Brain Tumour classification

Function : #For precise image classification | **Industry :** #Computer Vision

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Goal

- To enable early detection and diagnosis of Brain Tumour from MRI Scans.
- To detect location and area of tumour.
- To implement algorithms for quantitative assessment of tumour growth over time.

Technique

- Exploratory Data Analysis
- Image pre-processing and augmentation
- Image classification and Segmentation algorithms
- Visualization

Impact

- Provides an early and appropriate information for diagnosis.
- Delineates pathological regions, offering valuable insights for surgical planning.
- Early Intervention and Treatment
- Lesser Human Intervention.

Result

Attention U-Net	Training Set	0.9950	0.0131	0.9940	0.9891	0.9882
	Validation Set	0.9930	0.0200	0.9930	0.9880	0.9880
	Testing set	0.9927	0.0183	0.9922	0.9860	0.9810

Metric		Accuracy	Loss	Precision	Sensitivity	Specificity
U-Net model A	Training Set	0.9836	0.0698	0.9835	0.9835	0.9945
	Validation Set	0.9824	0.0798	0.9824	0.9824	0.9941
	Testing set	0.9814	0.0824	0.9814	0.9814	0.9938
U-Net model B	Training Set	0.9874	0.0411	0.9907	0.9842	0.9968
	Validation Set	0.9894	0.0371	0.9909	0.9875	0.9969
	Testing set	0.9870	0.0427	0.9891	0.9848	0.9963
U-Net model C	Training Set	0.9938	0.0177	0.9943	0.9921	0.9981
	Validation Set	0.9915	0.0255	0.9922	0.9899	0.9974
	Testing set	0.9933	0.0185	0.9938	0.9918	0.9979
U-Net Model D	Training Set	0.9950	0.0152	0.9948	0.9931	0.9982
	Validation Set	0.9926	0.0232	0.9931	0.9912	0.9977
	Testing set	0.9940	0.0183	0.9943	0.9927	0.9981
Attention U-Net	Training Set	0.9950	0.0131	0.9940	0.9891	0.9882
	Validation Set	0.9930	0.0200	0.9930	0.9880	0.9880
	Testing set	0.9927	0.0183	0.9922	0.9860	0.9810

Value Points

Understand the **what, why, when, where** & **how**

Data Preprocessing

Data preprocessing steps to derive meaningful data insights
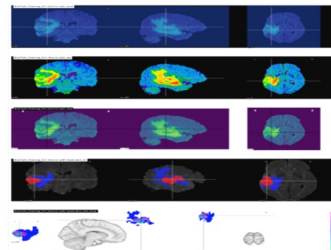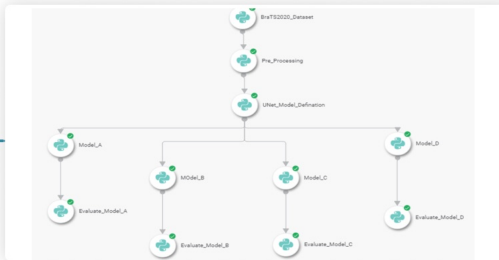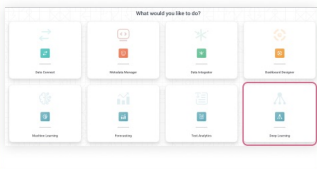

Image preprocessing using augmentation techniques and labelling

Image augmentation generates additional data for model to learn. Image labelling is preprocessing step for model building.
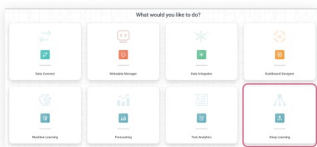
Model Building

CNN Architecture for tumour classification

U-Net architecture enables accurate classification and precise tumour area segmentation for immediate and accurate medical diagnosis.

U-Net (Attention) Analysis

|	Accuracy	Loss	Precision
Training Set	0.9950	0.0131	0.9940
Validation Set	0.9930	0.0200	0.9930
Testing set	0.9927	0.0183	0.9922

Attention based U-Net model

Deployment of Attention based U-Net architecture run for 35 epochs so as to obtain accurate and precise tumour area segmentation.

Multi Persona DSML Platform

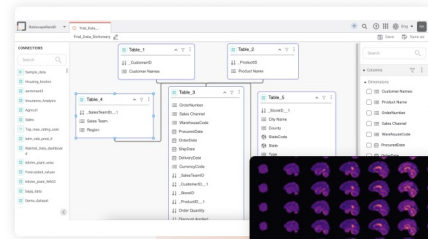For all your data needs- Data Engineering, Data Science, Data Visualisation, IoT

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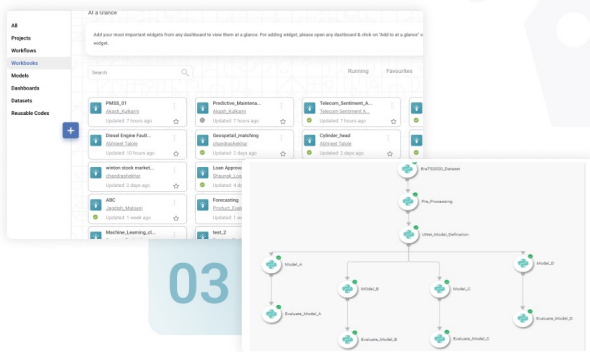## ⇄ Data Connect
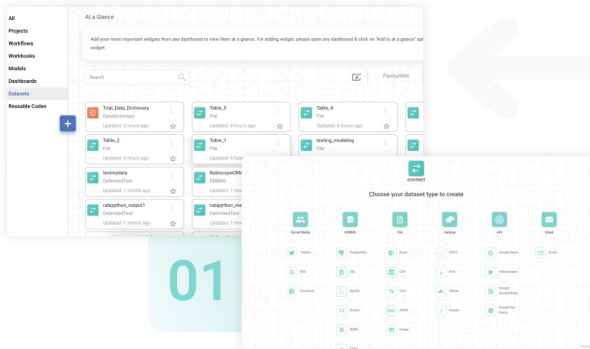
01

Data Source: TumourData

⟨⟩ Metadata Manger

02

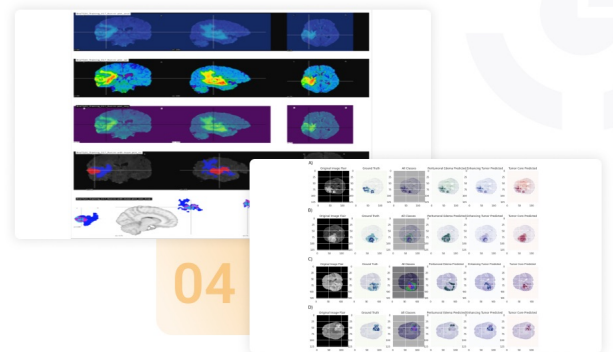Comprehensive Data Operations, encompassing Metadata Management

Model Studio

03

Modeling, encompassing the selection and configuration of models

◎ Visualisation

04

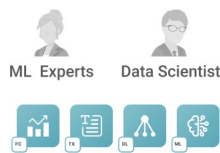Viz Ops, Illustrating The Core Trends And Graphical Representations

Agile Data Science

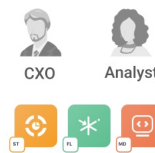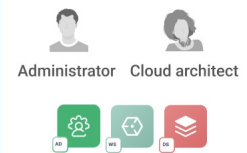Encapsulating **best practices**, tools and **methods**

Data Ops	ML Ops	Viz Ops	Tech Ops
Data Architect Data Manager	ML Experts Data Scientist	CXO Analyst	Administrator Cloud architect

💡 Ideate

- What is the **goal**?
- How can you leverage the **data**?
- What do you want to **predict**?

➡ Acquire

- How is data **sampled**?
- Which data is **relevant**?
- Any data **privacy** issue?

🔍 Explore

- Plot the **data**
- Are there **anomalies**?
- Are there **patterns**?

⬡ Model

- **Build** a model
- **Fit** the model
- **Validate** the model

🖥 Present

- What did we **learn**?
- Do the results make **sense**?
- Can we tell a **story**?

🖳 Deploy

- Where to **Deploy**?
- What is the **Structure** of Pipeline?
- How to **Optimise** and **Scale**?