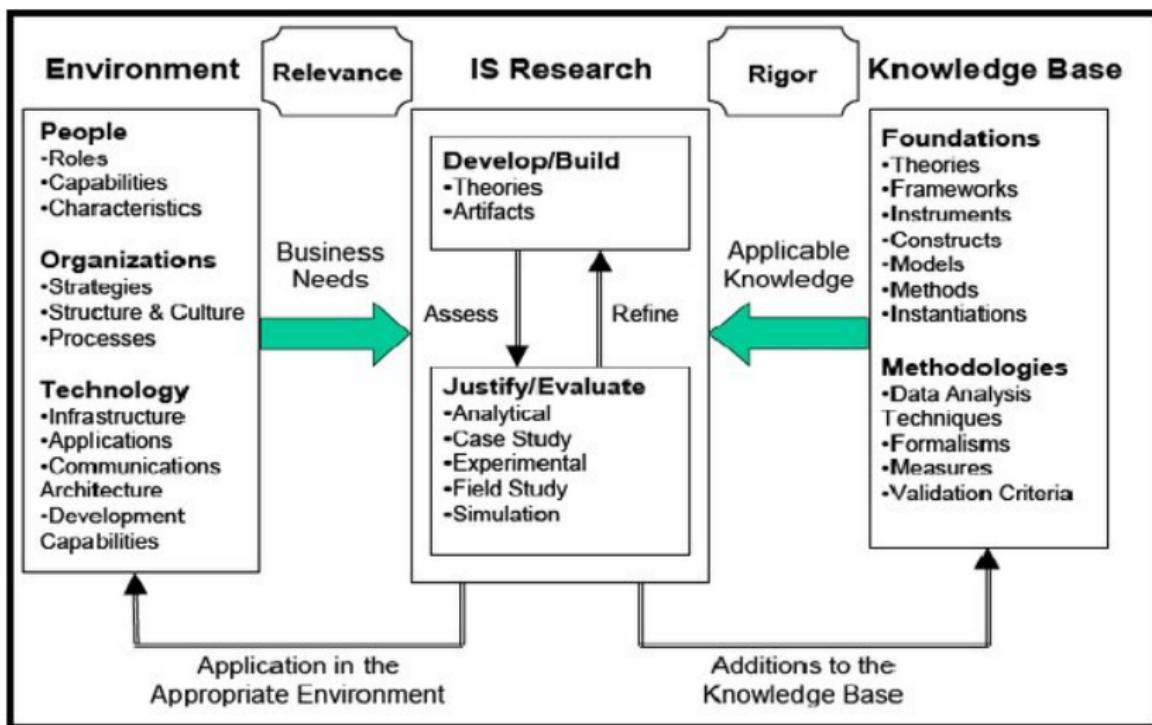
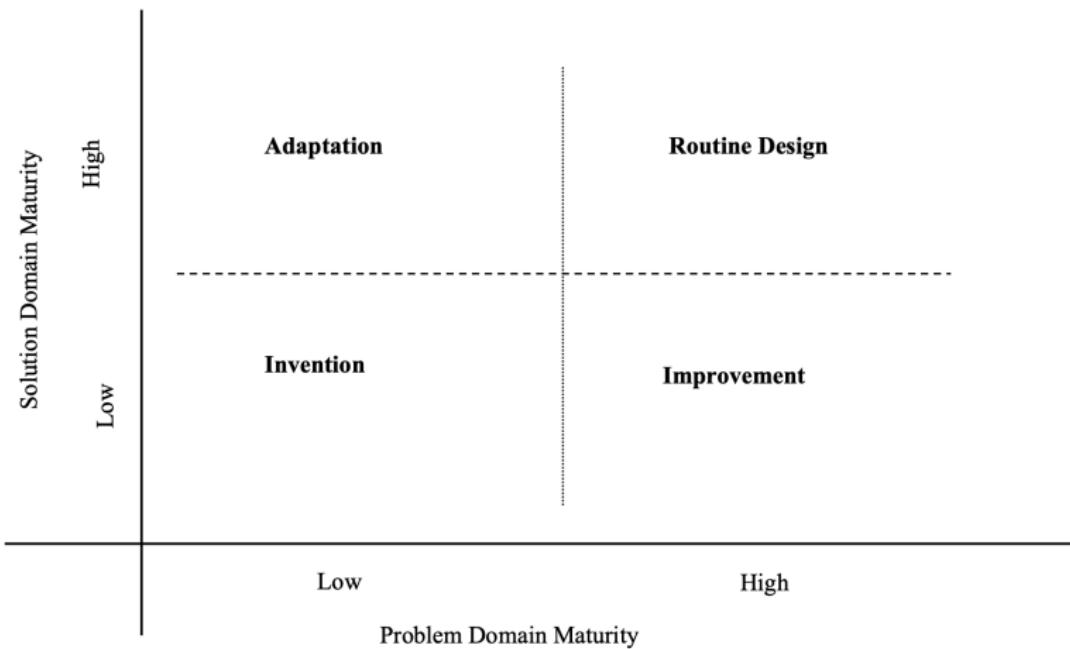


Figure: Scientific Methodologies for my Research

Design Science Research



DSR Knowledge Contribution Framework



(adapted from Gregor and Hevner, 2013 [?])

DSR Knowledge Contribution Framework

- **Invention** (inventing NEW knowledge/solutions for NEW problems),
- **Improvement** (developing NEW knowledge/solutions for KNOWN problems)
- **Adaptation** (non-trivial or innovative adaptation of KNOWN knowledge/solutions for NEW problems)
- **Routine Design** (applying KNOWN knowledge/solutions to KNOWN problems)

DSR and Ethics

DSR:

- 1.** What is the problem I am trying to solve in my research?
Why? and what is the proposed solution?
- 2.** What is new knowledge I am contributing to the knowledge base? and how am I evaluating if the proposed solution solves the problem being identified?

Research Ethics:

- 1. The obligation of research to the society? [?]**
- 2. Scientific integrity, truthfulness, and accountability**

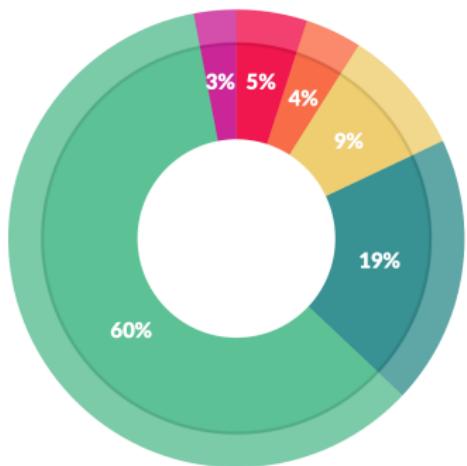
Contribution to the society

- 450 million people currently suffer from such conditions [?].
- Our aim is to create an adaptive technology that can be used in treatment of mental health problems.

Contribution to the research community

- **Research Paper and Thesis**
- **Codebase**
- **Research Data**

Data unavailability Problem



What data scientists spend the most time doing

- Building training sets: 3%
- Cleaning and organizing data: 60%
- Collecting data sets; 19%
- Mining data for patterns: 9%
- Refining algorithms: 4%
- Other: 5%

Data Collection

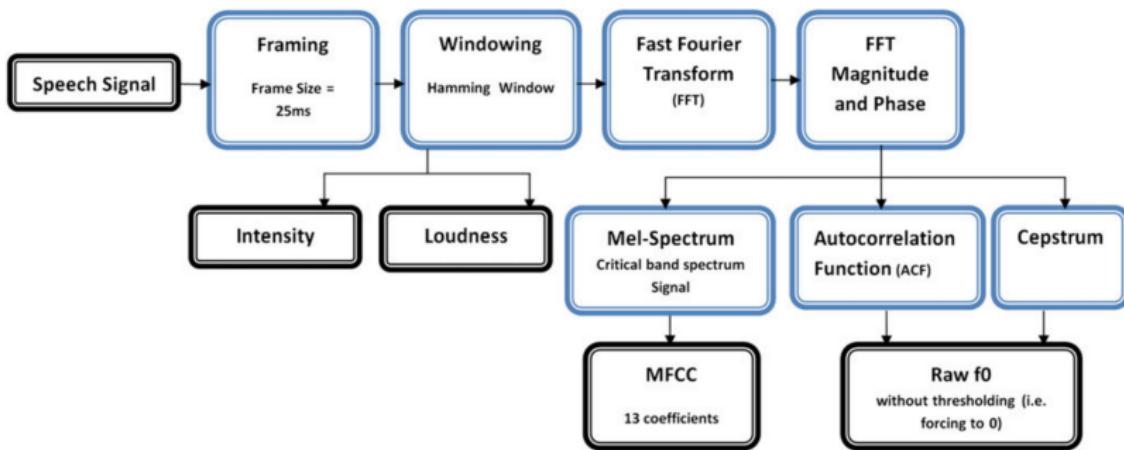
- **Speech Data:** Collect speech data from mentally ill patients with proper consent.
- **Sensors Data:** HR, EDA, Temperature, Eye Movement, Activity data using mobile application. App should aware the user that about data collection and storage.

Why Personal Health Record (PHR) should be shared?

- providing access to and sharing of health data have been shown to benefit and empower the patients [?]
- limitation in sharing health data is detrimental to patient care, provider satisfaction, and healthcare cost [?].

Data Sharing

- Consent from patients that these data will be used for research purpose.
- Share only the feature set of the data, not actual voice. Share pre-processed data.



Uncertainty

- **Measurement Uncertainty**
- **Process Uncertainty**
- **Model uncertainty**
- **Estimation Uncertainty**
- **Implementation uncertainty**

Measurement Uncertainty during Data Labeling



fills up the self questionnaire form

Patient Health Questionnaire - Depression (PHQ-9)

Instructions:

Over the last 2 weeks, how often have you been bothered by any of the following problems?

	Not at all	Several days	More than half the days	Nearly every day
1 Little interest or pleasure in doing things	0	1	2	3
2 Feeling down, depressed, or hopeless	0	1	2	3
3 Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4 Feeling tired or having little energy	0	1	2	3
5 Poor appetite or overeating	0	1	2	3
6 Having trouble concentrating — feel like you can't have let yourself or your mind rest	0	1	2	3
7 Feeling restless or on edge	0	1	2	3
8 Having thoughts that you would be better off dead or trying to kill yourself	0	1	2	3
9 Thoughts that you would be better off dead or trying to kill yourself	0	1	2	3

Score
34

Voice is recorded



Export Speech Data



Questionnaire

PATIENT HEALTH QUESTIONNAIRE (PHQ-9)

NAME: _____ DATE: _____

Over the last 2 weeks, how often have you been
bothered by any of the following problems?
(use "✓" to indicate your answer)

	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself—or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3

and Obviously!

Table: Dos and Don'ts of my Research Ethics

Criteria	Do's	Dont's
Research Data	Record all research activities and share data maintaining its integrity and completeness.	Falsification, fabrication of research data.
Funding agency	Disclose financial or personal interests that affect the research work.	Deceive research sponsors, colleagues, or ethical committee by biased data, review or decisions.
Objects of research	Care and respect living beings under study.	Use any external research data without permission.
Privacy Policy	Respect intellectual property, privacy and confidentiality and proper credit for any contributions from other researchers.	Irresponsible publication practice and use data/research without proper consent.
Publication	Submit original articles not submitted to any other publication.	Simultaneous submission and salami publication.
Authorship	Credit authorship to any individual with a significant contribution.	Promote ghost, guest or gift authors.
Plagiarism	Give credit or acknowledgment to other researchers work, without falsification or modification.	Use others work without permission, credit or acknowledgment. Motivate literal copying, structural copying, self-plagiarism and paraphrasing.

Take Away!

- Research Ethics guides researchers to conduct research in honest, responsible way.
- Research Ethics is very challenging and depends on society, race, demographics, government rules. (Legality \cap Morality).
- In my Ph.D project, I tend to incline to research guidelines mentioned in [?] in terms of honestly, integrity and truthfulness.

Ph.D Project
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Backgrounds
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Analysis
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Research Data
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Summary
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References |