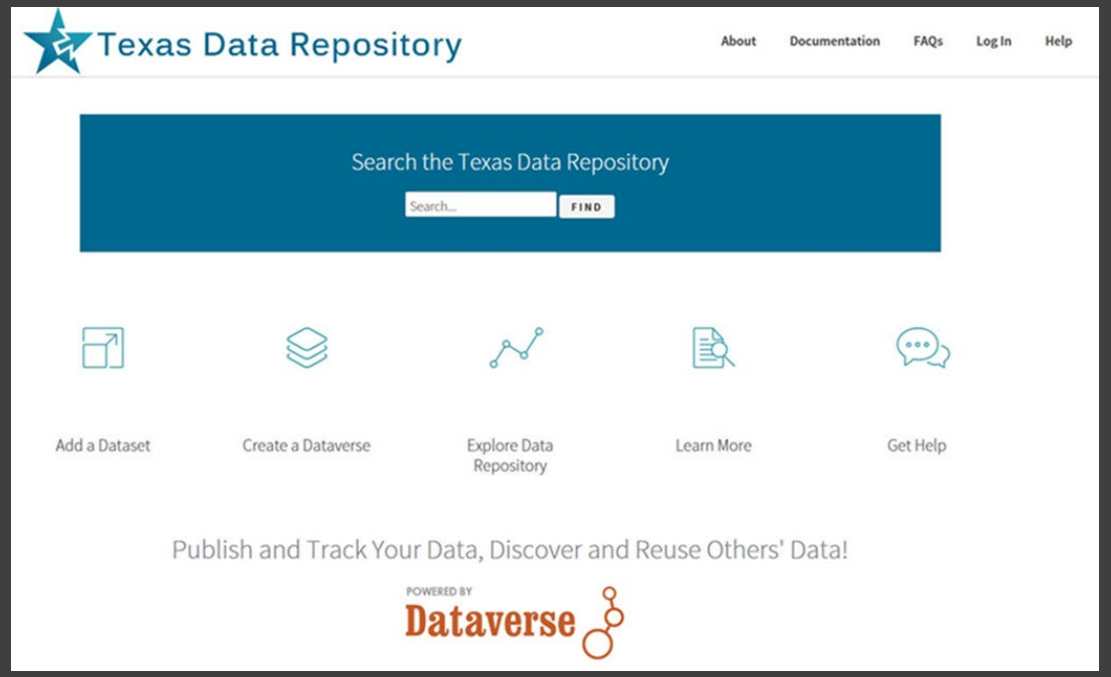
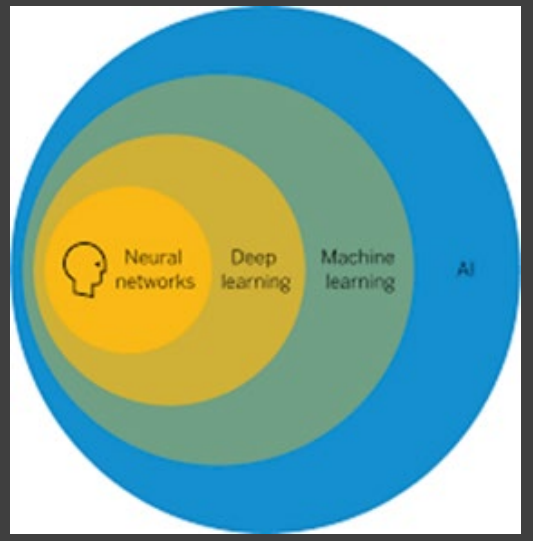
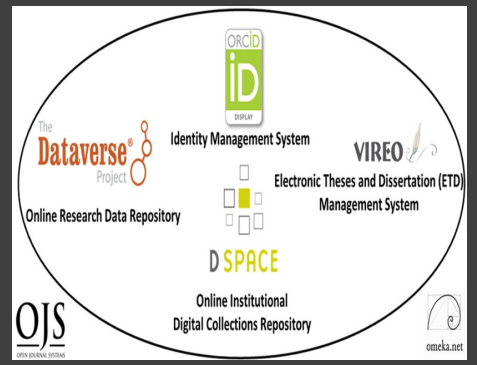
Digital Technology and Innovation in Library Research Services

From **Data and Scholarly Research Ecosystems** to **Artificial Intelligence and Global Discovery**







Session 1: Digital Transformation and Libraries
PCLIPK Library Policy Forum
National Library of Korea, November 3, 2022

Ray Uzwyshyn, Ph.D. MBA MLIS
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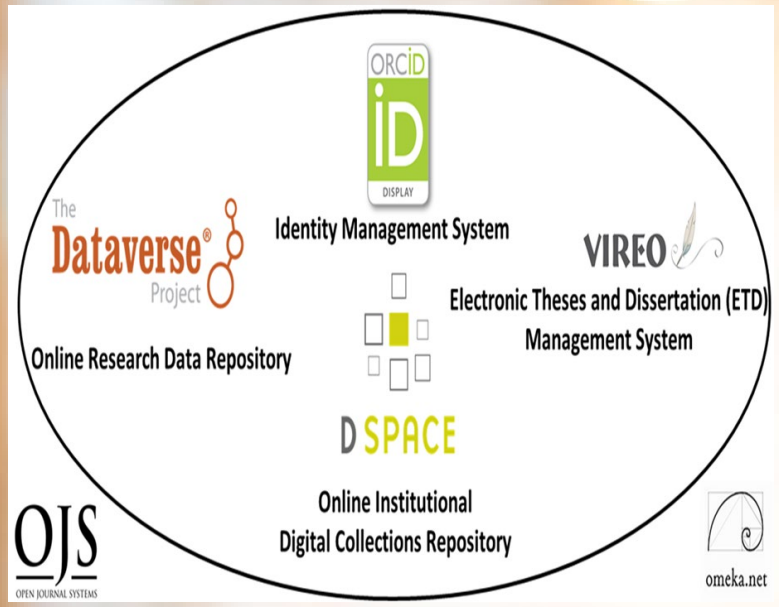
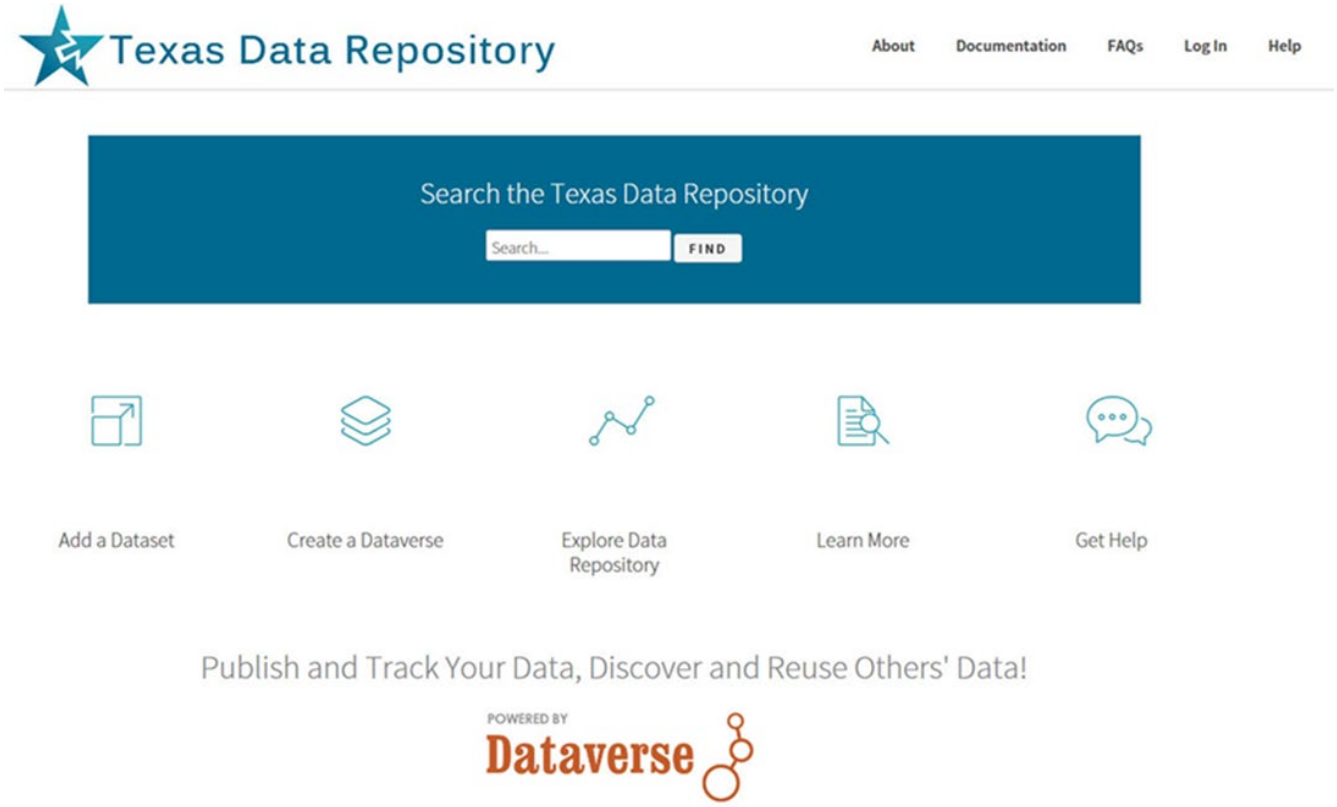
The Physical Library is Transforming From Book Warehouse to Digital Ecosystem

- 90% of Materials Budgets are currently Electronic Resources, e-journals and e-books.
- Digital Literary, Specialized Software and Digital Technologies Are Ushering In New Paradigms
- Data Research Repositories, Scholarly Research Ecosystems and New Artificial Intelligence Models and Infrastructures are Bringing in the new millennia



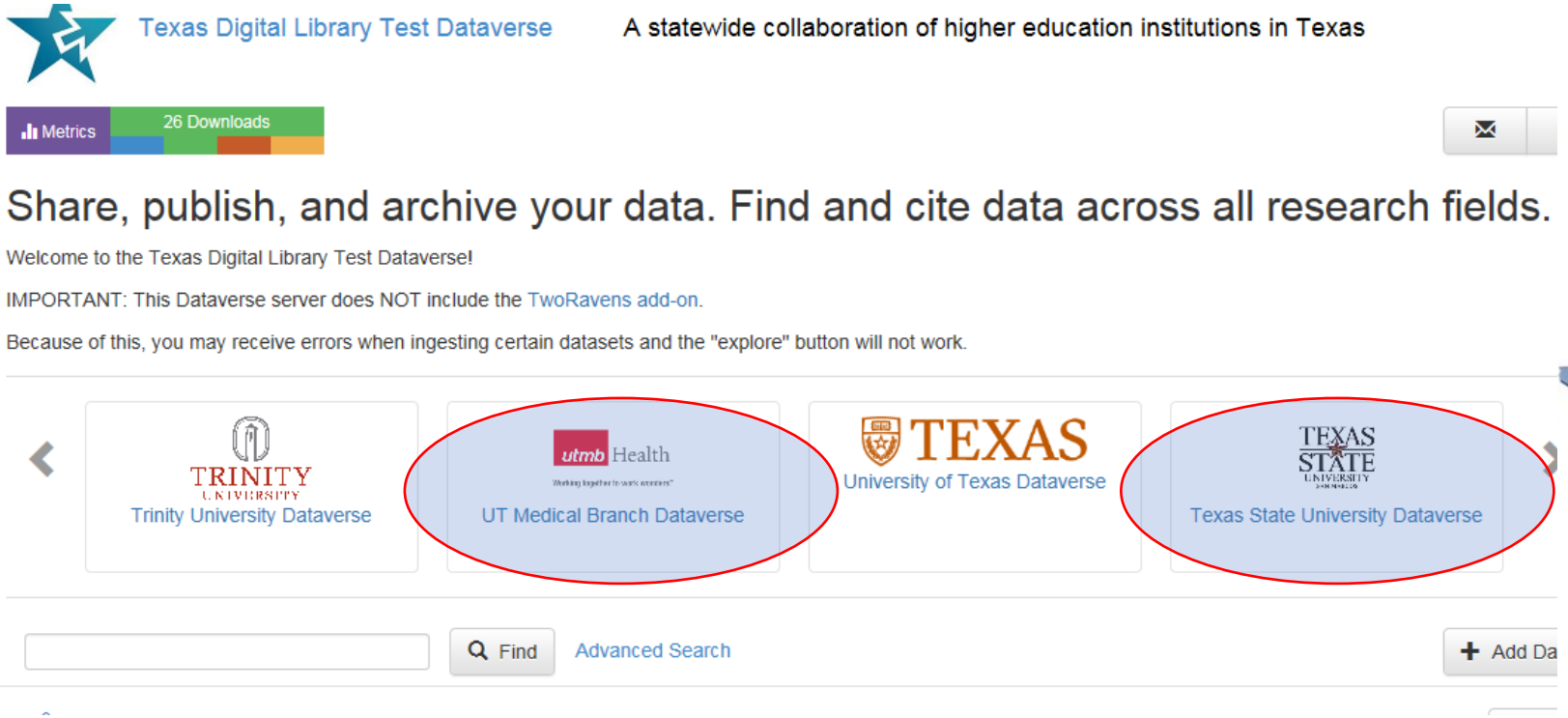
What is an Online Research Data Repository?



https://dataverse.tdl.org/

- Platform to Manage Researcher and Institutions Data/Metadata
- Permalinking Strategy for Data Citation
- Way to Manage Open Access, Funder Compliance and Open Science and Research
- Data Archiving and Sharing Strategy

What Does and Online Research Data Repository Do?



Texas Data Repository which is a shared repository of several Texas Universities leveraging technological cooperation and expertise among academic research libraries libraries, https://dataverse.tdl.org

One Size Does Not Fit All for Various Data Research Repository Project Needs

Many Types of Data Projects (Sizes)

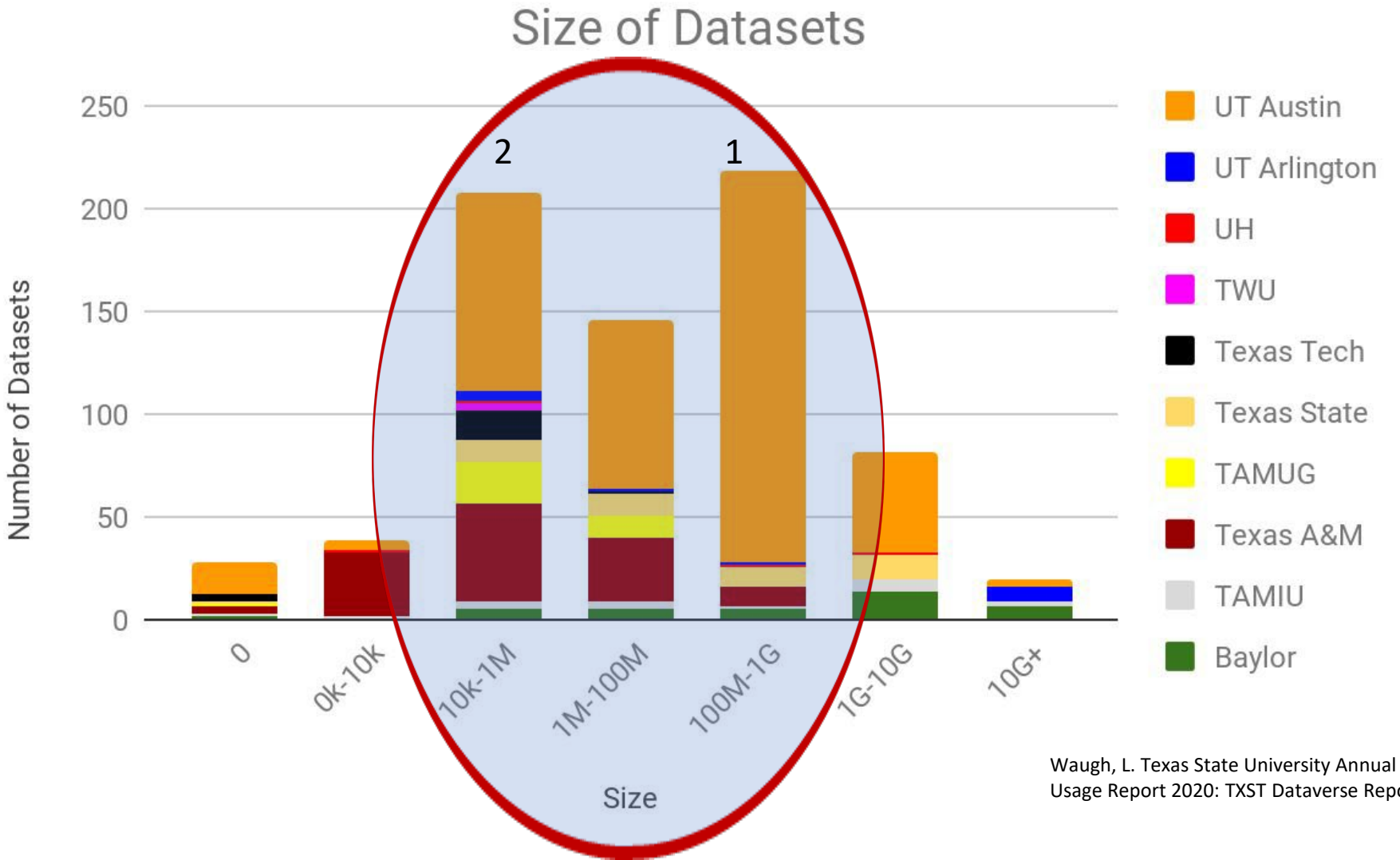
1) Normal range (<4GB Files <10GB Datasets)
Files/Data Fit on Server/Cloud, may be uploaded to the Data Repository, 4GB files, 10GB Datasets)

2) Large Projects, Bigger Data <TB
(Data may require specialized university IT Support, i.e. terabyte/petabyte tape drives, Pointers, Checksums)

3) Huge Projects, Big Data
(Projects require consortial possibilities, national models, **Texas Advanced Computer Center TAAC**, Lyrasis, Duracloud, AWS S3, Custom Solutions)

Present Sizes of Texas Data Repository Datasets

Most 1MB <1GB, Greater than 10 GB+ Rare



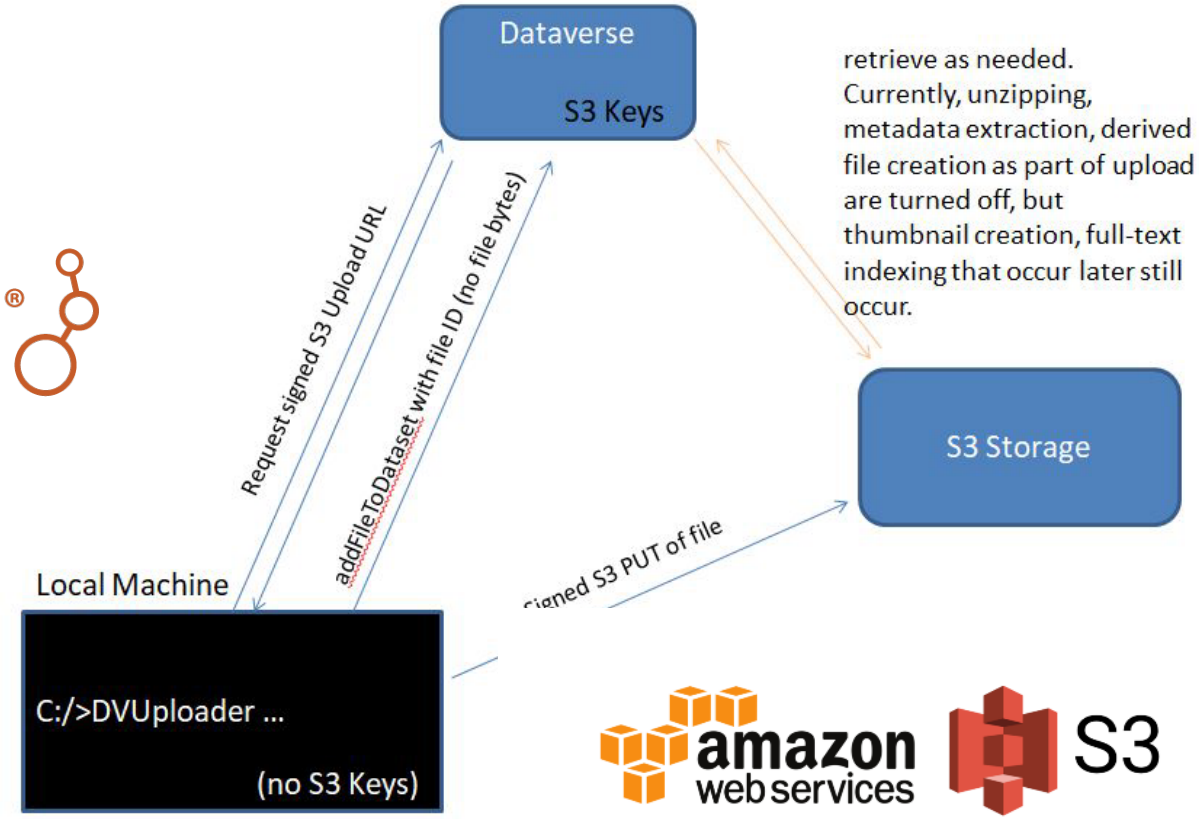
Waugh, L. Texas State University Annual Usage Report 2020: TXST Dataverse Repository. Texas State University

Beta Prototyping Big & Bigger Data Options

2020-2022

DRYAD

The Dataverse® Project

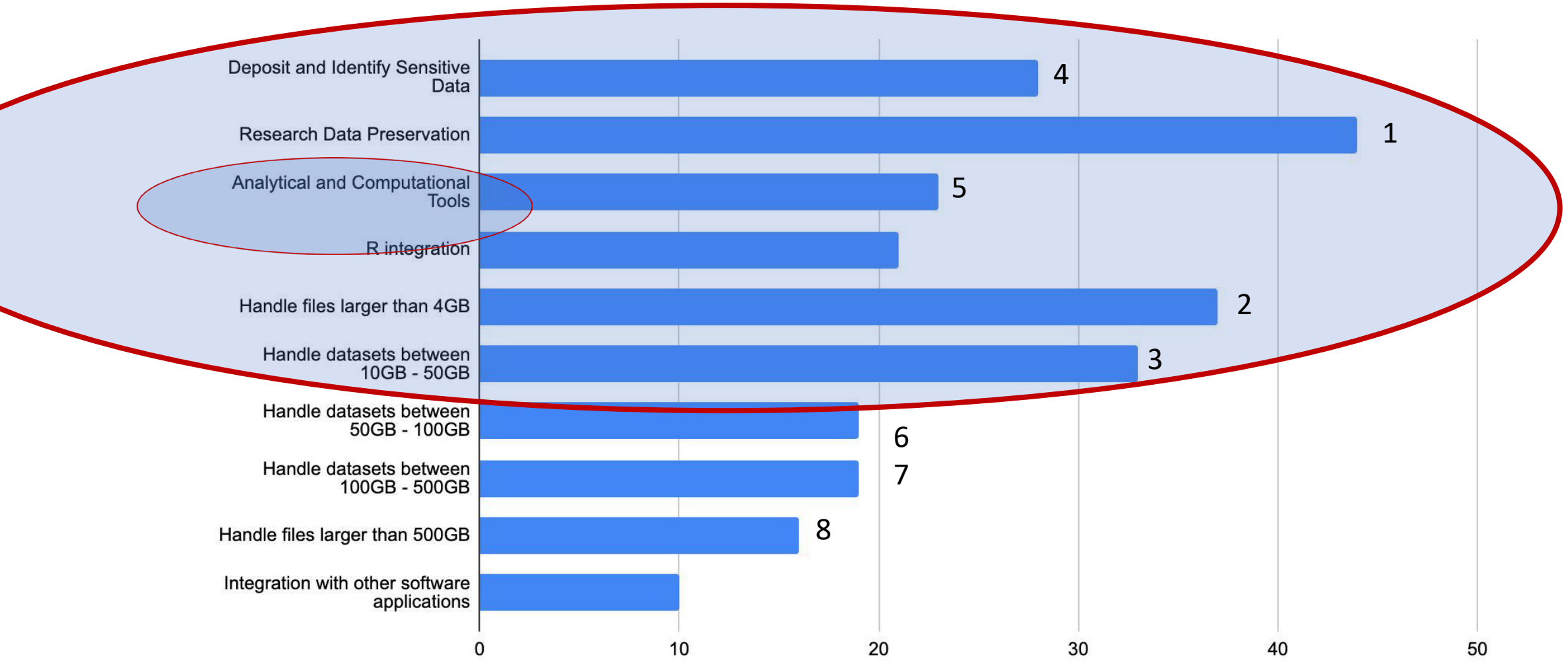


Up to 300 GB/dataset
Fee Based Institutional Model 7.5/13.5 K/Year

TACC
TEXAS ADVANCED COMPUTING CENTER

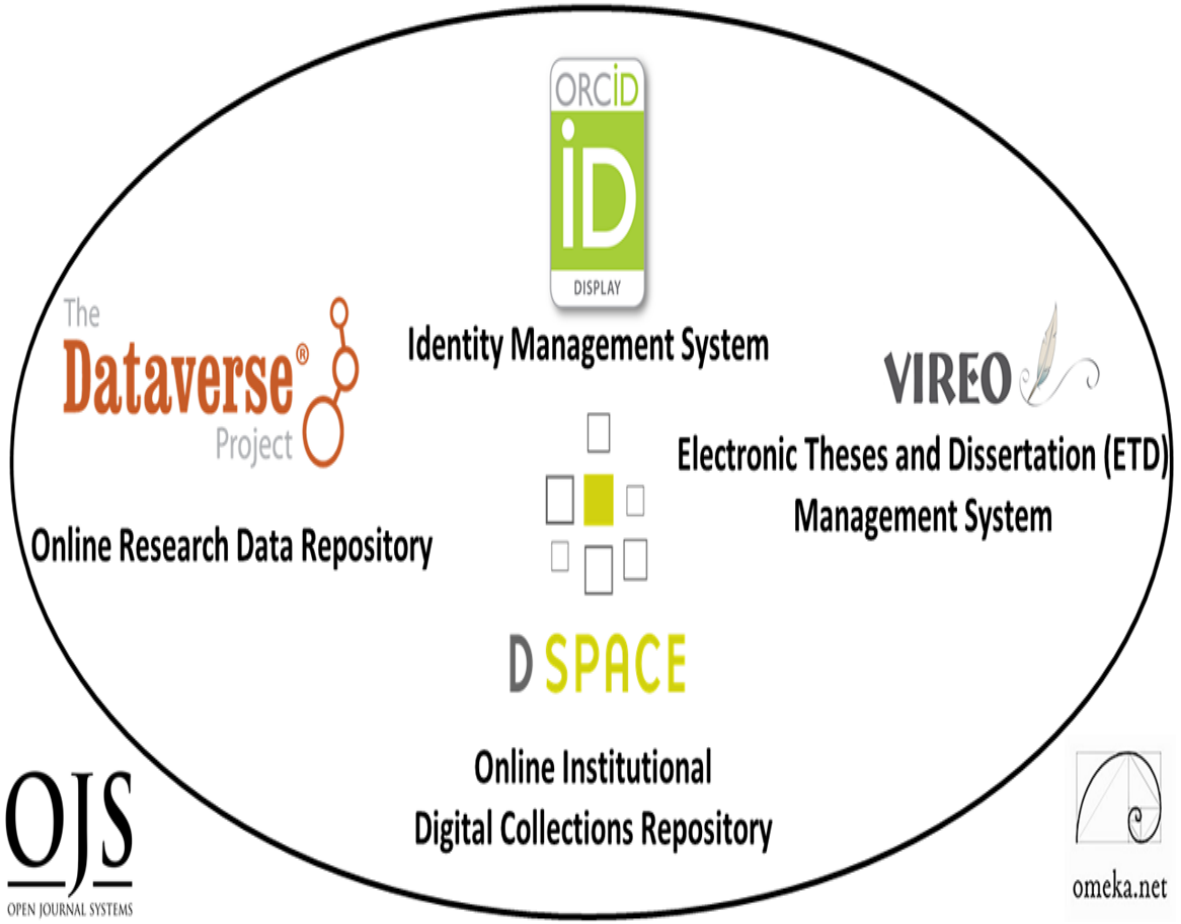
<20 GB Upload
(Download Challenges)

What New Data Repository Features Would Users Like to See in 2022?



Chan- Park, C. and Sare, L. Waugh, S. Results of the Texas Data Repository User Survey, 2022. Texas Conference on Digital Libraries, 2022.

A Data Repository May Also Be Placed Within a Larger Digital Scholarship Research Ecosystem



Digital & Web Services : University Libraries : Texas State University (txstate.edu)

TWO PRIMARY COMPONENTS
(Content)

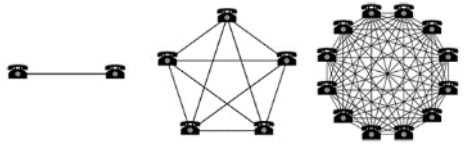
- **RESEARCH DATA REPOSITORY**
- DIGITAL COLLECTIONS REPOSITORY

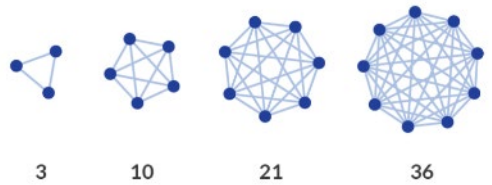
FOUR TERTIARY COMPONENTS
(Communication)

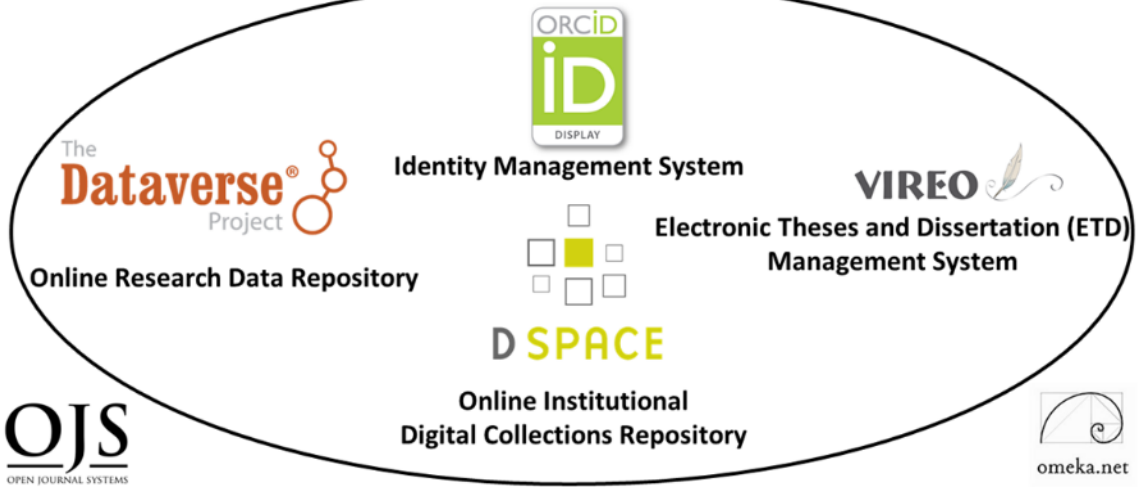
- Electronic Thesis and Dissertation Management System (VIREO)
- Identity Management System (ORCID)
- Open Academic Journal Software (OJS3
- User Interface/Content Management Software (OMEKA)

Collocating Open Source Digital Components in a Networked Research Ecosystem Enables Larger Connections and/or Network Effects

(Sum of Connections Becomes Greater than the Parts)







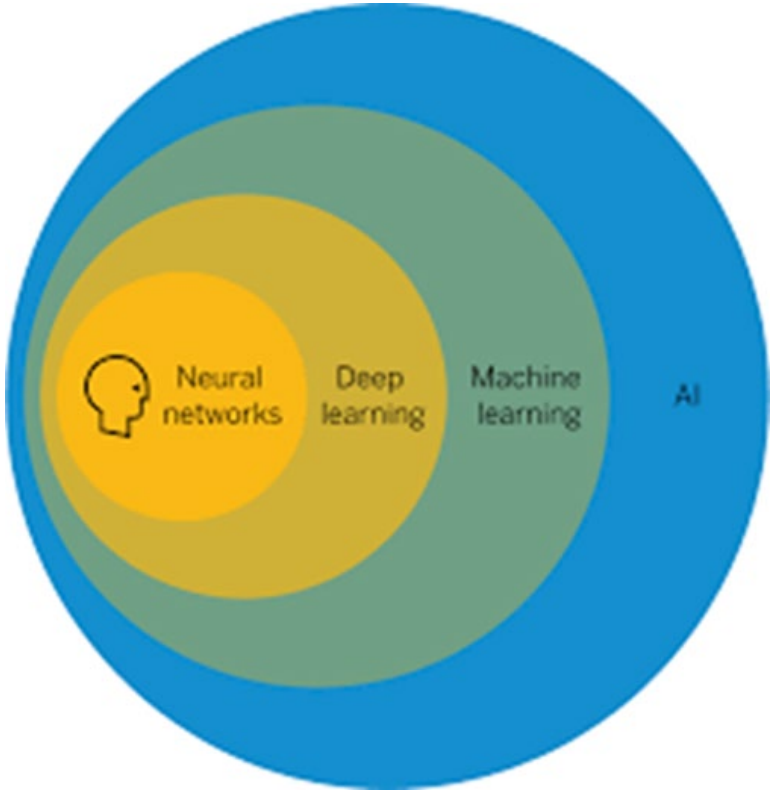
Together These Digital Ecosystem Components Enable the Academic Research Cycle

Faculty
Students
Researchers
Industry

Pragmatic Levels

Last Five Years Has Shown Incredible Progress of, Analytical Computational Tools, Particularly, AI

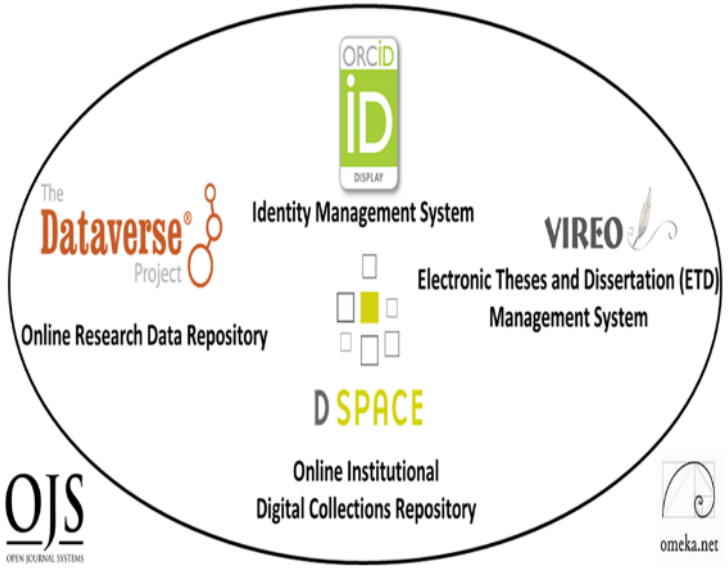
Artificial Intelligence (Machine Learning (Deep Learning)) = Better Algorithms +
Greater Computing Power +
Large Data Sets



Artificial Intelligence Models

- **Computer Vision (Facial/Object Recognition Cancer Cell Detection))**
- Natural Language Processing (Speech to Text, Translation)
- Cybersecurity, Fraud Detection
- Conversational Chatbots & Robotic Agents
- Strategic Reasoning (AlphaGo)

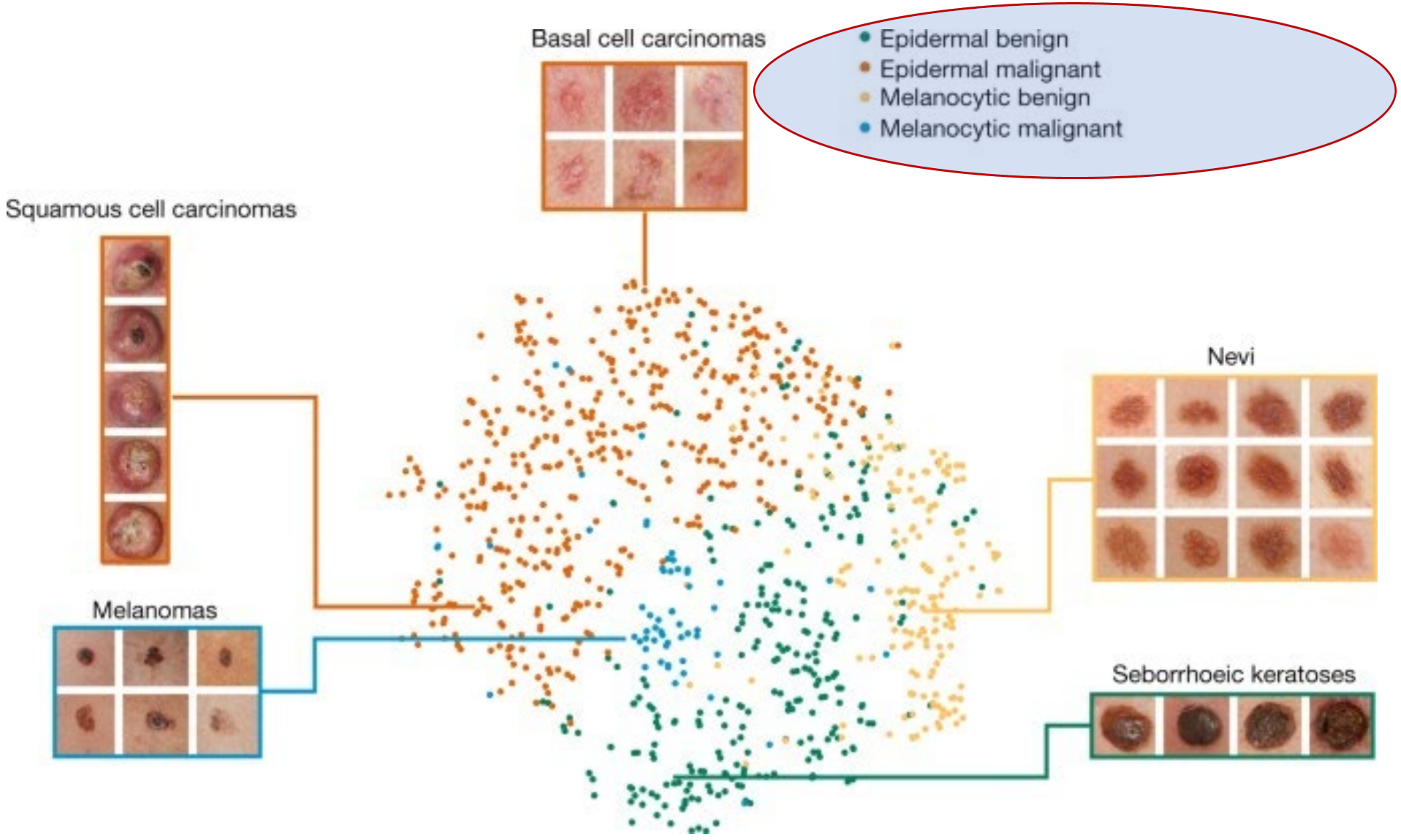
+



New Digital Library Ecosystem Possibilities

Dermatologist-Level Classification of Skin Cancer with Deep Neural Networks

2017, Nature, Esteva, Thrun et Al



[Video Stanford]

Data Research Repository Upload

Open Science Dermatology Image Dataset, Dr. Philip Tschandl, University of Vienna
https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/DBW86T

The HAM10000 dataset, a large collection of multi-source dermatoscopic images of common pigmented skin lesions

Version 3.0

Tschandl, Philipp, 2018, "The HAM10000 dataset, a large collection of multi-source dermatoscopic images of common pigmented skin lesions", https://doi.org/10.7910/DVN/DBW86T, Harvard Dataverse, V3, UNF:6:/APKSsDGVDhwPBWzsStU5A== [fileUNF]

Cite Dataset ▾ Learn about Data Citation Standards.

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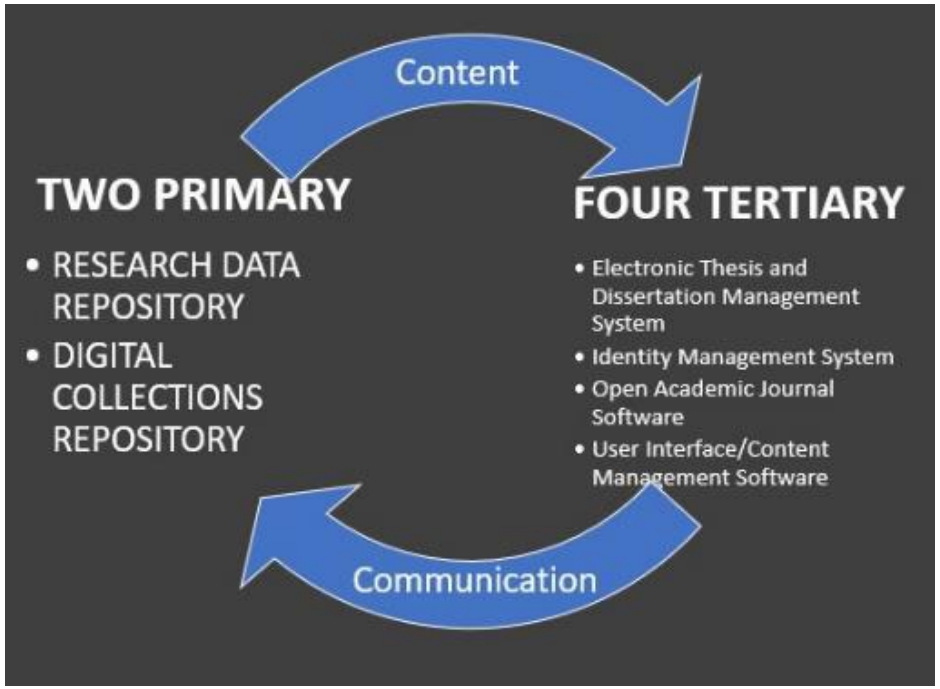
Dataset Metrics

58,334 Downloads

Description

Training of neural networks for automated diagnosis of pigmented skin lesions is hampered by the small size and lack of diversity of available dataset of dermatoscopic images. We tackle this problem by releasing the HAM10000 ("Human Against Machine with 10000 training images") dataset. We collected dermatoscopic images from different populations, acquired and stored by different modalities. The final dataset consists of 10015 dermatoscopic images which can serve as a training set for academic machine learning purposes. Cases include a representative collection of all important diagnostic categories in the realm of pigmented lesions: Actinic keratoses and intraepithelial carcinoma / Bowen's disease (`akiec`), basal cell carcinoma (`bcc`), benign keratosis-like lesions (solar lentigines / seborrheic keratoses and lichen-planus like keratoses, `bkl`), dermatofibroma (`df`), melanoma (`mel`), melanocytic nevi (`nv`) and vascular lesions (angiomas, angiokeratomas, pyogenic granulomas and hemorrhage, `vasc`).



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- List of Figures
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- Model Building and Evaluation by CNN Model using Keras Sequential API
- Model Building and Evaluation using RESNET50
- Model Building and Evaluation using DENSENET121
- Model Building and Evaluation using VGG11
- Conclusion
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An Efficient Deep Learning Approach to Detect Skin Cancer

by

Ashfaqul Islam
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Daiyan Khan
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Rakeen Ashraf Chowdhury
16141014

A thesis submitted to the Department of Computer Science and Engineering
in partial fulfillment of the requirements for the degree of
B.Sc. in Computer Science

Department of Computer Science and Engineering
Brac University

September 2021

The Progress of Knowledge Through Global Open Science & Network Possibilities

2017 Stanford Nature Deep Learning Cancer ID Article

2018 Viennesse Doctor in Austria uploaded Dermatalogical Image Library to **Harvard Dataverse Data repository**

2021 (November) Undergrad Thesis Published in Dspace Repositor BRAC University, Dhaka Bangladesh, Dept. of Computer Science and Engineering

All Downloaded July 2022 Texas, USA for Dublin IFLA Big Data Presentation

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An efficient deep learning approach to detect skin Cancer

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Abstract
Each year, millions of people around the world are affected by cancer. Research shows that the early and accurate diagnosis of cancerous growths can have a major effect on improving mortality rates from cancer. As human diagnosis is prone to error, a deep-learning based computerized diagnostic system should be considered. In our research, we tackled the issues caused by difficulties in diagnosing skin cancer and distinguishing between different types of skin growths, especially without the use of advanced medical equipment and a high level of medical expertise of the diagnosticians. To do so, we have implemented a system that will use a deep-learning approach to be able to detect skin cancer from digital images. This paper discusses the identification of cancer from 7 different types of skin lesions from images using CNN with Keras Sequential API. We have used the publicly available HAM10000 dataset, obtained from the Harvard Dataverse. This dataset contains 10,015 labeled images of skin growths. We applied multiple data pre-processing methods after reading the data and before training our model. For accuracy checks and as a means of comparison we have pre-trained data, using ResNet50, DenseNet121, and VGG11, some well-known transfer learning models. This helps identify better methods of machine-learning application in the field of skin growth classification for skin cancer detection. Our model achieved an accuracy of over 97% in the proper identification of the type of skin growth.

Keywords
Cancer detection; Convolutional neural networks; Image classification; Deep learning

LC Subject Headings
Machine learning; Cognitive learning theory (Deep learning)

Description
This thesis is submitted in partial fulfillment of the requirements for the degree of Bachelor of Science in Computer Science and Engineering, 2021.

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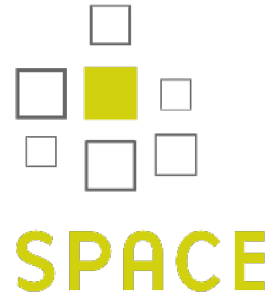

Digital Collections Repository

Dspace http://dspace.bracu.ac.bd/xmlui/handle/10361/15932

BRAC University Libraries Institutional Repository
Chaka Bangladesh

Questions & Comments

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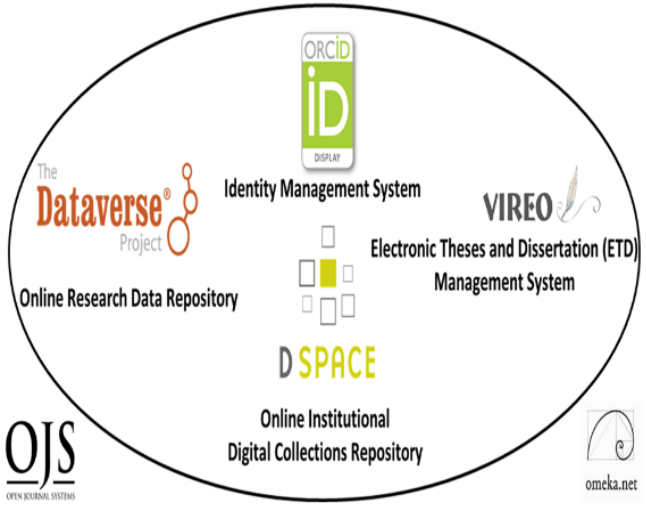

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