DATASET OVERVIEW

LINK - https://drive.google.com/file/d/1fYT4FvF-oomL5KbECgXgieZc6-GK6FVY/view?usp=drive_link

General description of dataset theme: Student Enrollment and Application Management Dataset

The dataset contains **7,543 observations (rows)** and **80 variables (columns)**, organized in a structured tabular format. Each row represents an individual record, while each column corresponds to a specific attribute associated with that individual. The dataset is relatively wide, indicating that a large number of features are captured for every record.

Dataset Structure

The variables in the dataset can be broadly classified into the following categories:

1. **Identification Variables:** These variables uniquely identify each record and include reference or ID fields, along with basic personal information such as first and last names. These fields help distinguish individual entries and maintain record integrity.
2. **Demographic and Educational Variables:** This category includes attributes related to an individual's educational background, such as college or institution name, academic program, major, degree type, and related academic details. These variables are primarily categorical in nature.
3. **Process and Status Variables:** Several variables describe the status, stage, or type of process associated with each record. These fields track progression, classification, or engagement and are useful for workflow analysis and monitoring. While these fields are critical for workflow tracking, many contain null or blank values, indicating incomplete data capture or optional fields.
4. **Temporal Variables:** The dataset includes multiple date and time fields that record important events such as creation dates, modification dates, or activity timestamps. These variables enable time-based analysis, trend identification, and process duration evaluation.

Types of Variables

- **Categorical (String/Object):** Used for names, institutions, statuses, regions, and descriptive labels.
- **Numerical (Integer/Continuous):** Used for quantitative measures, counts, or coded values.
- **Date/Time:** Used to capture event timelines and chronological changes.

Data Quality Issues Observed

During initial inspection, several data quality concerns were identified:

- **Missing / Null Values:** A significant number of variables contain null or missing values, particularly in optional fields such as secondary educational details, status updates, and date fields.
- **Inconsistent Formatting:** Text-based fields exhibit inconsistent capitalization, spelling variations, and the use of placeholders (e.g., blanks or special characters). Date fields show mixed formats, which may require standardization.
- **Incomplete Records:** Some rows contain partial information, where key attributes are missing while others are populated. This affects completeness and may influence downstream analysis.
- **Redundant or Sparse Columns:** Certain variables have very few non-null values, making them less informative and candidates for removal or consolidation.

Implications for Analysis

Due to the presence of missing values and formatting issues, **data preprocessing is required** before analysis. This includes:

- Handling missing values through imputation or removal based on relevance
- Standardizing categorical fields
- Converting and validating date/time formats
- Identifying and addressing redundant or low-variance columns

General Characteristics

Despite the presence of missing values and formatting inconsistencies, the dataset remains valuable and information-rich. With appropriate data cleaning and preprocessing, it is well-suited for exploratory data analysis, reporting, and further statistical or predictive modeling tasks.

In [1]:
```
from google.colab import drive
drive.mount('/content/drive')
```

```
Mounted at /content/drive
```

In [22]:
```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as  sns
import re
```

In [3]:
```
# Importing the Data
file_path = ('/content/drive/MyDrive/Data/Copy of Copy of DePaul_Data.xlsx')
df = pd.read_excel(file_path)

print(df.shape)
df.head()
```

```
(7543, 80)
```

Out[3]:

	Reference_ID	Given_Name	Last_Name	College	Major	Degree_Type	Country	Recieved_At	Counsler	University	...	Degree_Type-2
0	45405320	Deeksha Reddy	Bhumireddy	INDIA - Osmania University - Bachelor's Degree	NaN	NaN	India	1757494436974	NaN	DePaul University	...	NaN
1	858032003	Pearl Ashok Kumar	Patel	INDIA - Manipal University Jaipur - Bachelor's...	NaN	NaN	India	1757494436974	NaN	DePaul University	...	NaN
2	902518555	Hamza	Javed	PAKISTAN - Shaheed Zulfikar Ali Bhutto Institu...	NaN	NaN	Pakistan	1757494436974	NaN	DePaul University	...	grad
3	902518555	Hamza	Javed	PAKISTAN - Shaheed Zulfikar Ali Bhutto Institu...	NaN	NaN	Pakistan	1757494436974	NaN	DePaul University	...	grad
4	218755608	Ronil Dhavalbhai	Thakkar	INDIA - Swarrnim Institute of	NaN	NaN	India	1757494436974	NaN	DePaul University	...	NaN

	Reference_ID	Given_Name	Last_Name	College	Major	Degree_Type	Country	Recieved_At	Counsler	University	...	Degree_Type-2
				Technology - Swa...								

5 rows × 80 columns

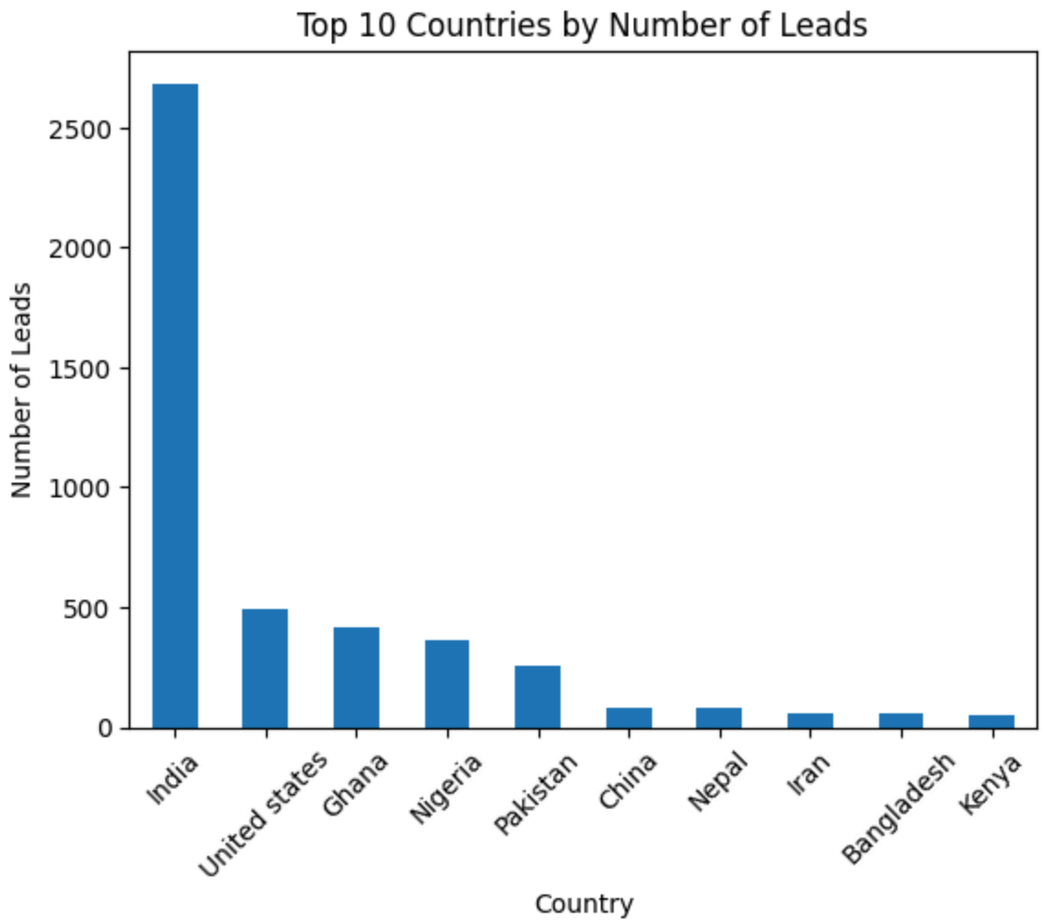
In [4]:
```
# Remove duplicate IDs
df = df.drop_duplicates(subset=["Reference_ID"])
```

In [5]:
```
# Check Number of rows after removing Duplicates
num_rows = df.shape[0]
print(num_rows)
```

```
5000
```

In [6]:
```
# Bar Chart for Top 10 Countries
top_countries = df["Country"].value_counts().head(10)

plt.figure()
top_countries.plot(kind="bar")
plt.title("Top 10 Countries by Number of Leads")
plt.xlabel("Country")
plt.ylabel("Number of Leads")
plt.xticks(rotation=45)
plt.show()
```



In [ ]:
```
# As all the rows in the followin column are NULL (Major, Degree Type, Age/Data Of Birth) can not work on visualzing them and have to be skipped as we dont have a way to replace the NULLs
```

In [18]:
```
# Shows most popular admission terms
df["Intake"].value_counts()
```

Out[18]:

Intake	count
computersciencems:2024fall(september24)	199
businessanalyticsms:2024fall(september24)	166
businessanalyticsms:2025fall(september25)	142
businessanalyticsms:2024winter(january24)	121
computersciencems:2025fall(september25)	109
...	...
womensandgenderstudiesma:2023fall(september23)	1
businessinformationtechnologyms(fullyonline):2025fall(september25)	1
valuecreatingeducationforglobalcitizenshipmed(fullyonline):2024summer(june24)	1
traumapsychologycertificate:2024fall(september24)	1
nondegree(csh):2025winter(january25)	1

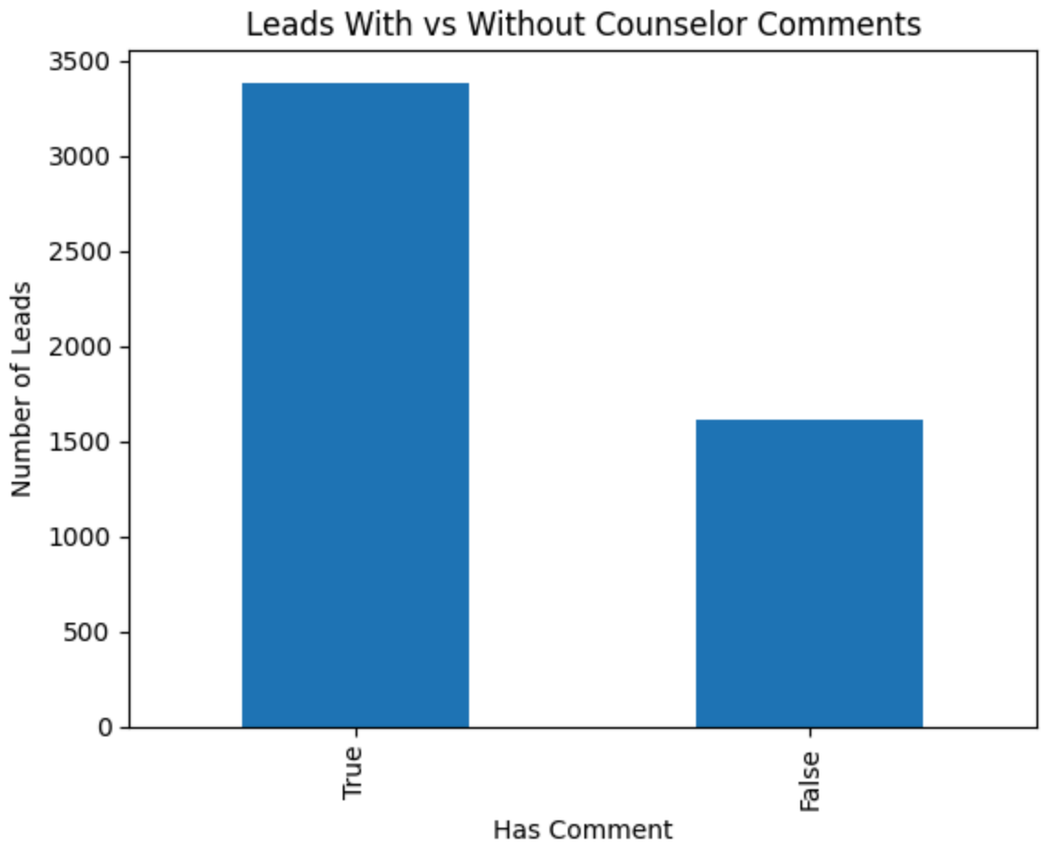
584 rows × 1 columns

dtype: int64

In [23]:
```
# Comment Cleaning
df["Comments_clean"] = (
    df["Comments"]
    .astype(str)
    .str.lower()
    .str.replace(r"[^a-z\s]", "", regex=True)
)
```

In [24]:
```
# Leads With vs Without Counselor Comments
df["has_comment"] = df["Comments"].notna() & (df["Comments"].str.strip() != "")

df["has_comment"].value_counts().plot(kind="bar")
plt.title("Leads With vs Without Counselor Comments")
plt.xlabel("Has Comment")
plt.ylabel("Number of Leads")
plt.show()
```



In [ ]:
```
from google.colab import drive
drive.mount('/content/drive')
```

```
Mounted at /content/drive
```

In [ ]:
```
import pandas as pd
import numpy as np
```

In [ ]:
```
# Importing the Data
file_path = ('/content/drive/MyDrive/Data/Copy of Copy of
DePaul_Data.xlsx')
df = pd.read_excel(file_path)

print(df.shape)
df.head()
```

```
(7543, 80)
```

	Reference_ID	Given_Name	Last_Name	College	Major	Degre
0	45405320	Deeksha Reddy	Bhumireddy	INDIA - Osmania University - Bachelor's Degree	NaN	NaN
1	858032003	Pearl Ashok Kumar	Patel	INDIA - Manipal University Jaipur - Bachelor's...	NaN	NaN
2	902518555	Hamza	Javed	PAKISTAN - Shaheed Zulfikar Ali Bhutto Institu...	NaN	NaN
3	Hamza	NaN	Javed	PAKISTAN - Shaheed Zulfikar Ali Bhutto Institu...	NaN	NaN
4	Ronil Dhavalbhai	NaN	Thakkar	INDIA - Swarrnim Institute of Technology - Swa...	NaN	NaN

5 rows × 80 columns

In [ ]:
```
num_rows = df.shape[0]
print(num_rows)
```

```
7543
```

In [ ]:
```
missing_summary = pd.DataFrame({
    "Missing Count": df.isnull().sum(),
    "Missing %": (df.isnull().sum() / len(df)) * 100
})

missing_summary.sort_values("Missing %", ascending=False)
```

	Missing Count	Missing %
Degree_Type	7543	100.0
Major	7543	100.0
Citizenship	7543	100.0
Counsler	7543	100.0
Major_1st_Choice	7543	100.0
...	...	...
Recieved_At	0	0.0
University	0	0.0
Modified_At	0	0.0
Application_Source	0	0.0
Created_At	0	0.0

80 rows × 2 columns

In [ ]:
```
duplicate_rows = df.duplicated().sum()
duplicate_rows
```

```
np.int64(0)
```

In [24]:
```
numeric_cols = df.select_dtypes(include=["int64","float64"])

outlier_summary = {}

for col in numeric_cols.columns:
    Q1 = numeric_cols[col].quantile(0.25)
    Q3 = numeric_cols[col].quantile(0.75)
    IQR = Q3 - Q1

    lower = Q1 - 1.5 * IQR
    upper = Q3 + 1.5 * IQR

    outliers = df[(df[col] < lower) | (df[col] > upper)]
    outlier_summary[col] = len(outliers)

pd.DataFrame.from_dict(outlier_summary, orient="index", columns=["Outlier
Count"])
```

Out[24]:

	Outlier Count
Major	0
Degree_Type	0
Recieved_At	1015
Counsler	0
Citizenship	0
Status	0
Major_1st_Choice	0
Street_3	0
Date_of_Birth	0
Phone_Number_2	0
Most_Recent_Released_Decision	0
RIT_Email_Created	0
Housing_Contract	0
Is_Global_Grad	0
Is_Admitted	0
SEVIS_ID	0
Official_University_email_address	0
Application_Agency_Code	0
Created_At	1015
Modified_At	1015
Reference_ID-2	0
Outstanding_Checklist_Items	0
Prior_I-20_Outreach_Detail	0
Prior_Non_I-20_Outreach_Detail	0
Most_Recent_Contact	0
Most_Recent_User_and_Date	0
Recent_GT_Form_Initiative	0

	Outlier Count
Caller_Name_2	0
Date_of_Contact_2	0
Outcome_2	0
Final_Result	0
Campaign_Id	122
Escalation_Required	0
SLU_Start_Comment	0
SLU_Start_City	0
I_901_Status	0
Created_At-2	0
Modified_At-2	0
ID	122
Category	0
Attempts	0
Intake-2	0
Status-2	0
City_and_Branch	0
Header	0
Template	0
Region-2	0
Created_At-3	0
Modified_At-3	0

In [ ]:
```
# Identify and display value counts for text columns
text_cols = df.select_dtypes(include="object")

for col in text_cols.columns:
    print("\nColumn:", col)
    print(df[col].value_counts(dropna=False).head(10))
```

```
Column: Reference_ID
Reference_ID
924093519    48
48921321     33
20367881     31
553724526    30
516679919    30
11979156     27
838525490    26
769886402    25
467992191    23
265477508    23
Name: count, dtype: int64

Column: Given_Name
Given_Name
Fnu                 101
Raj                  53
Rahul                45
Syed Ali Mujtaba     33
Salman               31
Sejal                30
Preksha Gowda        30
Umar Javeed          27
Ishanshi             26
Dhruva Chaitanya     25
Name: count, dtype: int64

Column: Last_Name
Last_Name
Patel       296
Mohammed    145
Shah         67
Gupta        55
Khan         48
Kundur       48
Lnu          47
Parmar       44
Syed         41
Singh        37
Name: count, dtype: int64

Column: College
College
INDIA - Osmania University - Bachelor's Degree
269
INDIA - Gujarat Technological University - Bachelor's Degree
74
INDIA - University of Mumbai - Bachelor's Degree
71
NaN
71
INDIA - Visvesvaraya Technological University - Bachelor's Degree
62
INDIA - Anna University - Bachelor's Degree
60
INDIA - Jawaharlal Nehru Technological University Hyderabad -
Bachelor's Degree
56
INDIA - Maharashtra State Board of Technical Education - Other\nINDIA
- K J College Of Engineering Management and Research - Bachelor's
```

```
Degree     48
INDIA - Savitribai Phule Pune University - Bachelor's Degree
47
INDIA - Jawaharlal Nehru Technological University, Hyderabad -
Bachelor's Degree
40
Name: count, dtype: int64

Column: Country
Country
India            4617
United states     764
Ghana             440
Nigeria           430
Pakistan          273
China             125
Nepal              81
Iran               75
Canada             69
Kenya              62
Name: count, dtype: int64

Column: University
University
DePaul University    7543
Name: count, dtype: int64

Column: Intake
Intake
Computer Science - MS: 2024 Fall (September '24)              504
Business Analytics - MS: 2024 Fall (September '24)            419
Data Science - MS: 2024 Fall (September '24)                  254
Cybersecurity - MS: 2024 Fall (September '24)                 181
Business Analytics - MS: 2025 Fall (September '25)            160
Artificial Intelligence - MS: 2024 Fall (September '24)       160
Health Informatics - MS: 2024 Fall (September '24)            155
Business Analytics - MS: 2025 Winter (January '25)            144
Business Analytics - MS: 2024 Winter (January '24)            143
Human-Computer Interaction - MS: 2024 Fall (September '24)    140
Name: count, dtype: int64

Column: College_1st_Choice
College_1st_Choice
Jarvis College of Computing and Digital Media                   3831
Kellstadt Graduate School Of Business                           2523
College of Science and Health                                    269
College of Education                                             208
College of Liberal Arts and Social Sciences                      207
College of Communication                                          87
School of Psychology                                              79
School of Public Service                                          77
Jarvis College of Computing and Digital Media (Fully Online)      72
College of Education (Fully Online)                               35
Name: count, dtype: int64

Column: Phone_Number
Phone_Number
NaN                587
920000000000        43
919000000000        39
+91 84290 90019     33
+91 96764 94150     31
+91 80088 47896     30
+91 97899 88124     30
+91 91217 94780     27
+1 872-338-6722     26
+91 7019941170      25
Name: count, dtype: int64
```

```
Column: Street_1
Street_1
Omkarpark Phase-2,Rajmudra Society, Dhankawadi        48
45F Mohalla Kundigarrh Post Sadar                     33
H.No:-9-4-136/146, Jamalikunta, Tolichowki            31
Annapurneshwari Krupa, Near Royal Apollo              30
6-1-306/B56 Old Cib Quarters Khairatabad              30
10-5-4/A Masab Tank                                   27
13 Shreenath Soc, Usmanpura Ashram Road, Ahmedabad    26
No 57,14th Cross, Mts Layout, Kengeri                 25
74 Prakruti Banglows Sterling                         23
60 Sainik Vihar, Pitampura                            23
Name: count, dtype: int64

Column: Street_2
Street_2
NaN                                        4639
School Hemavathi Nagara                      30
Secunderabad                                 30
Musheerabad                                  26
Satellite Town                               25
City Sector F  Bhopal Ahemdabad              23
Silent Zone, Opp. Airport Road, Dumas        22
Sri Ram Park Colony, Road No.8,              21
Flat 102, Mumtaz College Road,               20
Lbs Marg                                     20
Name: count, dtype: int64

Column: City
City
Hyderabad    975
Chicago      268
Ahmedabad    223
Chennai      206
Mumbai       204
Pune         164
Accra        158
Bengaluru    134
Karachi      108
Surat         96
Name: count, dtype: int64

Column: Region
Region
Telangana         1239
NaN                914
Maharashtra        645
IL                 524
Gujarat            486
Andhra Pradesh     406
Karnataka          338
Tamil Nadu         288
Greater Accra      208
Lagos              149
Name: count, dtype: int64

Column: Postal
Postal
NaN       226
233       198
500008    112
0          81
500028     65
500004     58
411043     48
500036     45
500034     38
110034     34
Name: count, dtype: int64
```

```
Column: Email_ID
Email_ID
rajkundur.rk@gmail.com                    48
syedalig1020@gmail.com                    33
salmanawaise707@gmail.com                 31
sejalmudiraj12@gmail.com                  30
sppreksha.india@gmail.com                 30
umar.amf555@gmail.com                     27
ishanshipatel12@gmail.com                 26
dhruvachaitanyagopal25082002@gmail.com    25
ayush593sach@gmail.com                    23
krishvekariya116@gmail.com                23
Name: count, dtype: int64

Column: Comments
Comments
Evaluation Completed
1642
NaN
1625
No Record
159
Email sent to study group team
145
Transcript not on slate
139
Student will upload official semester wise marksheet by today via mail.\n February 27, 2024call not answered\n February 28, 2024I have applied for the official transcript and will receive it soon. And I will upload it immediately.\n February 27, 2024Dear Raj,\n\nWe hope this email finds you well.\n\nYour application to DePaul University has been received. Before we can start reviewing your transcripts you will need to provide your complete semesterwise / yearly undergraduate transcripts.\n\nWe kindly request that you send us your complete semesterwise / yearly undergraduate transcripts at your earliest convenience. After they are received, our team of professionals will begin the transcript evaluation process. You can either reply to this email with the transcripts attached or upload them on your Grad Gateway portal by clicking the belowmentioned link.\n\nhttps://grad.depaul.edu/portal/status \n\nWe appreciate your cooperation and look forward to receiving your transcripts soon.\n\nBest Regards, \nJagdeep Singh\nDePaul Transcript Evaluation Team\n February 27, 2024The attached file is my unofficial transcript including all semester wise details year wise.I have already applied for official transcript as soon as i receive my official transcript, I will upload that immediately.
48
Email sent to study group team.
45
Evaluation completed
38
Student will submit the Prefinal semester marksheet only on May month\n April 29, 2024Dear Syed,\n\nWe hope this email finds you well.\n\nYour application to DePaul University has been received. Before we can start reviewing your transcripts you will need to provide your Prefinals university authenticated undergraduate transcripts.\n\nWe kindly request that you send us your prefinals university authenticated undergraduate transcripts at your earliest convenience. After they are received, our team of professionals will begin the transcript evaluation process. You can either reply to this email with the transcripts attached or upload them on your Grad Gateway portal by clicking the belowmentioned link.\n\nhttps://grad.depaul.edu/portal/status \n\nWe appreciate your cooperation and look forward to receiving your transcripts soon.\n\nBest Regards, \nJagdeep Singh\nDePaul Transcript Evaluation Team\n March 17, 2024Need Prefinal semester marksheet
33
student's 7th semester exam will held in March' 24\n February 26,
```

```
2024Dear Jagdeep,\nGreetings for the day!\n\nThank you for replying
to me about the transcript evaluation, Presently I have marksheets of
my Bachelor's degree till Semester 6th  & for the 7th Semester mark
sheet it will take some time till April month.\nAs soon as I receive
my 7thsemester mark sheet, I will send the documents for the
evaluation process.      \n\nHope you will understand as I am still
pursuing my Final Year Bachelor.\nThanks & Regards\nSalman Awaise.\n
February 20, 2024Dear Salman,\n\nWe hope this email finds you
well.\n\nYour application to DePaul University has been received.
Before we can start reviewing your transcripts you will need to
provide your official 6th & 7th semester undergraduate
transcripts.\n\nWe kindly request that you send us your official 6th
& 7th semester undergraduate transcripts at your earliest
convenience. After they are received, our team of professionals will
begin the transcript evaluation process. You can either reply to this
email with the transcripts attached or upload them on your Grad
Gateway portal by clicking the belowmentioned
link.\n\nhttps://grad.depaul.edu/portal/status \n\nWe appreciate your
cooperation and look forward to receiving your transcripts
soon.\n\nBest Regards, \nJagdeep Singh\nDePaul Transcript Evaluation
Team\n January 18, 2024Course inprogress. Need final year marksheet\n
August 12, 2024Please find the attached copy for my 7th sem memo.\n
August 21, 2024Evaluation Completed      31
Name: count, dtype: int64

Column: Admit_Date
Admit_Date
NaN                     1754
2024-12-03 00:00:00       80
2024-12-06 00:00:00       80
03/18/2024                79
2024-05-03 00:00:00       67
2024-03-04 00:00:00       66
02/27/2024                63
2024-06-05 00:00:00       61
2024-12-01 00:00:00       59
2024-10-04 00:00:00       59
Name: count, dtype: int64

Column: Application_Source
Application_Source
Non Study Group    6528
STUDY GROUP        1015
Name: count, dtype: int64

Column: Recieved_At-2
Recieved_At-2
NaN                     3194
2024-01-04 00:00:00       47
2024-03-05 00:00:00       45
2024-04-01 00:00:00       44
2024-02-07 00:00:00       41
2024-06-03 00:00:00       41
2024-03-06 00:00:00       40
2024-06-05 00:00:00       40
2024-05-03 00:00:00       40
03/18/2024 00:00:00       39
Name: count, dtype: int64

Column: University-2
University-2
DePaul University    4349
NaN                  3194
Name: count, dtype: int64

Column: Date_of_Contact
Date_of_Contact
NaN                     3194
2024-01-04 00:00:00       47
```

```
2024-03-05 00:00:00      45
2024-04-01 00:00:00      44
2024-02-07 00:00:00      41
2024-06-03 00:00:00      41
2024-03-06 00:00:00      40
2024-06-05 00:00:00      40
2024-05-03 00:00:00      40
03/18/2024 00:00:00      39
Name: count, dtype: int64

Column: Caller_Name
Caller_Name
NaN        3194
Jagdeep    2085
Swarna     1214
Ayesha      855
Lavnaya     195
Name: count, dtype: int64

Column: Outcome_1
Outcome_1
NaN                                        3194
Follow up                                  1375
Missing 0 Transcript (NOT Study Group)     1177
Issue ID's                                  450
Study Group ID                              397
Transcript received on mail                 318
NOT Study Group                             277
Transcript received                          79
Missing >1 Transcript (NOT Study Group)      72
Replied to student                           53
Name: count, dtype: int64

Column: Remark
Remark
NaN
6869
Call not answered
544
Email sent
103
call not answered
9
Will submit the transcripts soon
3
study group
2
student not able to login in Depaul application portal and will share
marksheets on mail       2
will share marksheets on mail
2
Student is from US and have US transcripts
2
Transcript received on mail and uploaded
1
Name: count, dtype: int64

Column: Remark_2
Remark_2
NaN
7459
Discussed about the transcript
6
Discussed about the transcripts
5
Discussed about the transcripts.
3
Student just finished his final sem exams, he is still not sure about
the results.          2
```

```
Student will submit Provisional or graduation certificate today via
mail.                   2
Student will submit the semester 8 marksheet & graduation certificate
in August month       2
Student will submit the final semester marksheet in august.
2
Student will submit Complete Bachelor marksheet in a month
2
Student will submit 7 sem marksheet today and 8 sem marksheet after 2
months.               2
Name: count, dtype: int64

Column: Slate_Form_Filled
Slate_Form_Filled
Yes    4336
NaN    3194
No       13
Name: count, dtype: int64

Column: Name
Name
NaN                              3316
Email To Student                 1007
Call To Student                   960
Sent For Evaluation               960
Complete Case                     549
Email From Student                413
Email Sent To Study Group Team    211
Call From Student                  83
Whatsapp From Student              24
Whatsapp To Student                20
Name: count, dtype: int64

Column: University-3
University-3
DePaul University    4349
NaN                  3194
Name: count, dtype: int64

Column: Degree_Type-2
Degree_Type-2
grad    4349
NaN     3194
Name: count, dtype: int64

Column: Type
Type
Calling    4349
NaN        3194
Name: count, dtype: int64
```

In [ ]:
```
# Quick Summary
quality_report = {
    "Rows": df.shape[0],
    "Columns": df.shape[1],
    "Duplicate Rows": df.duplicated().sum(),
    "Total Missing Values": df.isnull().sum().sum(),
    "Total Numeric Outliers": sum(outlier_summary.values())
}

quality_report
```

```
{'Rows': 7543,
 'Columns': 80,
 'Duplicate Rows': np.int64(0),
 'Total Missing Values': np.int64(371664),
 'Total Numeric Outliers': 3289}
```

Student Enrollment & Application Trends Dashboard

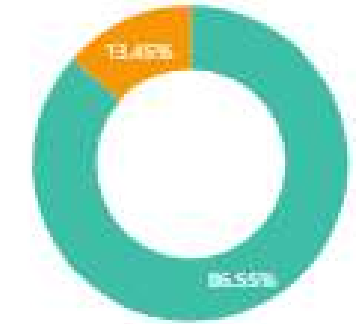
Country
All

7540
Total Students

125
Total Major

96
Total Countries

Total Students by Application Source

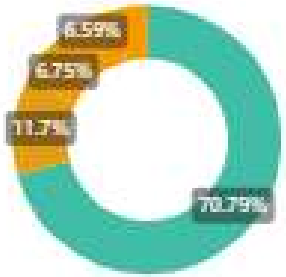


Student Admissions Trend Over Time

Year

(Blank)	2024
2023	2025

Total Students by Country



Country India United states Ghana Nigeria Pakistan

Total Students by Major