Data4Good – Case Crushers


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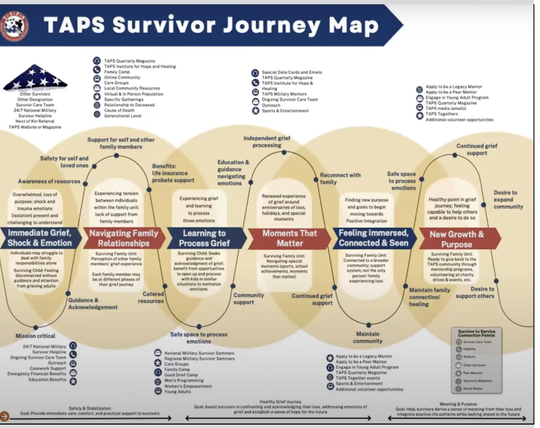
ABSTRACT

This project aimed to utilize cutting-edge technology to solve real-world problems for the Tragedy Assistance Program for Survivors (TAPS), a nonprofit organization that provides care and resources for those grieving a death in the military community.

We designed a machine learning algorithm to automatically assign survey respondents to 1 of 6 appropriate stages of a survivor journey map. By accurately assigning respondents, staff members are enabled to provide more impactful care and support to bereaved families.

BUSINESS PROBLEM

Accurately predicting the stages of grief for veterans and their families is crucial to providing life-saving treatment and care for those in need. According to the TAPS organization, over 130,000 survivors have connected with TAPS for comfort, care, and resources. By accurately predicting the stages of grief, the Care Team and TAPS organization can enhance the quality of life of survivors.



ANALYTICS PROBLEM FRAMING

ANALYTICS PROBLEM	ASSUMPTION	KEY METRIC
01 **Tokenizing Text** How do you translate text into processable data?	"Text is the best indicator of predicting a survivor's stage in the grief journey"	= PREDICTION ACCURACY
02 **Choosing Models** What models best depict the ongoing relationship?		
03 **Ensambling** How can we use multiple model approaches?		

RESEARCH QUESTION

How can data mining principles be leveraged to understand what stage of grief a TAPS survivor is in based on survey and text responses?

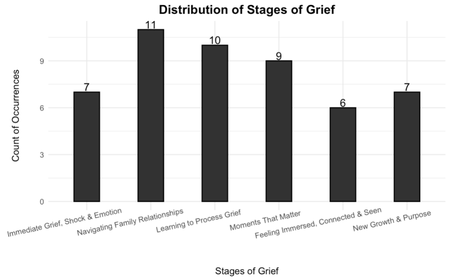
DATA

Data Overview

We were given 50 rows of data to train our model, where each row of data represented a survey response. Each row contained 20 columns of Likert-type questions/multiple choice questions and 2 columns of open-ended text data, which was translated into the English language. Our machine learning model predicted 2950 rows of unlabeled data, by classifying each survey respondent into 1 of 6 stages of grief in the survivor journey map.

Data Source

Data used in the Machine Learning Algorithm came from survey respondents after participating in Tragedy Assistance Program for Survivors (TAPS) seminars.



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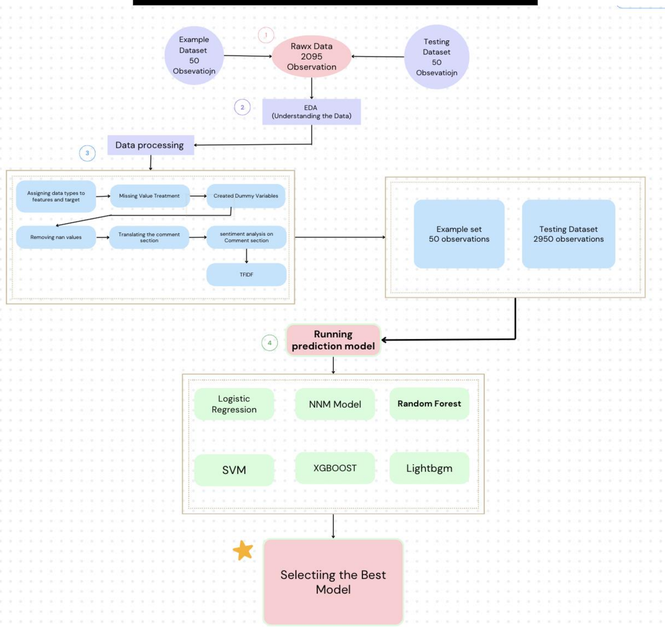
METHODOLOGY



MODEL BUILDING AND EVALUATION – STATISTCIAL PERFORMANCE

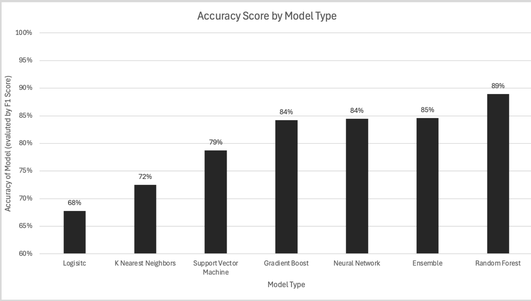
Model/Score	Private Score	Public Score	features
Logistic Regression	83.0%	83.0%	Translation Sentiment
SVM	78.7%	76.8%	Translation sentiment
Random Forest	90.26%	91.36%	Translation Sentiment
Random Forest V2.	89.91%	90.46%	Translation Sentiment Top features
LightBGM	77.8%	77.8%	TFIDF Translation
Neural Network	85.7%	84.8%	Sentiment

MODEL BUILDING AND EVALUATION - CONT.

To approach our problem, we utilized multiple model techniques in order to learn more about the trends found within the data. After completing multiple model types, our team engaged with an Ensamble modeling approach to see if the models as a sum could out preform any individual model; however, we ultimately learned that the Random Forest model with Language Translation and Sentiment Analysis fared the best.

MODEL EVALUATION – BUSINESS IMPLICATIONS

- Business validation of model/solution demonstrated
- Impact (actual or estimated) of using model/solution
- Audience/stakeholder feedback or testimony of business impact
- Future scope aligns with conclusions



CONCLUSIONS

The families of fallen service members deserve the best support as they go through their grief journey. Our research shows how data mining and generative AI can better equip TAPS to support individua survivors with the right resources at the right time.

For future work, we will focus on integrating LLM and machine learning to create a better representation of the survivor journey map.

The Survivor Journey Map

Other Survivors
Other Designation
Survivor Care Team
24/7 National Military Survivor Helpline
Next of Kin Referral
TAPS Website or Magazine

- TAPS Quarterly Magazine
- TAPS Institute for Hope and Healing Family Camp
- Online Community
- Care Groups
- Local Community Resources
- Virtual & In Person Population Specific Gatherings
- Relationship to Deceased
- Cause of Death
- Generational Level

- Special Date Cards and Emails
- TAPS Quarterly Magazine
- TAPS Institute for Hope & Healing
- TAPS Military Mentors
- Ongoing Survivor Care Team Outreach
- Sports & Entertainment

- Apply to be a Legacy Mentor
- Apply to be a Peer Mentor
- Engage in Young Adult Program
- TAPS Quarterly Magazine
- TAPS media (emails)
- TAPS Togethers
- Additional volunteer opportunities

Immediate Grief, Shock & Emotion

Overwhelmed, loss of purpose; shock and trauma emotions (isolation) present and challenging to understand

Individuals may struggle to deal with family responsibilities alone

Surviving Child: Feeling disconnected without guidance and attention from grieving adults

Awareness of resources

Safety for self and loved ones

Guidance & Acknowledgement

Mission critical

- 24/7 National Military Survivor Helpline
- Ongoing Survivor Care Team Outreach
- Casework Support
- Emergency Financial Benefits
- Education Benefits

Navigating Family Relationships

Experiencing tension between individuals within the family unit; lack of support from family members

Surviving Family Unit: Perception of other family members' grief experience

Each family member may be at different phases of their grief journey

Support for self and other family members

Benefits: life insurance probate support

Catered resources

Learning to Process Grief

Experiencing grief and learning to process those emotions

Surviving Child: Seeks guidance and acknowledgment of grief; benefit from opportunities to open up and process with kids in similar situations to normalize emotions.

Education & guidance navigating emotions

Community support

Safe space to process emotions

- National Military Survivor Seminars
- Regional Military Survivor Seminars
- Care Groups
- Family Camp
- Good Grief Camp
- Men's Programming
- Women's Empowerment
- Young Adults

Moments That Matter

Renewed experience of grief around anniversaries of loss, holidays, and special moments

Surviving Family Unit: Navigating special moments (sports, school achievements, moments that matter)

Independent grief processing

Reconnect with family

Continued grief support

Feeling Immersed, Connected & Seen

Finding new purpose and goals to begin moving towards Positive Integration

Surviving Family Unit: Connected to a broader community; support system; not the only person/ family experiencing loss

Safe space to process emotions

Maintain family connection/ healing

Maintain community

- Apply to be a Legacy Mentor
- Apply to be a Peer Mentor
- Engage in Young Adult Program
- TAPS Quarterly Magazine
- TAPS Together events
- Sports & Entertainment
- Additional volunteer opportunities

New Growth & Purpose

Healthy point in grief journey; feeling capable to help others and a desire to do so

Surviving Family Unit: Ready to give back to the TAPS community through mentorship programs, volunteering at charity drives & events, etc.

Continued grief support

Desire to expand community

Desire to support others

Survivor to Service Connection Points:

- Survivor Care Team
- Helpline
- Website
- Other Survivors
- Peer Mentors
- Quarterly Magazine
- Social Media