```
  "<img src=\"https://imgur.com/BlQx2dl.png\" width=300 length=300 align=\"center\">\n",
  "<!-- ![](https://imgur.com/BlQx2dl) -->\n",
  "\n",
  "## Opening this .txt file up, you get messages in a format that looks like this:\n",
  "\n",
  "![](https://imgur.com/EINDP1F.png)\n"
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  "# *Importing Necessary Libraries*\n",
  "\n",
  "We will be using :\n",
  "1. **Regex (re)** to extract and manipulate strings based on specific patterns.\n",
  "    - References:\n",
  "        - [Regex - Python Docs](https://docs.python.org/3/library/re.html)\n",
  "        - [Regex cheatsheet](https://www.rexegg.com/regex-quickstart.html)\n",
  "        - [Regex Test - live](https://regexr.com/)\n",
  "        - [Datetime Format](http://strftime.org/)\n",
  "2. **pandas** for analysis.\n",
  "3. **matlotlib** and **seaborn** for visualization.\n",
  "4. **emoji** to deal with emojis.\n",
  "    - References:\n",
  "        - [Python Docs](https://pypi.org/project/emoji/)\n",
  "        - [Emoji](https://github.com/carpedm20/emoji)\n",
  "        - [EMOJI CHEAT SHEET](https://www.webfx.com/tools/emoji-cheat-sheet/)\n",
  "5. **wordcloud** for the most used words."
 ]
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  "import re\n",
```

```
   "import datetime\n",
   "import numpy as np\n",
   "import pandas as pd\n",
   "import matplotlib.pyplot as plt\n",
   "import seaborn as sns\n",
   "from wordcloud import WordCloud, STOPWORDS\n",
   "import emoji\n",
   "import itertools \n",
   "from collections import Counter\n",
   "import warnings\n",
   "\n",
   "%matplotlib inline\n",
   "warnings.filterwarnings('ignore')"
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   "##### NOTE: \n",
   "- This special command `%matplotlib inline` to ensure that plots are shown and embedded within the Jupyter notebook itself. Without this command, sometimes plots may show up in pop-up windows.\n",
   "- `warnings.filterwarnings('ignore')`: The warnings filter controls whether warnings are ignored, displayed, or turned into errors (raising an exception). [REFERENCE](https://docs.python.org/3/library/warnings.html)"
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   "## *Preparation and reading data*"
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```
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   "    '''Converts raw .txt file into a Data Frame'''\n",
   "    \n",
   "    split_formats = {\n",
   "        '12hr' : '\\d{1,2}/\\d{1,2}/\\d{2,4},\\s\\d{1,2}:\\d{2}\\s[APap][mM]\\s-\\s',\n",
   "        '24hr' : '\\d{1,2}/\\d{1,2}/\\d{2,4},\\s\\d{1,2}:\\d{2}\\s-\\s',\n",
   "        'custom' : ''\n",
   "    }\n",
   "    datetime_formats = {\n",
   "        '12hr' : '%d/%m/%Y, %I:%M %p - ',\n",
   "        '24hr' : '%d/%m/%Y, %H:%M - ',\n",
   "        'custom': ''\n",
   "    }\n",
   "    \n",
   "    with open(file, 'r', encoding='utf-8') as raw_data:\n",
   "        # print(raw_data.read())\n",
   "        raw_string = ' '.join(raw_data.read().split('\\n')) # converting the list split by newline char. as one whole string as there can be multi-line messages\n",
   "        user_msg = re.split(split_formats[key], raw_string) [1:] # splits at all the date-time pattern, resulting in list of all the messages with user names\n",
   "        date_time = re.findall(split_formats[key], raw_string) # finds all the date-time patterns\n",
   "        \n",
   "        df = pd.DataFrame({'date_time': date_time, 'user_msg': user_msg}) # exporting it to a df\n",
   "        \n",
   "    # converting date-time pattern which is of type String to type datetime,\n",
   "    # format is to be specified for the whole string where the placeholders are extracted by the method \n",
   "    df['date_time'] = pd.to_datetime(df['date_time'], format=datetime_formats[key])\n",
   "    \n",
   "    # split user and msg \n",
   "    usernames = []\n",
   "    msgs = []\n",
   "    for i in df['user_msg']:\n",
```

```
    "        a = re×split('([\\w\\W]+?):\\s', i) # lazy pattern match to first {user_name}: pattern and spliting it aka each msg from a user\n",
    "        if(a[1:]): # user typed messages\n",
    "            usernames.append(a[1])\n",
    "            msgs.append(a[2])\n",
    "        else: # other notifications in the group(eg: someone was added, some left ...)\n",
    "            usernames.append(\"group_notification\")\n",
    "            msgs.append(a[0])\n",
    "\n",
    "    # creating new columns         \n",
    "    df['user'] = usernames\n",
    "    df['message'] = msgs\n",
    "\n",
    "    # dropping the old user_msg col.\n",
    "    df.drop('user_msg', axis=1, inplace=True)\n",
    "    \n",
    "    return df"
   ]
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    "#### *NOTE*:\n",
    "- Since WhatsApp texts are *multi-line*, you cannot just read the file line by line and get each message that you want. Instead, you need a way to *identify* if a line is a new message or part of an old message. You could use regular expressions.\n",
    "- While reading each line, I split it based on a comma and take the first item returned from the `split()` function. If the line is a new message, the first item would be a valid date, and it will be appended as a new message to the list of messages. If it’s not, the message is part of the previous message, and hence, will be appended to the end of the previous message as one continuous message."
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```
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  "## *Prior Information of my Whatsapp Data*\n",
  "- This is my most active college coding group.\n",
  "- It has **235+** participants; 237 to be precise.\n",
  "- This group was made in **January 2020.**"
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    "RangeIndex: 13655 entries, 0 to 13654\n",
    "Data columns (total 3 columns):\n",
    " #   Column     Non-Null Count  Dtype         \n",
    "---  ------     --------------  -----         \n",
    " 0   date_time  13655 non-null  datetime64[ns]\n",
    " 1   user       13655 non-null  object        \n",
```

```
    " 2   message    13655 non-null  object       \n",
    "dtypes: datetime64[ns](1), object(2)\n",
    "memory usage: 320.2+ KB\n"
   ]
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  "df.info()"
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  "- Here is how it looks like:"
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     "\n",
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     "        vertical-align: top;\n",
     "    }\n",
     "\n",
     "    .dataframe thead th {\n",
     "        text-align: right;\n",
```

```
"    }\n",
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"      <th>user</th>\n",
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"      <td>Sad</td>\n",
"    </tr>\n",
"    <tr>\n",
"      <th>5618</th>\n",
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"      <td>Tanay Kamath (TSEC, CS)</td>\n",
"      <td>ohk</td>\n",
"    </tr>\n",
"    <tr>\n",
"      <th>6701</th>\n",
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"      <td>Harsh Kapadia (TSEC IT, SE)</td>\n",
"      <td>True true</td>\n",
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"      <th>2766</th>\n",
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"      <td>Darshan Rander (TSEC, IT)</td>\n",
"      <td>Let's see mera logic galat tha ya site ka issu...</td>\n",
"    </tr>\n",
"    <tr>\n",
"      <th>5531</th>\n",
```

```
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"  </tr>\n",
"  <tr>\n",
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"    <td>Abhi sunday ko</td>\n",
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"    <td>not bad</td>\n",
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"    <td>+91 97027 35002</td>\n",
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"  </tr>\n",
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```

```
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    "             date_time                    user  \\\n",
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    "5618 2020-05-02 17:08:00      Tanay Kamath (TSEC, CS)   \n",
    "6701 2020-05-28 02:40:00  Harsh Kapadia (TSEC IT, SE)   \n",
    "2766 2020-03-07 19:12:00    Darshan Rander (TSEC, IT)   \n",
    "5531 2020-04-30 18:34:00   Dheeraj Lalwani (TSEC, CS)   \n",
    "292  2020-01-28 19:25:00           Saket (TSEC, CS)   \n",
    "2073 2020-02-24 22:15:00    Darshan Rander (TSEC, IT)   \n",
    "9399 2020-08-06 23:17:00      Tanay Kamath (TSEC, CS)   \n",
    "3102 2020-03-14 17:54:00   Dheeraj Lalwani (TSEC, CS)   \n",
    "3850 2020-03-24 20:59:00            +91 97027 35002   \n",
    "\n",
    "                                      message  \n",
    "3053                                      Sad  \n",
    "5618                                     ohk   \n",
    "6701                                True true  \n",
    "2766  Let's see mera logic galat tha ya site ka issu...  \n",
    "5531                This is wow!! Great work  \n",
    "292                                           \n",
    "2073                          Abhi sunday ko  \n",
    "9399                               not bad  \n",
    "3102                Canceled or postponed?  \n",
    "3850                          Read the manga  "
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```

```
   "source": [
    "### An important observation\n",
    "- One might wonder there are no NaNs, but as you can see, there are some rows, where messages are an *empty string.*\n",
    "- This can be because, the message might just contain **emojis.**\n",
    "#### To see, how many such rows are there, we can use `df[df['message'] == \"\"].shape[0]`"
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   "source": [
    "df[df['message'] == \"\"].shape[0]"
   ]
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    "## Adding extra *helper columns for analysis and visualization*"
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   "cell_type": "code",
```

```
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  "df['day'] = df['date_time'].dt.strftime('%a')\n",
  "df['month'] = df['date_time'].dt.strftime('%b')\n",
  "df['year'] = df['date_time'].dt.year\n",
  "df['date'] = df['date_time'].apply(lambda x: x.date())"
 ]
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  "# Now that we have a clean DataFrame to work with, it’s time to perform analysis on it.\n",
  "### Final Data Frame"
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     "\n",
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     "        vertical-align: top;\n",
     "    }\n",
     "\n",
     "    .dataframe thead th {\n",
     "        text-align: right;\n",
```

```
"    }\n",
"</style>\n",
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  "- Ghosts present in the group. (shocking results.)\n",
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  "**4. Top 10 users most sent media.**\n",
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  "**5. Top 10 most used emojis.**\n",
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  "**6. Most active hours and days.**\n",
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    "matplotlib.rcParams['font.size'] = 10\n",
    "matplotlib.rcParams['figure.figsize'] = (12, 8)\n",
    "\n",
    "# A bar plot for top 10 days\n",
    "sns.barplot(top10days.date, top10days.message_count, palette=\"hls\");\n",
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    "- Because we were discussing fundamental yet tricky and brain-wracking \"Guess the Output\" Java questions!"

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      "Number of people who haven't sent even a single message on the group are 81\n"
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    "# Total number of people who have sent at least one message on the group;\n",
    "print(f\"Total number of people who have sent at least one message on the group are {len(df.user.unique()) - 1}\")   # `-1` because excluding \"group_notficiation\"\n",
    "\n",
    "print(f\"Number of people who haven't sent even a single message on the group are {237 - len(df.user.unique()) - 1}\")"
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```

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    "### *Shocking Result*\n",
    "- Total number of people who have sent at least one message on the group are **154**.\n",
    "- BUT, the total number of participants were **237**.\n",
    "- **That means 81 people in the group have not sent even a single message throughout these 9 months and 13500+ messages.**"
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