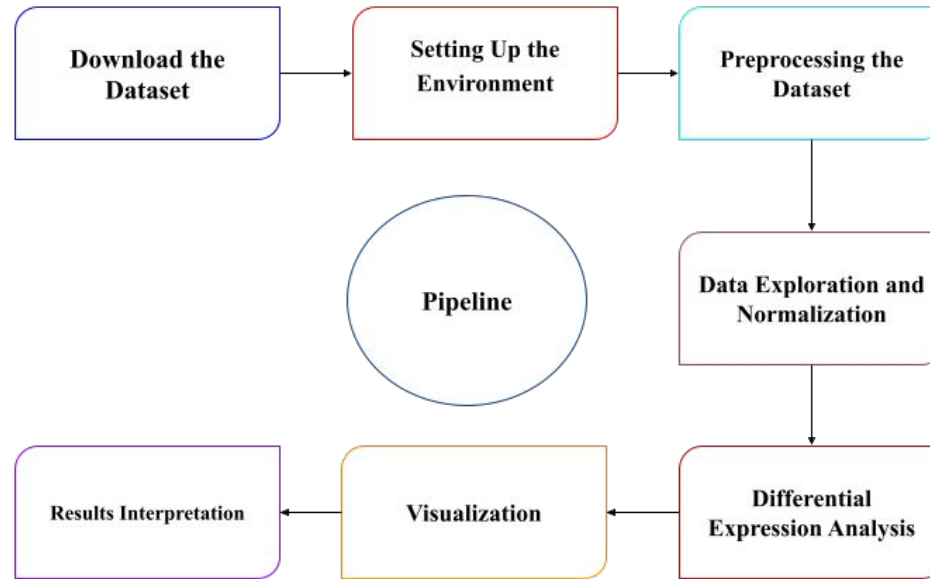


Title: Pipeline for RNA-Seq Data Analysis Using Jupyter and Colab Notebooks

Guidance Under: Prof. Yugandhar and Prof. Balan Ramesh

Centre for Life Sciences, Mahindra University



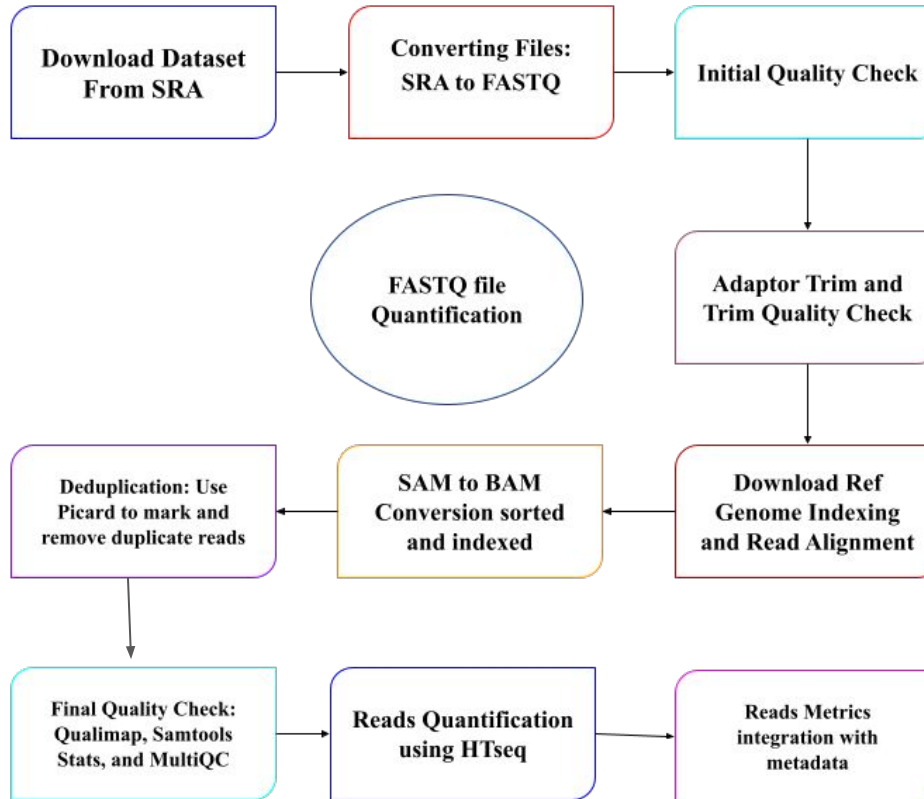
Setting up the environment:

		Libraries
Programming	Python	PyDeseq2 and related modules
Notebook	Jupyter and Google Colab	!pip: installer

Sample information: from SRA

	Sample	SRR_ID	Spots	Bases	Size (Mb)	Published	Instrument	Strategy	Source	Layout
0	Alzheimer's whole brain	SRR087416	14720816	529.9M	362.1	2011-01-05	Illumina Genome Analyzer II	WGS	TRANSCRIPTOMIC	SINGLE
1	Normal brain, temporal lobe	SRR085471	15256752	549.2M	372.8	2011-01-05	Illumina Genome Analyzer II	WGS	TRANSCRIPTOMIC	SINGLE
2	Alzheimer's brain, temporal lobe	SRR085473	14227702	498M	350.2	2011-01-05	Illumina Genome Analyzer II	WGS	TRANSCRIPTOMIC	SINGLE
3	Normal brain, frontal lobe	SRR085474	15772947	552.1M	391.0	2011-01-05	Illumina Genome Analyzer II	WGS	TRANSCRIPTOMIC	SINGLE
4	Alzheimer's brain, frontal lobe	SRR085726	15228832	533M	377.3	2011-01-05	Illumina Genome Analyzer II	WGS	TRANSCRIPTOMIC	SINGLE
5	Normal whole brain	SRR085725	13442077	483.9M	324.0	2011-01-05	Illumina Genome Analyzer II	WGS	TRANSCRIPTOMIC	SINGLE

Quantification:

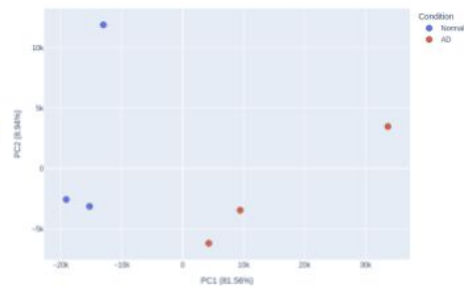


Visualization:

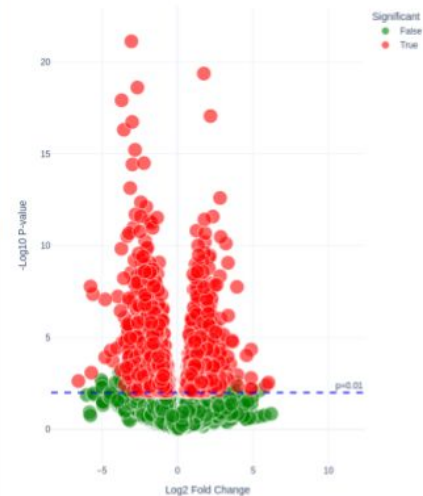
Normalization: Filter
lowly expressed genes
and Normalized
Dataset Creation

Visualization: PCA,
Volcano and Heatmap
Plots

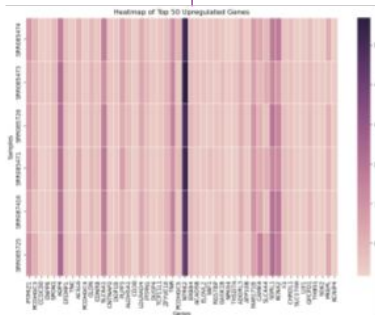
PCA Plot: PC1 (81.56% variance), PC2 (8.94% variance)



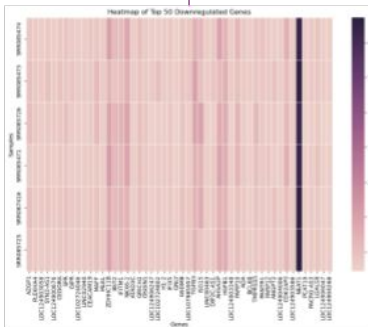
Volcano Plot of Differentially Expressed Genes



Heatmap of Top 50 Upregulated Genes



Heatmap of Top 50 Downregulated Genes



Result Interpretation: Upregulated and Downregulated Genes

Category	Count
Significant Genes	1752
Upregulated Genes	782
Downregulated Genes	970

References:

- Whole Transcriptome Sequencing Reveals Gene Expression and Splicing Differences in Brain Regions Affected by Alzheimer's Disease
- SRA
- Jupyter Notebook
- Google Colab
- python
- SRA
- SRA-TOOLS
- FASTQC
- multiqc
- Qualimap
- Picard
- Cutadapt
- htseq
- bwa