



How we preserve data privacy?

Security For Medical Data



OUR MAIN ISSUES

- Handling personal data shown on the image
- Handling personal data that is on DICOM
META DATA
- Striping unique skull parts from brain
MRI that is on NIFTI format data



HIPAA

Insurance Portability and Accountability Act

IBM



Google
Workspace



aws

HIPAA compliance software –
Microsoft 365 HIPAA



Techniques Used in MRI Privacy

1.De-identification

6.Decoy File

2.Cryptography

7.Synthetic Data Generation

3.Data Hiding

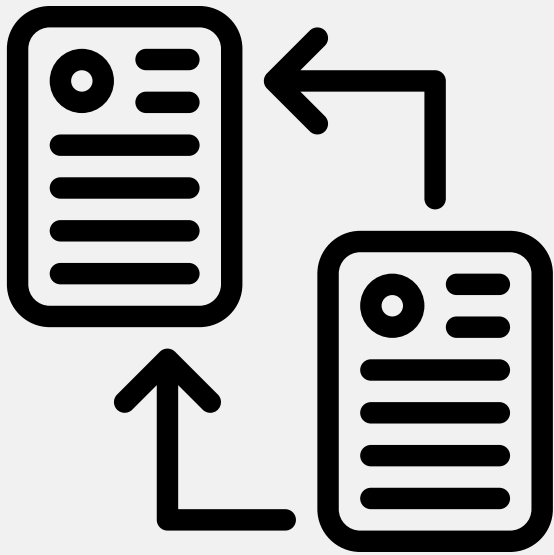
8.Randomized Order

4.Differential Privacy

9.Medical Imaging Devices

5.Federated Learning

10.Data Generation and Augmentation




| | DICOM | NIFTI |
|---------------------|------------------------------------------------------------------------|-----------------------------------------------|
| File Extension | ----- | .nii .nii.gz |
| Header Contains | many fields, protected health information, hospital-related data | image meta-data no patient informations |
| Storage | Diffrent directories per subject, more complex data structure | Diffrent files can be in same directory |
| File Representation | One slice | 3D image |

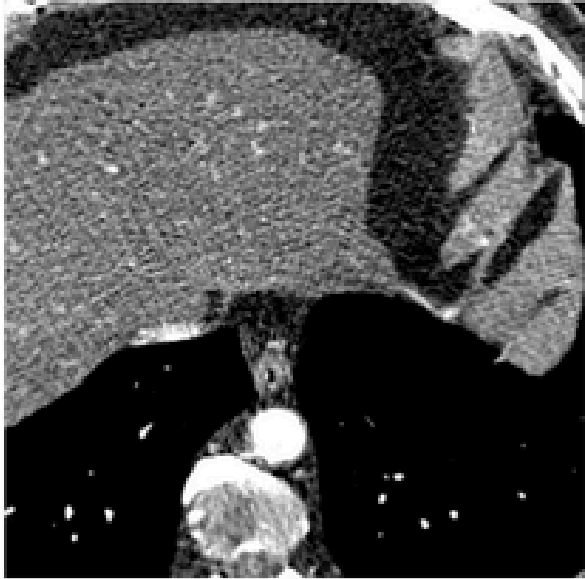


Data Embedding

Data embedding (data embedding) refers to discreetly embedding a data setting into another data setting (for example, an image).

DICOM File

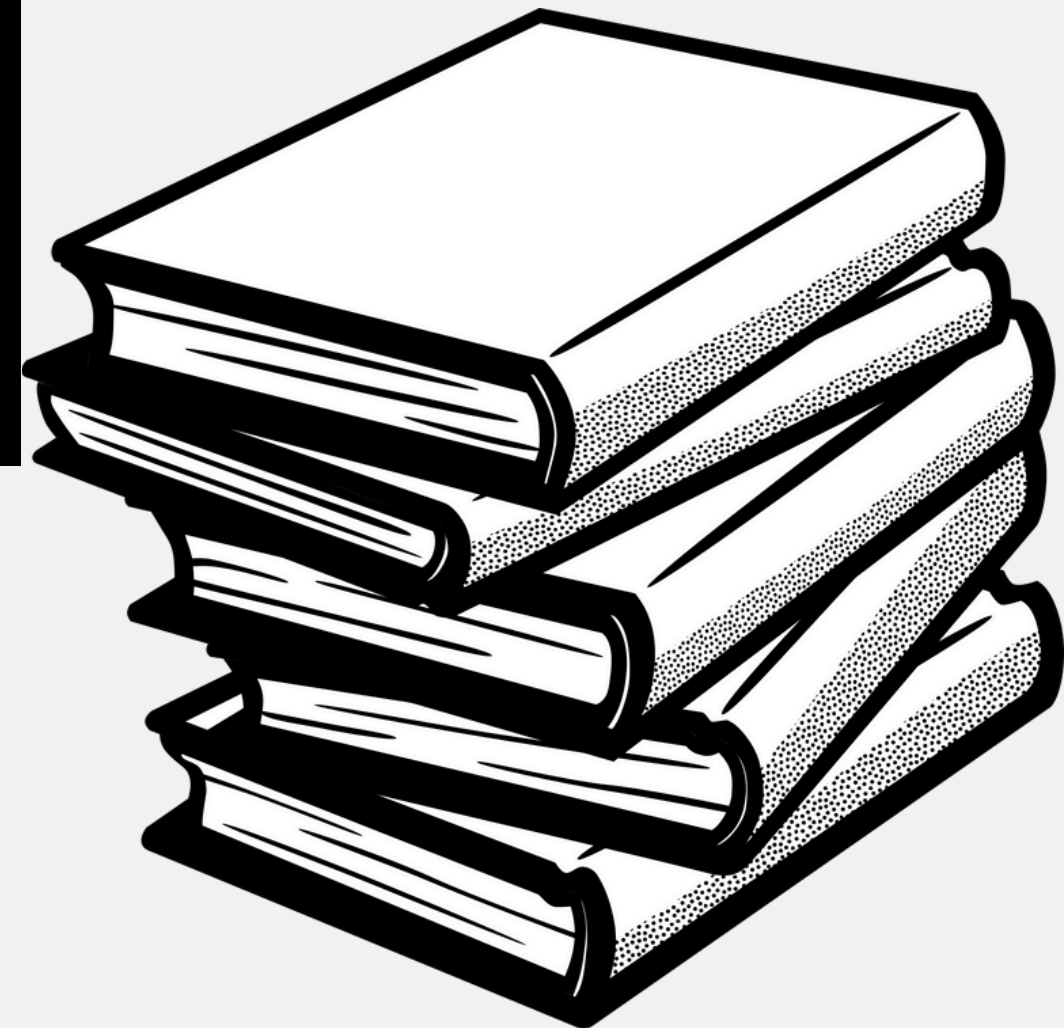
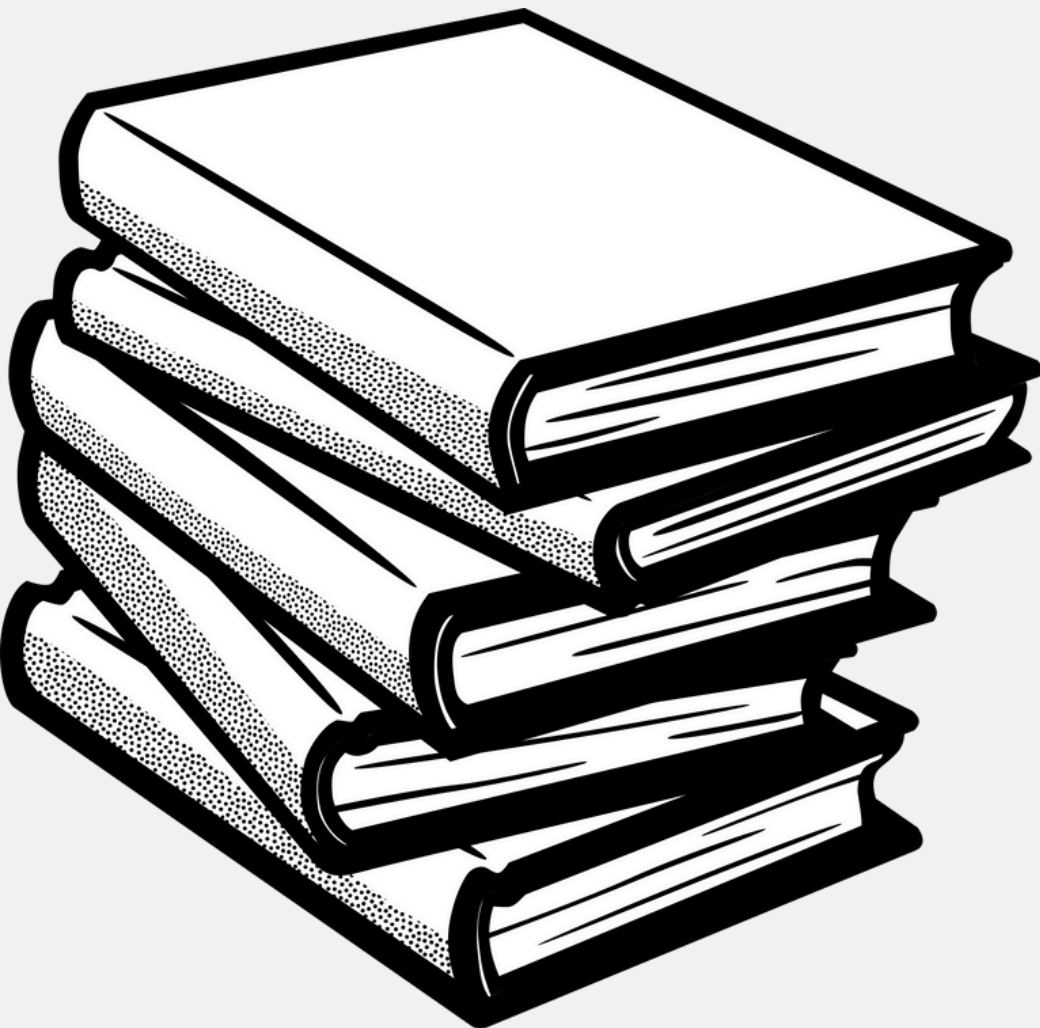




| | | |
|---------------------------------------|-----------|---------------------------------------------|
| ProtocolName | 0018,1030 | Coronarias |
| Contrast_BolusVolume | 0018,1041 | 0 |
| ContrastFlowRate | 0018,1046 | 0 |
| ContrastFlowDuration | 0018,1047 | 0 |
| Contrast_BolusIngredientConcentration | 0018,1049 | 0 |
| ReconstructionDiameter | 0018,1100 | 200 |
| DistanceSourceToDetector | 0018,1110 | 1040 |
| DistanceSourceToPatient | 0018,1111 | 570 |
| Gantry_DetectorTilt | 0018,1120 | 0 |
| TableHeight | 0018,1130 | 183 |
| RotationDirection | 0018,1140 | CW |
| ExposureTime | 0018,1150 | 238 |
| X-rayTubeCurrent | 0018,1151 | 260 |
| Exposure | 0018,1152 | 429 |
| FilterType | 0018,1160 | 0 |
| GeneratorPower | 0018,1170 | 58 |
| FocalSpots | 0018,1190 | 1.2 |
| DateofLastCalibration | 0018,1200 | 20060727 |
| TimeofLastCalibration | 0018,1201 | 085454.000000 |
| ConvolutionKernel | 0018,1210 | B25f |
| PatientPosition | 0018,5100 | FFS |
| Unknown | 0019,0010 | |
| Unknown | 0019,10b0 | |
| StudyInstanceUID | 0020,000d | 1.2.276.0.200607270934002006276091 |
| SeriesInstanceUID | 0020,000e | 1.3.12.2.1107.5.1.4.54...707295196800006906 |
| StudyID | 0020,0010 | 2006276091 |
| SeriesNumber | 0020,0011 | 5 |
| AcquisitionNumber | 0020,0012 | 11 |
| InstanceNumber | 0020,0013 | 553 |
| ImagePositionPatient | 0020,0032 | -76.8046875\ -282.8046875\ -331.3 |
| ImageOrientationPatient | 0020,0037 | 1\0\0\0\1\0 |
| FrameofReferenceUID | 0020,0052 | 1.3.12.2.1107.5.1.4.54...706504381200000934 |

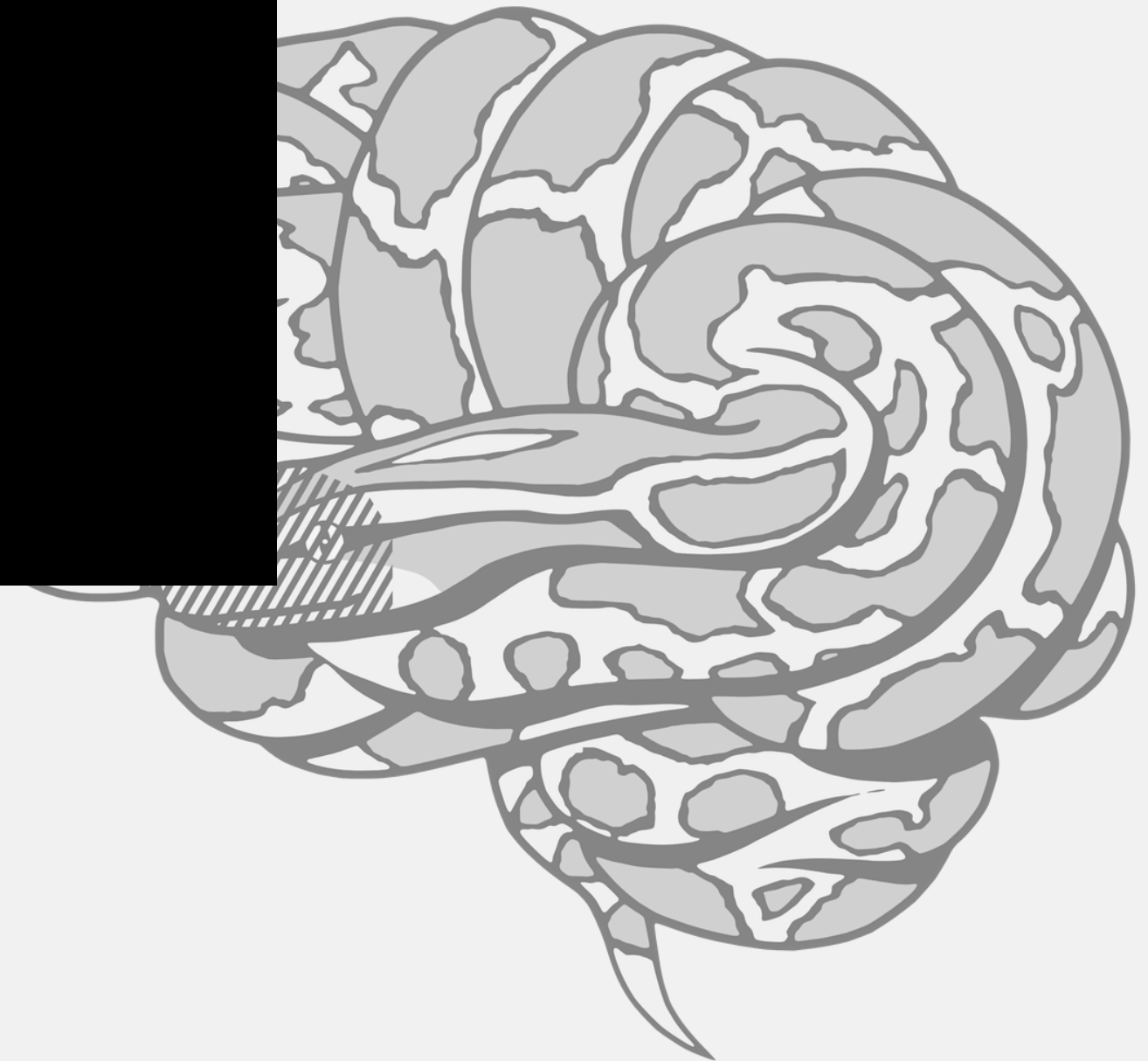
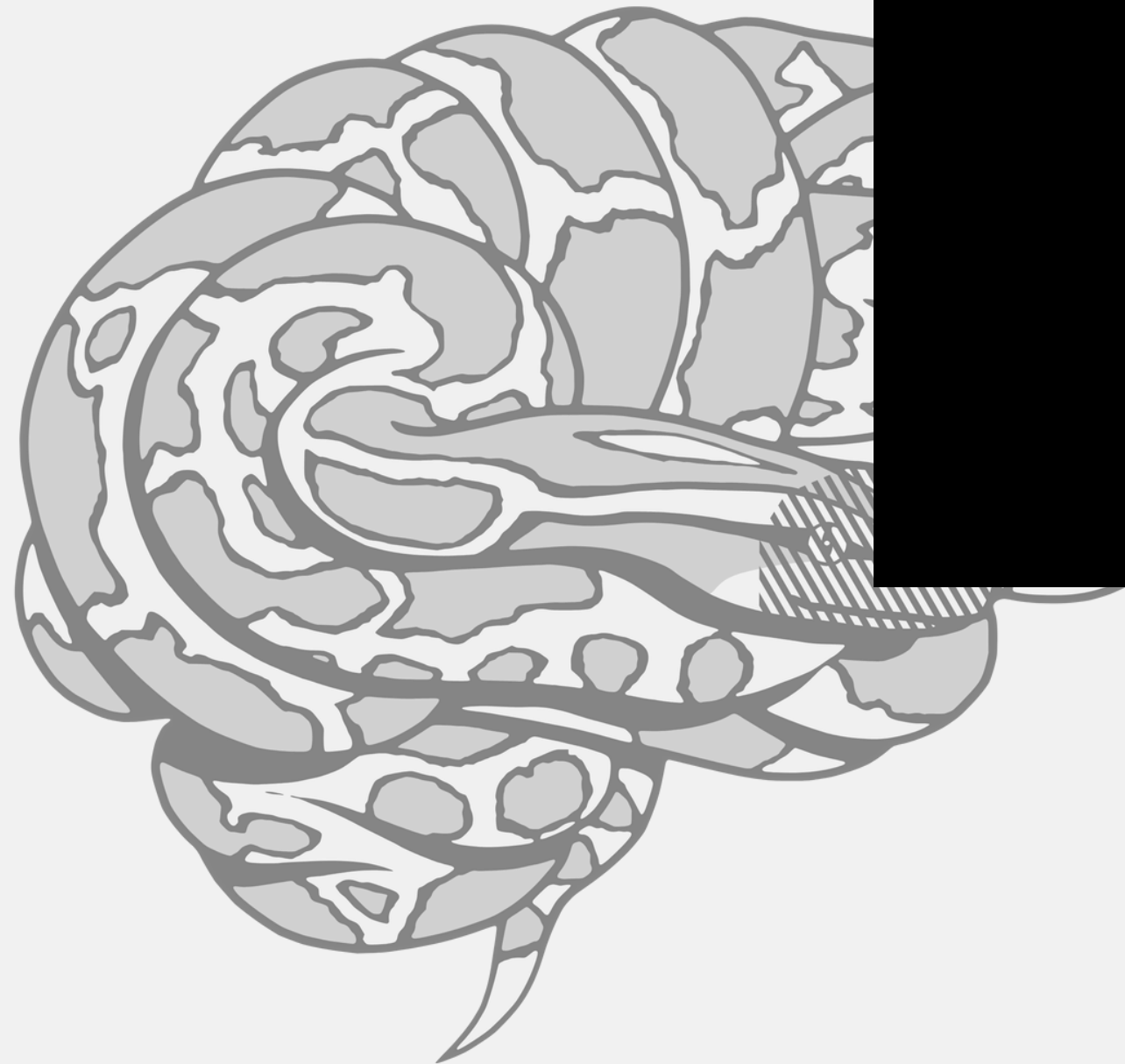
IMPORTANT LIBRARIES

pydicom
cryptography.fernet
nibabel (NiBabel)
subprocess



Anonymization Methods for Personal Health Data

- **Suppression**
- **Randomization**
- **Pseudonymization**
- **Bucketization**
- **Cryptographic Approaches**



FSL (FMRIB Software Library)

a suite of software tools and libraries used for analyzing and processing brain imaging data.

WHAT WE
CAN DO
WITH FSL

- Preprocessing
- Segmentation
- Visualization
- Statistical Analysis
- Brain Extraction

The background of the image is a light gray gradient, overlaid with a dense pattern of small, rectangular confetti pieces. These pieces are primarily in shades of orange, yellow, and light red, and they appear to be falling from the top of the frame, creating a celebratory atmosphere.

Thanks For Your Time

We offer our respect to

L* K*******

A*** K*******

R*** Ö*******

A*** K*******

A*** A*******

individuals who shared their data with us

 **Data privacy and protection remain vital, now and always.

TEAM

| | | |
|-----------------------|----|------------------|
| AYLİN AYGÜL | -- | 201180060 |
| AYCAN KAYNAKCI | -- | 191180052 |
| ATAKAN KAPLAN | -- | 191180768 |

