LYU2304

PRESENTATION

Collecting, Analyzing, and Curating Virtual Reality Driven Open Source Projects for Research and Developer Community

CAI Yong Jie 1155158879

WEI You Lin 1155157186

Contents

01
Introduction

VIRTUAL REALITY (VR) IS A TECHNOLOGY EMPLOYING POSE TRACKING AND 3D DISPLAYS, ENABLING USERS TO ENGAGE IN AN IMMERSIVE EXPERIENCE.

VR GAME

Data Visualization

VR Education

01 Introduction

VR once garnered significant interest from both developers and investors.

Oculus

Facebook acquired Oculus for $2bn 2014

Sony

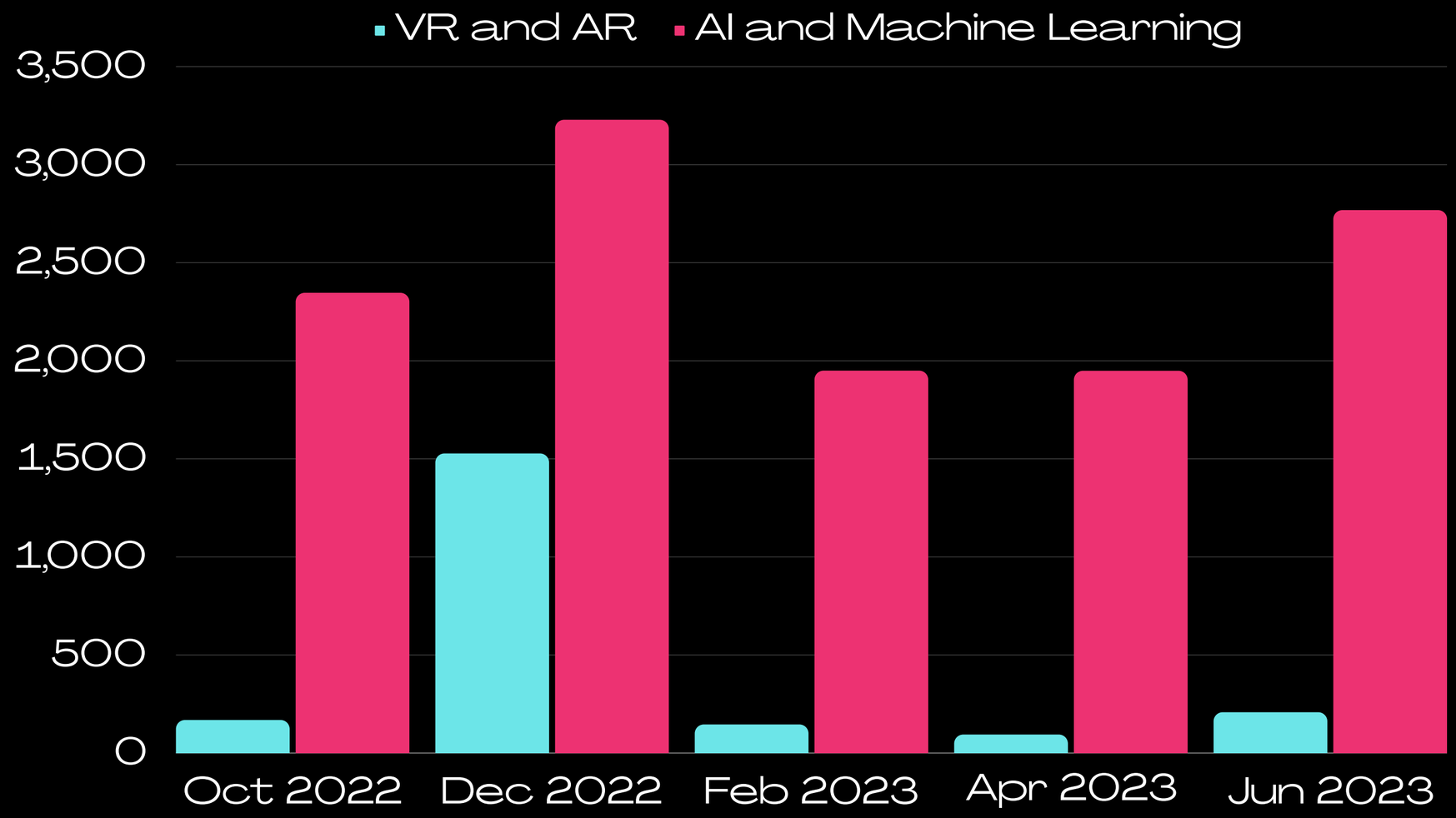
Sony announced that it had sold more than four million PSVR headsets 2019

Apple

Apple unveiled Apple Vision Pro 2023

02 Motivation

Virtual Reality once successfully attracted many developers' interest and investors' investment. However, its peak has passed, AR and VR funding is eclipsed by investments in other fields such as AI and Machine Learning.



Motivation

What might caused the decline in people’s interest in VR?

- **Buggy VR Application**

- **Motion Sickness**

- **Poor Optimization**

Motivation

We decided to establish a database for developers to utilize.

Debugging

Tool Building

Optimization

03 Methodology-Data Collection

We scanned open-source projects with VR/XR in their descriptions.

GitHub REST API

03 Methodology-Data Collection

By sending a query request via the API, we obtain a JSON file that contains important information.

```
base_url = (
    f"https://api.github.com/search/repositories?q={keyword}+in:name,description,readme,topics+stars:"
    f"{n}+pushed:{since}..{until}&per_page=100"
)
```

03 Methodology-Data Collection

By sending a query request via the API, we obtain a JSON file that contains important information.


```
"created_at": "2015-10-28T11:53:40Z",
"updated_at": "2023-11-24T19:19:10Z",
"pushed_at": "2020-03-05T13:53:43Z",
"git_url": "git://github.com/omgmog/uxofvr.com.git",
"ssh_url": "git@github.com:omgmog/uxofvr.com.git",
"clone_url": "https://github.com/omgmog/uxofvr.com.git",
"svn_url": "https://github.com/omgmog/uxofvr.com",
"homepage": "https://www.uxofvr.com",
"size": 432,
"stargazers_count": 535,
"watchers_count": 535,
"language": "HTML",
"has_issues": false,
"has_projects": false,
"has_downloads": true,
"has_wiki": false,
"has_pages": false,
"has_discussions": false,
"forks_count": 67,
"mirror_url": null,
"archived": true,
"disabled": false,
"open_issues_count": 13,
"license": null,
"allow_forking": true,
"is_template": false,
"web_commit_signoff_required": false,
"topics": [
  "design",
  "list",
  "rift",
  "ui",
  "ux",
  "virtual-reality",
  "vive",
  "vr"
],
"visibility": "public",
"forks": 67,
```

Methodology-Data Collection

The attributes we are concerned about

```
        if(item.get("stargazers_count") >= 10):
            author_name = item.get("owner").get("login")
            repo_name = item.get("full_name")
            html_url = item.get("html_url")
            updated_at = item.get("updated_at")
            created_at = item.get("created_at")
            pushed_at = item.get("pushed_at")
            author_names.append(author_name)
            repo_names.append(repo_name)
            html_urls.append(html_url)
            updated_ats.append(updated_at)
            created_ats.append(created_at)
            pushed_ats.append(pushed_at)
            stars_count = item.get("stargazers_count")
            stars_counts.append(stars_count)
            forks_count = item.get("forks_count")
            forks_counts.append(forks_count)
```

Methodology-Data Collection

Virtual Reality (VR)

Extended Reality (XR)

Methodology-Data Cleansing

We conducted a manual inspection on the data to exclude projects that are not related to VR and classify the projects.

- **Related to VR or not**

Contains codes or not

Archived or not

Methodology-Data Classification

During the manual inspection procedure, we labelled each project based on its functionality.

Application

Framework

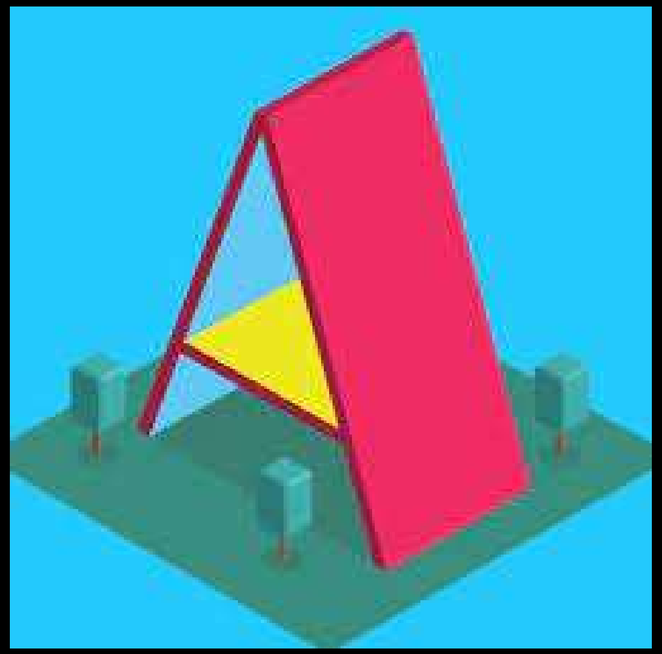
Asset

...

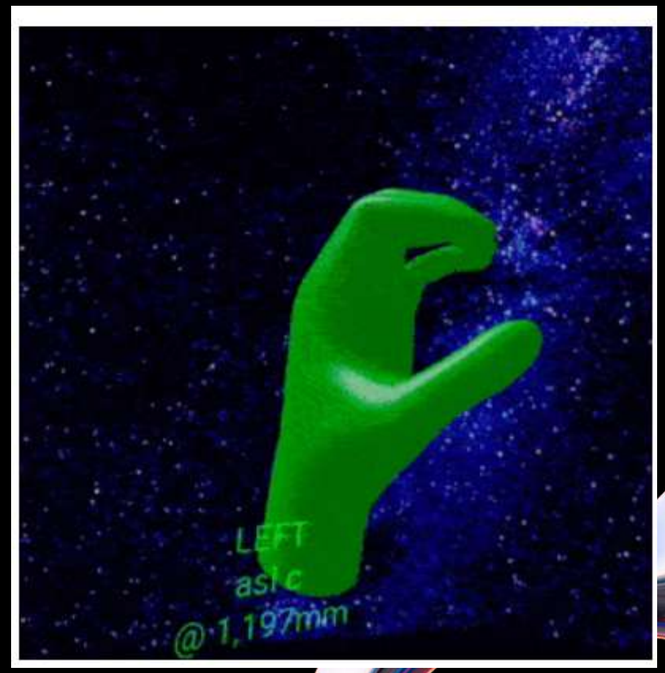
Methodology-Data Classification

Application

Framework



Asset



Methodology-Data Storage

We uploaded the data to a remote server, and the total size of the data reached up to 411 gigabytes.

```
(base) ylwei1@proj64:/data/project/ylwei$ du -sh github_repos
423G    github_repos
```

04 Results and Findings

Key statistics and insights trained from the repository analysis

- "Selected 1,447 Virtual Reality (VR) related Github projects from 4,423 after four rounds of screening and classification.
- Categorized these projects into 122 file types based on our classification standards.
- Created a tree diagram for each category, along with the code and tools used.

Our dataset classification results

We use **Notion** to create tree diagrams and categorize **each parent class in detail.**

```
graph TD
  Repo(Repositories) --> Documentation(Documentation)
  Documentation(Documentation) --> Other_Doc(Other Documentation)
  Repo(Repositories) --> Specification(Specification)
      Specification(Specification) --> SpecificationC(Specification Collection)
      Specification(Specification) --> APIRe(API, Registry)
      Specification(Specification) --> Other_spec(Other Specification)
  Repo(Repositories) --> Hardware_Introduction(Hardware Introduction)
```

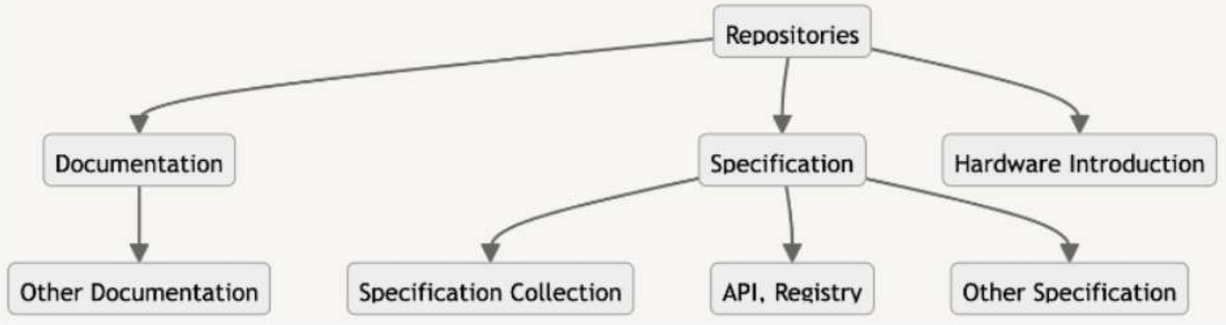
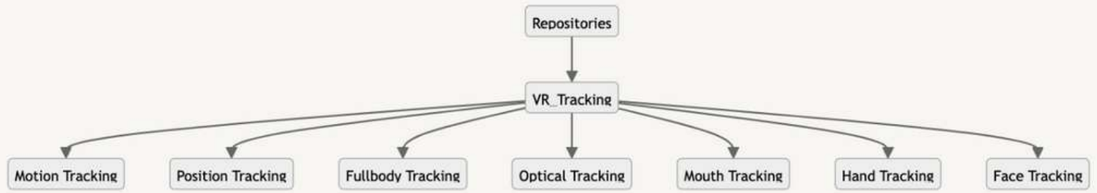


Figure 13: Documentation, Specification, Hardware Introduction

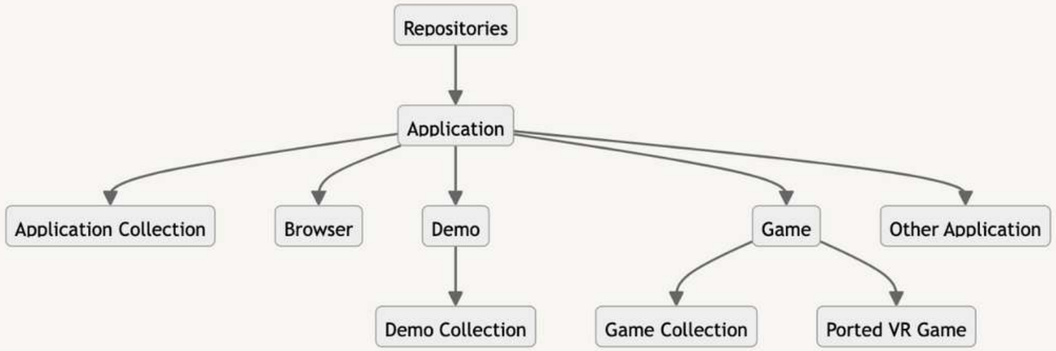
```
graph TD
   Repo(Repositories) --> VR_Track(VR_Tracking)
      VR_Track(VR_Tracking) --> Motion_T(Motion Tracking)
      VR_Track(VR_Tracking) --> Position_T(Position Tracking)
      VR_Track(VR_Tracking) --> Fullbody_T(Fullbody Tracking)
      VR_Track(VR_Tracking) --> Optical_T(Optical Tracking)
      VR_Track(VR_Tracking) --> Mouth_Tracking(Mouth Tracking)
      VR_Track(VR_Tracking) --> Hand_Tracking(Hand Tracking)
      VR_Track(VR_Tracking) --> Face_Tracking(Face Tracking)
```



Tracking

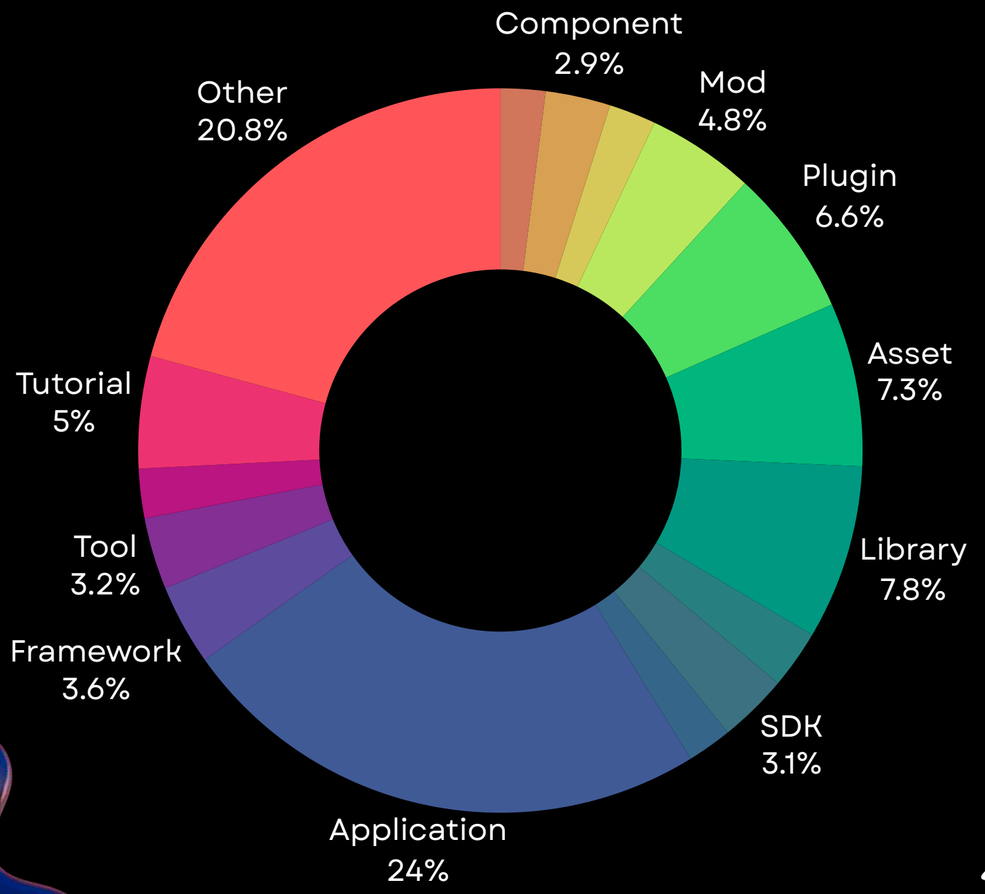
20

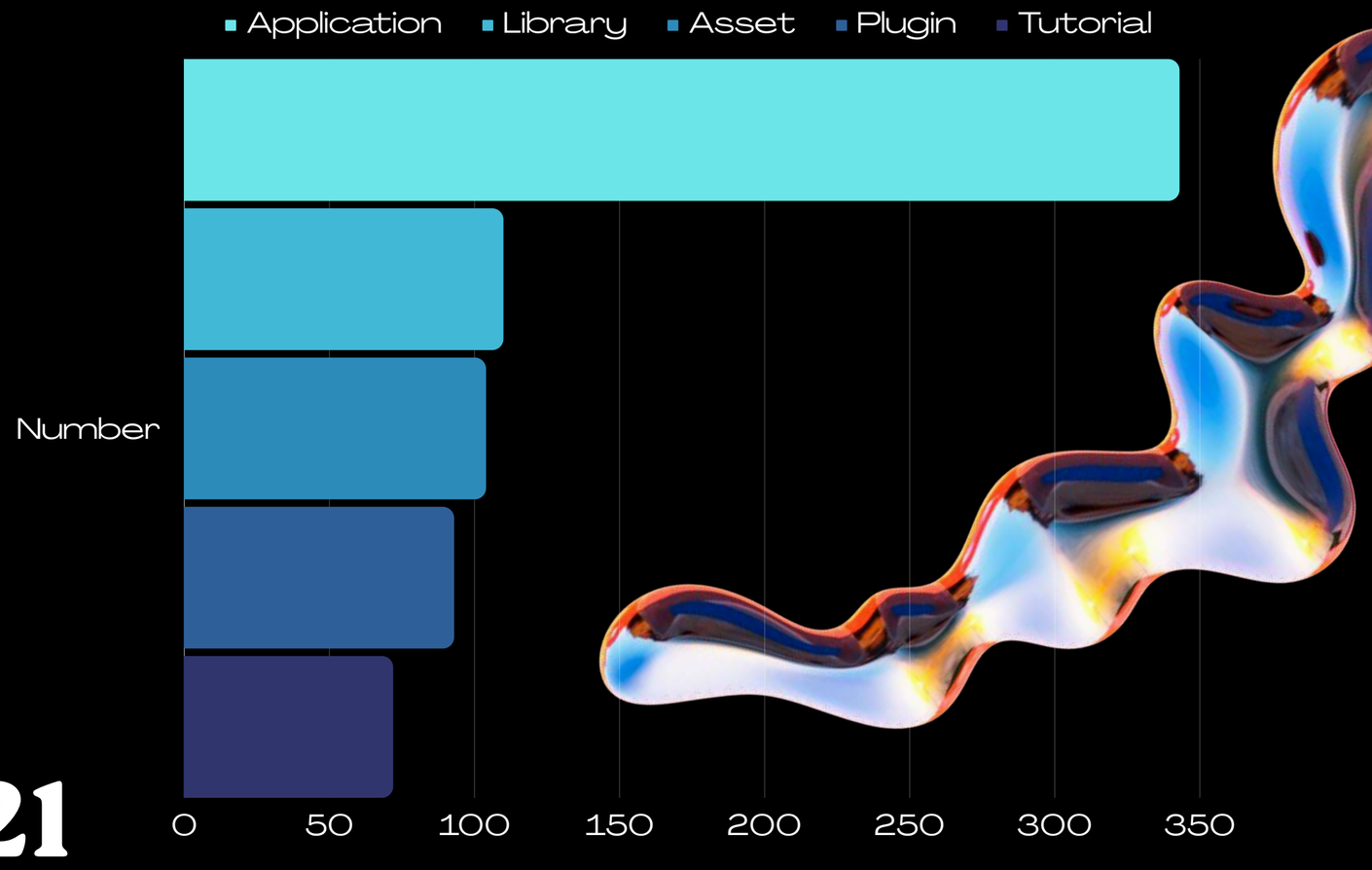
```
graph TD
Repo(Repositories) --> App(Application)
    App(Application) --> Appc(Application Collection)
    App(Application) --> Browser(Browser)

    App(Application) --> Demo(Demo)
          Demo(Demo) --> DemoC(Demo Collection)


    App(Application) --> Game(Game)
          Game(Game) --> Gamec(Game Collection)
          Game(Game) --> VR_Game_Port(Ported VR Game)

    App(Application) --> Other_Application(Other Application)
```



Application

Overview of the different categories and their distribution within the dataset





5 different categories

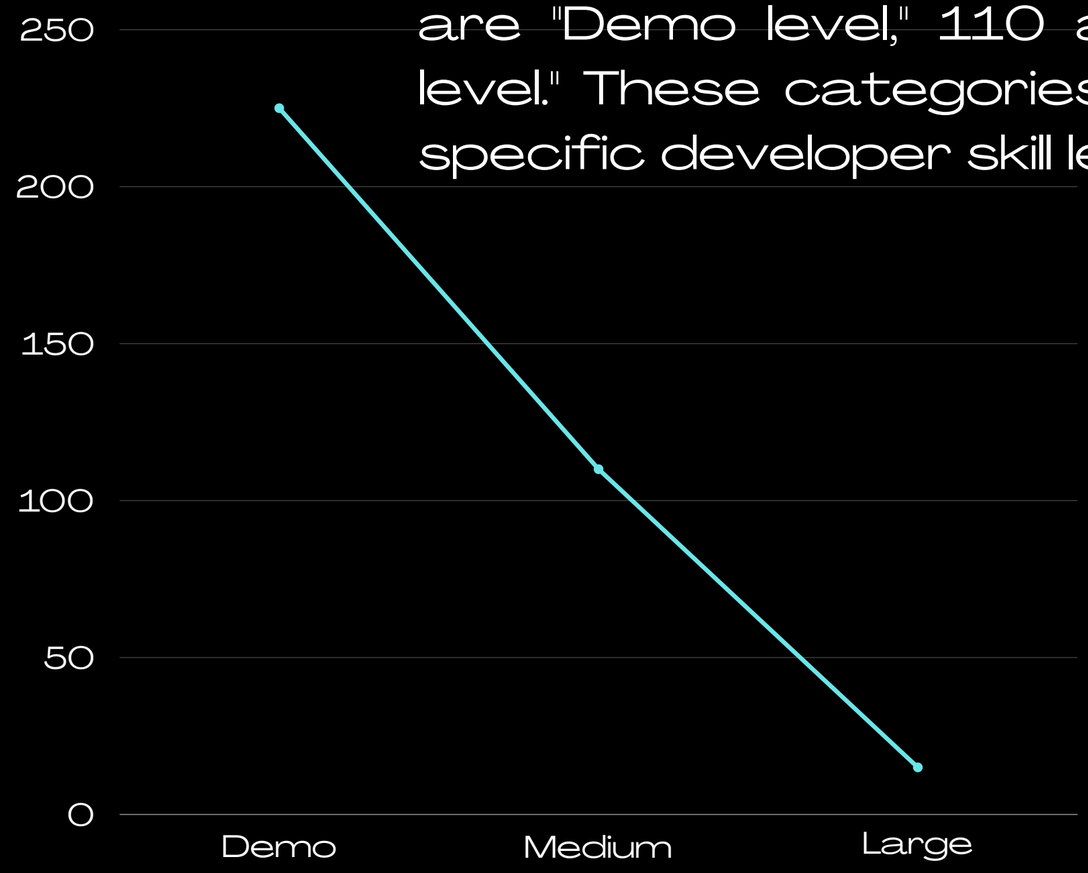
- Among the **1428** VR repository projects analyzed, the majority of them (**343 projects**) fall under the "**Application**" category.

- The "**Library**" and "**Asset**" categories have relatively lower numbers, with **110** and **104** projects respectively.

- The presence of **93** projects in the "**Plugin**" category and **72** projects in the "**Tutorial**" category.

Repository Classification by Size 23

Projects are divided into three categories based on size. 225 are "Demo level," 110 are "Medium level," and 15 are "Large level." These categories allow the projects to be tailored to specific developer skill levels and project requirements.



05 Demonstration of the demo created to showcase the dataset

04/01

Enhancing Dataset Exploration with a User-Friendly Interface

Object

- Develop a user-friendly interface for efficient dataset exploration
- Intuitive and efficient way to search and explore content
- Filter repositories based on specific categories
- Find the most relevant resources for specific requirements

Target audience

- Developers, researchers, and VR enthusiasts
- Platform offers a wealth of resources for VR-related projects
- Empowers users to discover and utilize valuable code and tools

Function 1: Database search with fuzzy search support

Searching for "app" returns all related repositories
Automatic download of associated repositories in a .txt file

Function 2: Uploading a text file exported from the search function (doing)

Assists in accessing corresponding GitHub files
Retrieves and returns description files to the user

https://sites.google.com/view/vr-open-source-dataset/home

2023 VR Open-source Projects on GitHub

hiltosan/GearVRI-docs	https://github.com/hiltosan/GearVR						Documentation
eggheadio-projects/vr-applications-us	https://github.com/eggheadio-proje	☑	☑	☑	☐	☐	Tutorial
NeVRo-study/NeVRo	https://github.com/NeVRo-study/N	☑	☑	☑	☐	☐	
Unity-Technologies/xr.sdk.validation.ir	https://github.com/Unity-Technolog	☑	☑	☑	☐	☑	Test (Tool)
cassiebreviu/Build-First-Web-VR-Gam	https://github.com/cassiebreviu/Bu	☑	☑	☑	☑	☑	Tutorial
JanLoehr/XR-Interaction-Toolkit_Exte	https://github.com/JanLoehr/XR-In	☑	☑	☑	☐	☑	Library
sariug/mpfluid_cave_frontend	https://github.com/sariug/mpfluid_	☑	☑	☑	☐	☑	Application with missing part
NicolasAubinet/virtual-rock-galactic	https://github.com/NicolasAubinet/	☑	☑	☑	☐	☑	Mod
grodno-vr/grodno-vr.github.io	https://github.com/grodno-vr/grodn	☑	☑	☑	☑	☑	Application
calmery/vrchat	https://github.com/calmery/vrchat	☑	☑	☑	☐	☑	Library
AndreZenner/hand-redirection-toolkit	https://github.com/AndreZenner/ha	☑	☑	☑	☐	☑	Toolkit
nebriv/VTOLVR-TacviewLogger	https://github.com/nebriv/VTOLVR-	☑	☑	☑	☐	☑	Mod
Raicuparta/unity-vr-patcher	https://github.com/Raicuparta/unity	☑	☑	☑	☐	☑	Patch
sbsce/cyubeVR-VoxelAPI-Modding	https://github.com/sbsce/cyubeVR	☑	☑	☑	☐	☑	Library
garytyler/cineplane	https://github.com/garytyler/cinepla	☑	☑	☑	☐	☑	Application
Bluscream/VRChatLauncher	https://github.com/Bluscream/VRC	☑	☑	☑	☐	☑	Application

Sheet1 Sheet2 check_list v3-new-projects updated_v3-new-projects 一起要看的 v4_projects v5_projects（可修改，新增notion父类页和notion子类页） v3-original-projects v2-W

Data Sheet

GitHub Repository Search

Enter a category: app Search

Results:

- **Name:** rudrajikadra/virtual-reality-tour-unity-3d-world-tour
  URL: https://github.com/rudrajikadra/Virtual-Reality-Tour-Unity-3D-World-Tour
- **Name:** c-through/xr-urpfader
  URL: https://github.com/C-Through/XR-URPFader
- **Name:** lvxin-keynes/play2vr
  URL: https://github.com/lvxin-keynes/play2vr
- **Name:** eggheadio-projects/vr-applications-using-react-360
  URL: https://github.com/eggheadio-projects/vr-applications-using-react-360
- **Name:** sariug/mpfluid_cave_frontend
  URL: https://github.com/sariug/mpfluid_cave_frontend
- **Name:** grodno-vr/grodno-vr.github.io
  URL: https://github.com/grodno-vr/grodno-vr.github.io

search function

Application of output file

Developers can use the output text file generated by this function to write crawler scripts that can navigate down the GitHub links and retrieve **code or readme files**, which can be used for **testing or learning purposes.** However, we could only create tools for searching this semester due to time constraints. These tools are intended to help developers stay updated with the latest knowledge in the VR field.

06 FUTURE WORK

EXPLORATION OF POTENTIAL DIRECTIONS FOR FUTURE RESEARCH AND DEVELOPMENT

The code, demonstrations, and applications found in our dataset are highly valuable for learning and understanding VR development and technologies.

Dataset could offer **researchers and scholars detailed information** about VR technology and applications.

we **encourage the community** to collaborate with us and actively use and contribute to our dataset.

Future Work

Our primary future objectives involve the development of **testing tools** based on the dataset assembled in this study

Objective: Development of **testing tools** based on the VR dataset

Purpose: Aid developers in identifying and resolving common issues

Benefits of the testing tool:

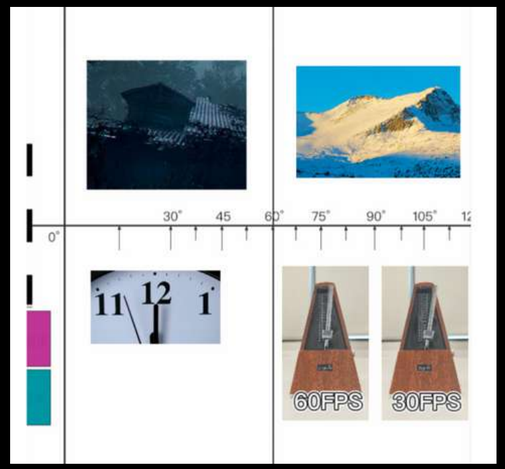
- Streamlining the debugging process
- Increasing overall development efficiency

The shortcomings of the existing VR field and what our dataset can do

- High-quality VR datasets can **improve graphics in virtual reality.** These datasets capture real-world scenes, allowing developers to enhance textures, lighting, and physics simulations for a more realistic virtual experience.

- **Utilizing audio recordings** from VR datasets aids in advancing spatial audio technology for immersive experiences through accurate sound localization, feedback, and environmental effects.

- VR datasets provide tracking data that helps developers **create more natural hand-tracking and gesture-recognition algorithms,** resulting in a better VR experience.



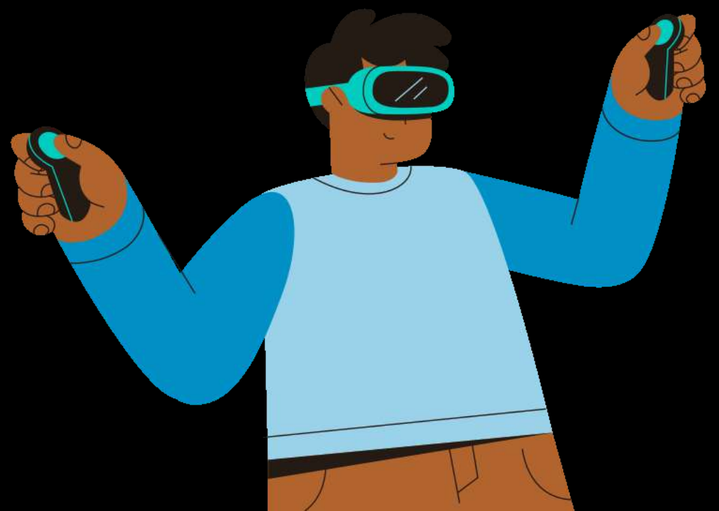
Repo Full Name	Repo Link	Type (Application, Library, Framewor	Scale (La	Deployed	Archived	Remarks	Created a	Pushed at	Updated	Stars	Fork
oculus-samples/Unity-Movement	https://github.com/oculus-samples/U	Tracking					2022-11-0	2023-06-2	2023-06-2	160	28
MerlinVR/PlayspaceTracking	https://github.com/MerlinVR/Playspa	Position Tracking					2021-07-1	2021-07-1	2023-05-1	16	0
ChristophGeske/ARCoreInsideOutTrackin	https://github.com/ChristophGeske/A	Position Tracking					2018-01-2	2022-01-0	2023-06-2	186	27
ju1ce/April-Tag-VR-FullBody-Tracker	https://github.com/ju1ce/April-Tag-V	Tracking					2020-10-2	2023-03-0	2023-06-1	818	51
SummerSigh/ProjectBabble	https://github.com/SummerSigh/Proj	Mouth Tracking					2022-07-0	2023-06-2	2023-06-2	59	6
CatCuddler/BodyTracking	https://github.com/CatCuddler/Body	Motion Tracking					2017-03-2	2021-05-1	2023-01-0	18	16
korinVR/VRGestureRecognizer	https://github.com/korinVR/VRGestu	Motion Tracking					2013-12-1	2021-09-0	2022-10-0	29	7
getnamo/VRArmIK-ue4	https://github.com/getnamo/VRArmI	Hand Tracking	Demo				2019-02-0	2020-04-0	2023-01-0	11	2
jorgejgnz/HandTrackingPack-HapticFeedt	https://github.com/jorgejgnz/HandTr	Hand Tracking					2020-03-0	2020-03-2	2023-03-2	59	13
TebogoNakampe/XRDriveSim	https://github.com/TebogoNakampe/	Hand Tracking					2018-12-0	2020-07-2	2021-01-1	11	6
ju1ce/Mediapipe-VR-Fullbody-Tracking	https://github.com/ju1ce/Mediapipe	Fullbody Tracking					2021-06-2	2023-05-1	2023-06-2	304	31
maceq687/FullBodyPoseEstimation	https://github.com/maceq687/FullBo	Fullbody Tracking					2022-03-2	2022-12-0	2023-06-2	57	6
MochiDoesVR/Caramel-For-VRChat	https://github.com/MochiDoesVR/Ca	Fullbody Tracking					2022-12-0	2022-12-1	2023-06-1	10	1
Adjerry91/VRCFaceTracking-Templates	https://github.com/Adjerry91/VRCFa	Face Tracking					2021-12-0	2023-06-0	2023-06-2	50	0

Figure 38: Tracking Data

The shortcomings of the existing VR field and what our dataset can do

- VR datasets are a **valuable reference for content creators and developers.** Our dataset provides insights into real-world scenes and elements captured in virtual reality, **helping to design and develop immersive VR content with enhanced visual quality and realism.**

- **VR datasets help improve cross-platform adaptation and compatibility in VR. These provide insights into device characteristics, enabling developers to adjust software for better performance and user experience on different platforms.**



Integration of LLM (Large Language Model) technology into VR dataset

Utilizing **OpenAI fine-tuning API** for training the **ChatGPT3.5-turbo-1106** model
Techniques such as prompt engineering and prompt chaining for training.
Training process underway, main focus for the next semester

Goal:

- Create a **conversational interface** for immersive and **personalized experiences**
- Engaging in dialogue with LLM model for **specific queries and requests**
- Obtaining relevant **information** and **explanations** based on user input

07 Reference

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08
THANK YOU
QUESTION & SECTION