Machine learning approaches on audio recordings for dementia assessment
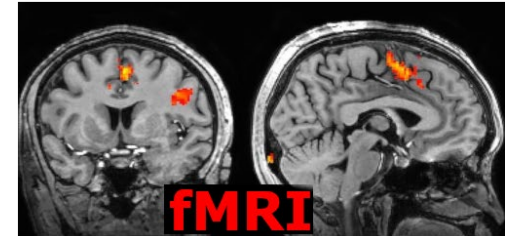
Vijaya B. Kolachalama, PhD
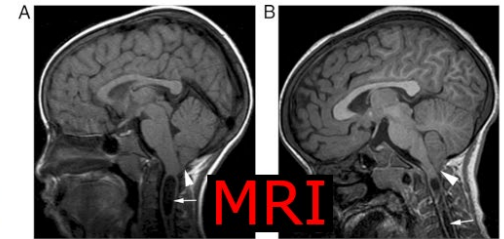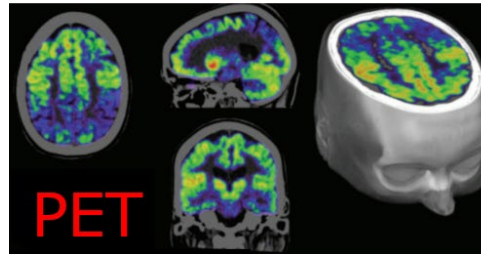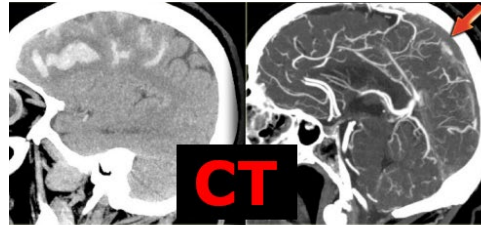
Associate Professor,
Department of Medicine, Boston University School of Medicine
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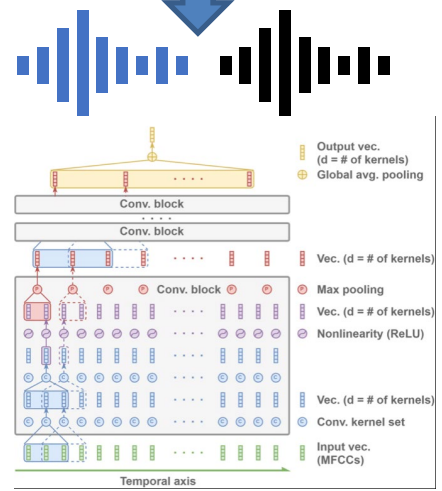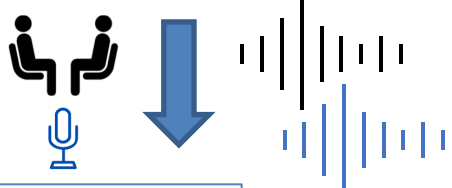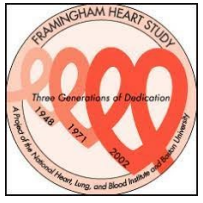
'Raw' data is the new oil

Summary: Data in native format(s) should be harnessed as it has the most information.

Examples:
- WAV or MPG for audio files
- DICOM, NIFTI, etc., for images

AI approaches to directly process 'raw' data

Digital voice

Raw Audio Available

Used for QC

- We are developing automated approaches to process voice recordings to assess dementia

- The goal is to build a computational framework that would require minimal manual processing

- Additional emphasis is on model validation and model interpretation

- Thousands of voice recordings from the Framingham Heart Study

Detection of dementia on voice recordings using deep learning: a Framingham Heart Study.
Xue C, Karjadi C, Paschalidis IC, Au R, Kolachalama VB. Alzheimers Res Ther. 2021 Aug 31;13(1):146.

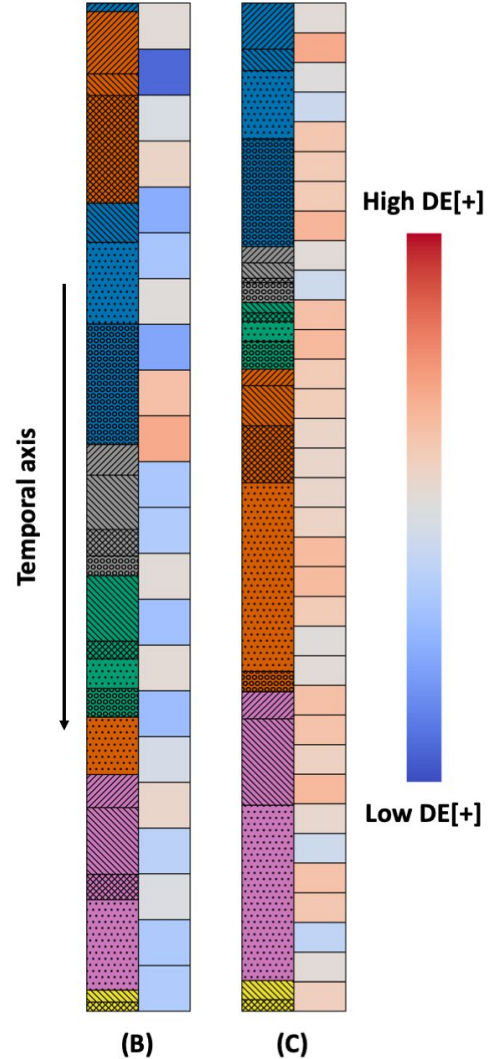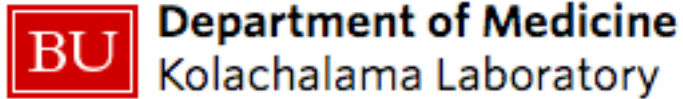# Preliminary results

(A)

(B)

(C)

(D)
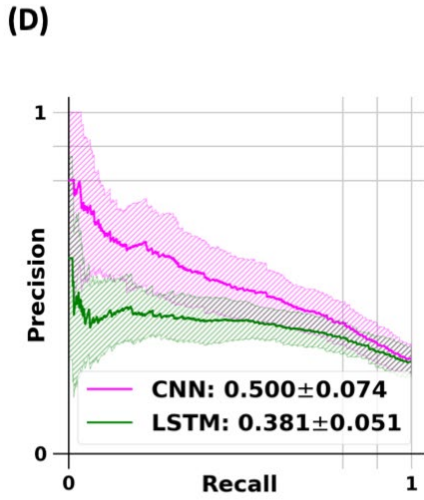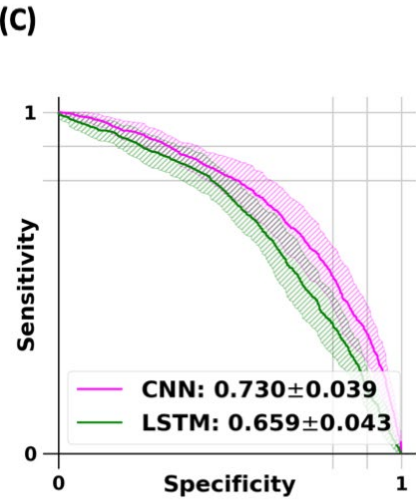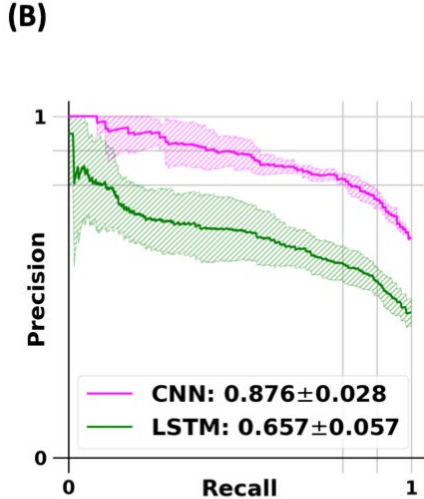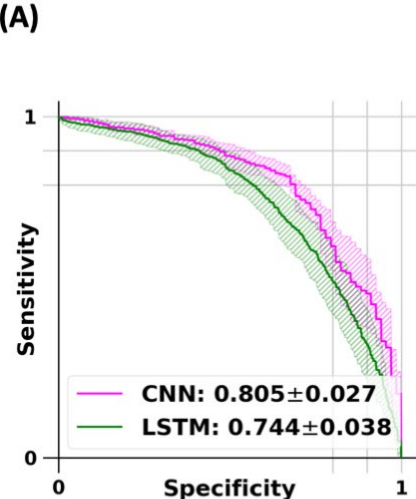
Neuropsychological Test

Demographics
Logical Memory Immediate Recall
Logical Memory Immediate Recall (+)
Visual Reproductions Immediate Recall
Verbal Paired Associates Learning
Digit Span Forward
Digit Span Backward
Logical Memory Delayed Recall
Logical Memory Delayed Recall (+)
Logical Memory Multiple Choice
Logical Memory Multiple Choice (+)
Visual Reproductions Delayed Recall
Visual Reproductions Multiple Choice
Verbal Paired Associates Recall
Verbal Paired Associates Recognition
Similarities
Command Clock
Verbal Fluency (FAS)
Boston Naming Test
Copy Clock
Trails A
Trails B
WRAT-3 Reading
Hooper Visual Organization Test
Block Design (WAIS)
Finger Tapping
Information (WAIS-R)
Cookie Theft
Digit Symbol Coding
Digit Symbol Learning
Digit Symbol Recall
Clock Drawing Number Placement
Clock Drawing Time Setting
Math Fluency
Balance Physical Function Test

Temporal axis

High DE[+]

Low DE[+]

Acknowledgments

Funding: