

# GEMINI Programming Skills Test

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May 14, 2024

## 1 Task One

Read in the csv files (admissions\_surg.csv, admissions\_med.csv and imaging.csv) and perform de-identification on all 3 files. De-identification is a common practice in health research in which an personal health identifier that identifies a patient is replaced with another unique ID for privacy purposes.

Table 1: First 5 rows of De-identified Medical Admissions

DE_ID	admission_date	admission_time	discharge_date	discharge_time	department	gender	age	main_diagnosis_icd10	main_diagnosis_name
1196	1985-10-19	04:27:00	1986-01-01	NA	General Internal Medicine	M	63	N830	Ovarian cyst
1197	1990-06-26	21:06:00	1990-09-03	21:03:00	General Internal Medicine	F	63	N410	Inflammatory conditions of male genital organs
1198	1994-06-13	06:36:00	1994-12-22	07:21:00	General Internal Medicine	F	51	K640	Hemorrhoids
1199	2005-03-11	21:54:00	2005-04-19	NA	General Internal Medicine	F	NA	C6200	Cancer of testis
1200	1997-06-26	09:49:00	1997-09-06	21:03:00	General Internal Medicine	M	81	I462	Cardiac arrest and ventricular fibrillation

Table 2: First 5 rows of De-identified Medical Admissions

DE_ID	admission_date	admission_time	discharge_date	discharge_time	department	gender	age	main_diagnosis_icd10	main_diagnosis_name
1196	1985-10-19	04:27:00	1986-01-01	NA	General Internal Medicine	M	63	N830	Ovarian cyst
1197	1990-06-26	21:06:00	1990-09-03	21:03:00	General Internal Medicine	F	63	N410	Inflammatory conditions of male genital organs
1198	1994-06-13	06:36:00	1994-12-22	07:21:00	General Internal Medicine	F	51	K640	Hemorrhoids
1199	2005-03-11	21:54:00	2005-04-19	NA	General Internal Medicine	F	NA	C6200	Cancer of testis
1200	1997-06-26	09:49:00	1997-09-06	21:03:00	General Internal Medicine	M	81	I462	Cardiac arrest and ventricular fibrillation

Table 3: First 5 rows of De-identified Imaging Data

DE_ID	test_name	ordered_date_time	performed_date	performed_time	technician_name	brief_report
1196	US	NA	1985-12-17	10:27:00	Trevon Hopson	No significant abnormality
1196	US PELVIS	NA	1985-12-02	11:40:00	Claire Melko	Indication: normal
1197	Abdomen CT	NA	1990-08-05	12:26:00	Ladonna Mcallister	Indication: Normal
1	US	NA	1998-03-24	16:15:00	claire melko	Indication: Normal
1198	CT neck + head	NA	1994-11-05	01:36:00	Lorena Burciaga	Normal

## 2 Task Two

Create one data frame called `admissions_img`, consisting of all rows in `admissions_surg` and `admissions_med`, merged with the imaging data using `DE_ID` (retaining all `DE_ID`s from both).

```
# Display the first 5 rows of the new merged dataset
head(admissions_img, 5)
```

```
DE_ID  ADMISSION.DATE  ADMISSION.TIME  DISCHARGE.DATE  DISCHARGE.TIME
1      1      1998-02-01      07:02:00      1998-03-31      07:17:00
2      2      2010-11-30      04:33:00      2011-03-25      20:59:00
3      3      2015-03-05      09:40:00      2015-08-28      04:51:00
4      3      2015-03-05      09:40:00      2015-08-28      04:51:00
5      4      1987-11-07      21:37:00      1988-05-10      15:32:00

DEPARTMENT  GENDER  AGE  MAIN.DIAGNOSIS.ICD10
1 General Surgery      M  NA      E0800
2 General Surgery      F  24      M0500
3 General Surgery      M  92      0045
4 General Surgery      M  92      0045
5 General Surgery      F  93      A6000

MAIN.DIAGNOSIS.NAME  admission_date  admission_time
1  Diabetes mellitus with complications      <NA>      NA
2  Rheumatoid arthritis and related disease      <NA>      NA
3      Induced abortion      <NA>      NA
4      Induced abortion      <NA>      NA
5      Viral infection      <NA>      NA

discharge_date  discharge_time  department  gender  age  main_diagnosis_icd10
1      <NA>      NA      <NA>      <NA>      NA      <NA>
```

2	<NA>	NA	<NA>	<NA>	NA	<NA>
3	<NA>	NA	<NA>	<NA>	NA	<NA>
4	<NA>	NA	<NA>	<NA>	NA	<NA>
5	<NA>	NA	<NA>	<NA>	NA	<NA>

	main_diagnosis_name	test_name	ordered_date_time	performed_date
1	<NA>	US	<NA>	1998-03-24
2	<NA>	ct neck and head	<NA>	2011-03-12
3	<NA>	ct neck	<NA>	2015-05-08
4	<NA>	RT LEG DOPPLER	<NA>	2015-05-21
5	<NA>	ct neck	<NA>	1988-01-26

	performed_time	technician_name	brief_report
1	16:15:00	claire melko	Indication: Normal
2	12:33:00	zach straughter	Normal
3	03:06:00	mastoora al-kaber	Cancer
4	02:44:00	marco carr	On visual analysis, normal
5	11:47:00	marco carr	No significant abnormality

### 3 Task Three

In `admissions_img`, create a new `length_of_stay` variable defined as discharge date and time minus admission date and time (in days). Calculate the mean `length_of_stay` for each department.

```
# Display the result
mean_length_of_stay_by_dept
```

```
# A tibble: 3 x 2
  DEPARTMENT      Mean_Length_of_Stay
  <chr>          <dbl>
1 General Surgery    100.
2 Obstetrics        105.
3 <NA>              NaN
```

### 4 Task Four

In `imaging`, filter to the first performed test for each `test_name` and save the resulting data frame as `q4_df`. Then, transform the data into wide format such that each `test_name` becomes a column displaying the `performed_date` of that test (see example table below). Display the head of the table.

```
# Display the head of the wide format table
head(q4_df)
```

```
# A tibble: 6 x 7
      ID test_name      ordered_date_time performed_date performed_time
  <dbl> <chr>          <dtm>          <date>      <time>
1 28711 ABDOMEN/PELVIS US NA          1980-02-17    10:05
2 22914 Abdomen CT      NA          1980-04-20    16:04
3 98627 CT            1980-04-16 02:26:00 1980-04-16    07:00
4 97068 CT - ABDOMEN    1980-03-14 08:58:00 1980-03-16    06:44
5 54816 CT - Femur      1981-08-14 05:30:00 1981-08-14    08:05
6 69300 CT neck + head  1980-03-24 00:59:00 1980-03-24    14:16
# i 2 more variables: technician_name <chr>, brief_report <chr>
```