**Presentation Appendix**

* Introduction
  + Current Indian Scenario

Brain tumors are diagnosed with 40,000 to 50,000 new people living in India, out of which 20% are children which amounts to over 2,500 children each year.

* + Lack of adequate doctors

Due to the lack of adequate doctors, many districts and rural parts of India is covered by a single specialist, only a small proportion of the patients ﬁnd their way to the specialists.

* + Conventional Vs. computerized diagnosis

Human assessment is one of the typical ways for brain tumor detection and classiﬁcation from MR images and it highly depends on the experience of radiologists who evaluate the characteristics of image slices thoroughly, also it is time-consuming and prone to error.

In view of this, there is a good scope of developing a computerized diagnostic tool which will automatically detect and classify the brain tumors from the MR images and thus assist the medical practitioners.

* + Our work

In this work, a fully automatic methodology which can categorize brain tumors from a limited amount of data into different pathological types is proposed by using convolutional neural networks, which may release some workload of the doctors.

The squeeze and excitation [10] CNN model using Residual network architecture [11] was used for the classiﬁcation of tumors.

* Block Diagram of Proposed Method
* Dataset Description & Data Pre-processing
  + Source of Data

The Brain tumor database collected from 2005 to 2010, from Nanfang Hospital, Guangzhou, China, and General Hospital, Tianjin Medical University, China is used in this study.

* + Full Description

It contained 3064 T1-weighted contrast-enhanced images from 233 patients:

* + - meningioma (708 slices)
    - glioma (1426 slices)
    - pituitary tumor (930 slices).
    - The dimension of each MRI slices: 512 × 512 pixels
  + ROI segmentation

The annotated masks of the tumors, which contained labels ‘1’ for tumor region and ‘0’ for everything else, were provided in the brain tumor database. The exact tumors were extracted from the brain MRI samples by multiplying them pixel wise with the corresponding masks. Then tumor ROI images were resized and added zero padding to ﬁt into the particular input shape

* + Intensity Zero-centering and Normalization
  + Data Augmentation

several combinations of transformations on the zero-centered, normalized, ROI segmented images of Glioma, Meningioma, and Pituitary tumor data were applied. The transformations were Flip, Rotate, Elastic transform and Shear with variable degrees of transformation.

* + Flip
  + Rotate
  + Elastic transform
  + Shear with variable degrees of transformation.
* Proposed Methodology
* Experimental Results & Discussions
* Conclusion
  + State-of-the-art method

Furthermore, experimental outcomes show that the proposed technique can provide a significant improvement in terms of overall accuracy, sensitivity, and specificity which significantly outperformed the other two recent competitive brain tumor classification techniques.

* + Handy tool to doctors

We believe that this proposed method may be used as a handy tool to doctors for brain tumor classification.

* + Other Applications

Applicable to the other usages, such as liver lesion classification, breast tumor classification, etc.

* Future Scope
  + It may include enhancement of the CNN based architecture to 3-dimensional data provided by MRI outputs
  + Covering a more number of classes of tumors.
* References