PREDICTING TROOP BETRAYAL IN THE WAR AGAINST THE PHRYGIANS

Github link: https://github.com/kaustubh202/onyttig

Creating an advanced decision making system for a task that is more feeling than facts posed a unique but highly intriguing challenge to our team. “Feeling over facts” makes it sound less data driven and more intuition driven and so we turned to Literature to support the basic intuitions that guide the overall workflow design of this project.

A Soldier’s Personal Data Sheet is used within the military setting at every documented step, be it in-processing and out-processing, pre-deployment preparation or emergency situations.

SOLDIER'S PERSONAL DATA SHEET

This information is highly sensitive and protected to maintain privacy and security of the personnel but it gives a key insight into:
Personal Identification Information: Name, rank, date of birth, etc.
Emergency Contact Information: Names and contact details of next of kin or emergency contacts.
Military Information: Unit, duty station, Military Occupational Specialty (MOS), etc.
Medical Information: Blood type, allergies, medications, medical conditions.
Education and Training: Military and civilian education, certifications.

This provides us the primary stack of information that is given to our intelligent advanced system for analyzing 4 of total 5 key metrics:
> *personal_metric*
> *behavioural_metric*
> *service_metric*
> *demographic_metric*

An additional *performance_metric* is used to understand recent as well as overall performance of the soldier in the field of combat and inactive duty.

External factors (*external_factor_bias*) such as the situation in and around Xernia would also affect the morale and inhibitions of the soldiers in the camp that may either boost their loyalty or give them better incentives to betray their country.

So a total of 24 aspects have been evaluated and taken care of. Correspondingly 6 metrics have been defined, 5 that depend on the soldier itself and 1 that factors in for changes around the soldier that they may not be direct causation of but may be affected by:

1. *service_metric*

```
 risk_last_op = #risk factor in the last operation assigned (0 to 1)
  active_duty_record = #contribution in active duty records (0 to 1)
  served_time = #total served time in the army
  off_time = #days since soldier took a holiday
  current_posting = #current posting/rank in the military (0 to 10)
  posting_period = #length of serving on the post that has elapsed
  failure = # failure rate of operations carried out by the soldier
(0 to 1)
```

[How coup-proofing strategies increase the likelihood of military defection]

According to this, 'Hence, military defection should be most likely to take place in personalist regimes and least likely to take place in single party regimes.' Personalist regimes make for individuals that concentrate all the power in their own hands for longer periods of time and in such regimes or leaderships, betrayal and desertion are both more likely to happen. Thus analyzing current_posting and posting_period is crucial in weighing if the concerned soldier is likely to betray the Xernia.

HIgher the posting and the longer the soldier on that posting, the more likely he is to betray.

Higher the risk of the operation, lower the efforts of the soldier in active service, more the failure rate of operations carried out by the soldier, all contribute to higher chances of betrayal.

Fatigue from combat may also demotivate the soldier from staying loyal to the Xernian army and so longer the served time, more the risk in the operation, longer periods between off days may contribute to mental and physical fatiguing of the soldier and more likely to betray.

2. Behavioral

```
  corruption=  # money difference depicting the level of greediness
or corruption within individuals of military
  physical_health=. #no. of days passed by after last injury
  injury_type=. #labels - 2 for high,1 for medium,0 for low
```

```
  mental_health=. #the number of self reports
  campaign_count=. #no. of campaigns , soldier is involved in
  campaign_cause=  #NLP sentiment analysis, 1 for Anti-national, 0
for Nationalism
  peer_based=  #no. of different reports in which name was there
```

Greed is a key motivator historically in having soldiers betray their nation and join the enemy forces. Thus more the greed, more the chances of betrayal.

Poor health of the soldier - both mental and physical would cause the soldier to eventually harbour negative emotions. Scientific evidence exists to support that pain impairs the brain and would cause the soldier to take unlikely courses of action like betrayal.

Any involvement in social causes or campaigns demonstrates will to rise for change and under the wrong influence, a Xernian soldier may betray Xernia.

Any name mentioned or instance mentioned in a grievance report may indicate abnormal behavior.

3. Performance

```
  grievance=  #no. of days last filed
  n_reports=. #no. of reports filed
  complaint_c=. #severity of the complaint 0 means unserious, 1
means dire
  absents=. #no. of unexplained absences
  task_sf=. #success/failure of tasks (1 for F, 0 for S)
```

Desertion from the British Army during the Napoleonic Wars

This points out ‘Soldiers faced severe and challenging conditions, including inadequate food, poor living conditions, and harsh discipline, which made military life difficult to endure.’ which can be mapped by the grievance reports filed, more the number, severity and frequency of filing, more the discontentment with the camp.

Success or failure of a recently given task also maps out a more imminent betrayal chance.

Unexplained absences, historically, have shown to be precursors of betrayals.

4. Personal

```
  familial_history = #number of people in the immediate family that were
in the military and died during active service period
  dependents = # number of dependents on the soldier
  kin = # number of next of kin
  pay_gap = # difference in salary between before joining the army and
after joining the army
```

Results and Recommendations from a Survey of Army Deserters and Leaders

This states that 'The most common reasons for desertion included personal and family problems, dissatisfaction with military life. Many deserters reported feeling isolated, unsupported, or mistreated by their superiors, contributing to their decision to leave.

Personal issues such as financial difficulties, family emergencies, or relationship problems were significant factors that pushed individuals towards desertion.

The inability to cope with these personal challenges while serving in the Army was cited as a primary motivator for desertion.'

Finances and dependencies in the form of family may contribute to the decision of betrayal in order to better provide for the family. Deaths caused while in or by the actions of the Xernian army may also cause a soldier to be moved to betray the Xernian army.

5. Demographic

```
  genb_location=. #distance from border
  genc_location=  #distance from capital
  age= #age
  edu_level= #grading
  previously_c=  #people who left before
```

Factors like young age (impulsive decision making as a vice) and low level of education make soldiers easy targets for brainwashing by Phrygians.

If a troop has a history of Xernian soldiers that betrayed Xernia for the Phrygians, it may cause the soldiers of that troop to be subject to ridicule and susceptible to ideas of betrayal.

General location of the place the soldier hails for also has a great impact on them betraying the country or not. If the place is closer to the Capitol, nationalist propaganda may boost loyalty but at the same time border nearing places would be more prone to infiltration and brainwashing which could lead to ultimate betrayal as a Xernian soldier.

6. External

```
  attack = #is the country under attack from Phrygians or other
countries (binary)
  riots = #is the country facing internal riots (binary)
  emergency= #has the govt declared emergency (binary)
  x_incentives = #difference in new incentives offered to the
soldier by the Xernians
  p_incentives = #difference in new incentives offered to the
soldier by the Phrygians
  risk = #risk in getting caught if soldier tries to betray Xernia
  cultural_change = #any societal change in Xernia that may be
relevant to the soldier
  discipline = #strictness and discipline maintained within the camp
```

If the country is under attack, facing interna riots or has an emergency declaration, cases of uncertainty and chaos can cause the soldier to betray or desert the Xernian army.

If the incentives given by the Xernia decrease and/or the incentives given by Phrygia increase, a soldier would be more likely to switch for pure financial gain.

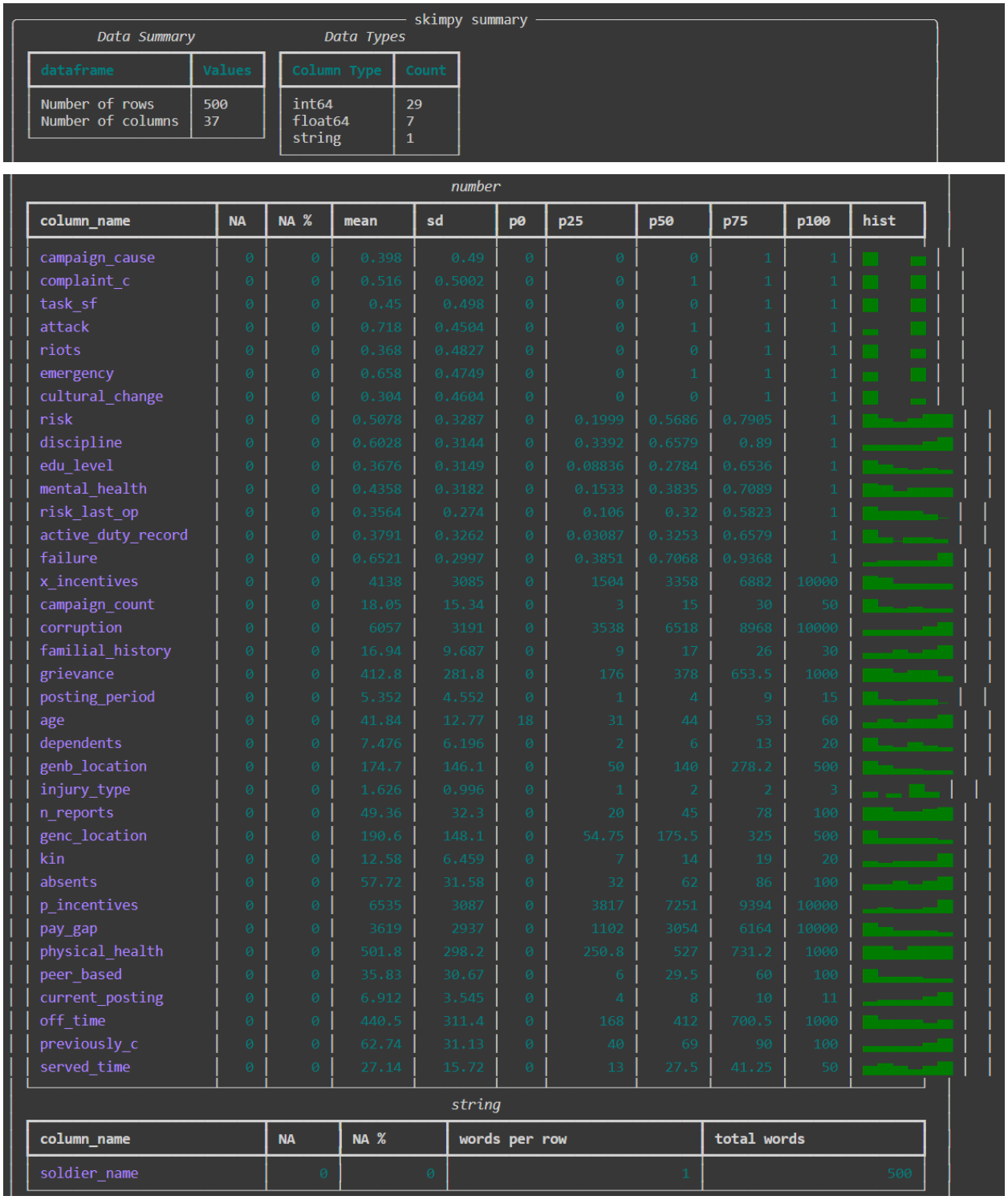
Strictness maintained within the camp and higher the risk involved in the successful desertion or betrayal may deter the soldier from betraying.

Any relevant cultural change within Xernia that may be relevant to the soldier may cause a change in ideology of the soldier.

All submetrics, as is visible, are very subjective to the wits and perceptions of the designer of the system. As firm believers in the Xernian military, we have assigned initial weights to each sub-metric and metric in a way that represents our understanding of the factors that affect the loyal nature of the soldiers.

Datasets for the military or anything remotely close to what is required for this intelligent decision making system were unavailable or simply did not exist.
One Military Deaths by Cause dataset talks about Military Deaths by Cause 1980-2010, and percent of total deaths in the US but obviously does not serve our purpose.

So for this explicit purpose we have synthesized such records of 500 soldiers and have predicted their betrayal likelihood using CTGAN and post-processing.



A snapshot of the output of the skimpy command has been attached here.
SKIMPY - A lightweight tool for creating summary statistics from data frames. skimpy is a lightweight tool that provides summary statistics about variables in pandas or Polars data frames within the console or your interactive Python window.

Based on the likelihood of betrayals within the dataframe present, a list is generated containing all the soldier_name values for entries corresponding to calculated_risk_score and betrayal_likelihood above 0.85.

```
row_calculation(syn_data)
```

```
['soldier_0',
 'soldier_4',
 'soldier_16',
 'soldier_20',
 'soldier_24',
 'soldier_31',
 'soldier_36',
 'soldier_37',
 'soldier_41',
 'soldier_46',
 'soldier_50',
 'soldier_70',
 'soldier_71',
 'soldier_76',
 'soldier_77',
 'soldier_78',
 'soldier_81',
 'soldier_86',
 'soldier_93',
 'soldier_95',
 'soldier_96',
 'soldier_97',
 'soldier_98',
 'soldier_102',
 'soldier_105',
 'soldier_106',
 'soldier_117',
 'soldier_120',
 'soldier_134',
 'soldier_137',
 'soldier_139',
 'soldier_140',
 'soldier_147',
 'soldier_149',
 'soldier_155',
 'soldier_157',
 'soldier_159',
 'soldier_162',
```

For soldier_429, who is present within the potential_betrayers list and for instance, soldier_1 who is not within that list,

```
[ ] data_analysis_soldier(syn_data, 'soldier_429')

Risk Assessment of soldier_429 :
Likelihood of betrayal based on:
        Personal records : 1.0
        Service records : 1.0
        Behaviour : 1.0
        Performance : 0.9999999999963998
        Demographic : 3.784906243060045e-12
        External Factors : 1.0
Betrayal Likelihood: 0.8698915256369635

Recent behaviours of Concern:
        Personal records is/are likely to cause betrayal. Please consider helping.
        Service records is/are likely to cause betrayal. Please consider helping.
        Behaviour is/are likely to cause betrayal. Please consider helping.
        External Factors is/are likely to cause betrayal. Please consider helping.
```

```
[ ] data_analysis_soldier(syn_data, 'soldier_1')

Risk Assessment of soldier_1 :
Likelihood of betrayal based on:
        Personal records : 1.0
        Service records : 1.0
        Behaviour : 1.0
        Performance : 0.9999982396567868
        Demographic : 1.0
        External Factors : 3.7690763969586906e-273
Betrayal Likelihood: 0.7310585094091028

Recent behaviours of Concern:
        Personal records is/are likely to cause betrayal. Please consider helping.
        Service records is/are likely to cause betrayal. Please consider helping.
        Behaviour is/are likely to cause betrayal. Please consider helping.
        Demographic is/are likely to cause betrayal. Please consider helping.
```

Function data_analysis_soldier will provide the RISK ASSESSMENT of the soldier which includes:

Likelihood of Betrayal based on all 6 individual metrics
Overall Likelihood of Betrayal
And
Recent Behaviours of Concern that should be rectified so as to prevent the Xernian soldier from betraying.

The workflow is explained along in the main code provided.