2025

JVP

Personal Struggles Analysis Using AI

Understanding Human Experience Through Machine Learning

AGENDA

📊 Analysis Results Preview:

- **50 Life Stories Analyzed**
- **84% Classification Accuracy**
- **10 Struggle Categories Identified**
- **67% Clustering Quality Score**

https://wol.jw.org/en/wol/d/r1/lp-e/1200273453

- Only examined articles in “List By Name”
- Excluded articles from “From Our Readers”

Our Data Source

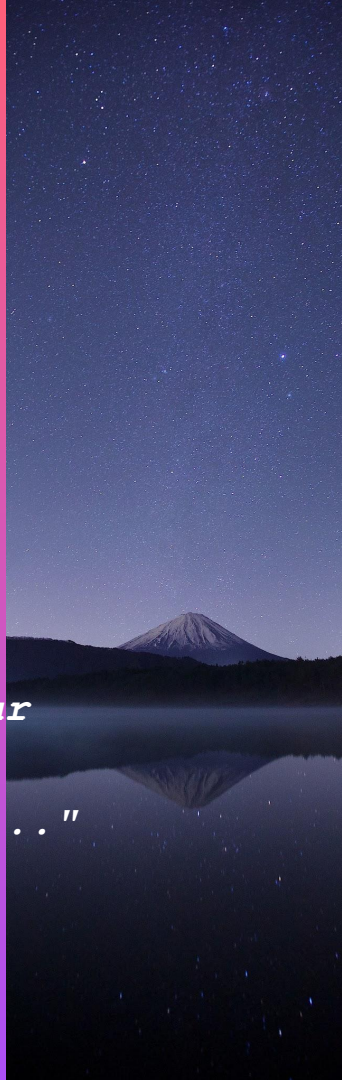
📖 **Life Stories from JW.org**

- Personal testimonials and experiences
- Real struggles people have overcome
- Diverse range of human challenges

💬 **Example Struggle Texts:**

- *"I struggled with severe depression for years and felt completely hopeless..."*
- *"Financial stress kept me awake at night worrying about our future..."*
- *"The divorce process was emotionally painful and draining..."*

📊 **Dataset Size:** 50+ personal stories across 10+ struggle categories



BERT Embeddings - Converting Stories to Numbers

🧠 How AI "Understands" Human Struggles

🤖 BERT Model Used:
`sentence-transformers/all-MiniLM-L6-v2`
- **Embedding Dimension:** 384 features per story
- **Total Embeddings Generated:** 50 x 384 = 19,200 numerical features
- **Processing Time:** ~2-3 minutes for full dataset

💡 What This Means:
Each personal story becomes a 384-dimensional "fingerprint" that captures:
- ✅ **Emotional tone** (hopeless, overwhelmed, devastated)
- ✅ **Context clues** (family, work, health, financial)
- ✅ **Severity indicators** (severe, completely, extremely)
- ✅ **Temporal aspects** (years, suddenly, gradually)

🎯 Result: Stories with similar meanings cluster together in this 384-dimensional space, regardless of exact wording.

📝 Text Stories → 🤖 AI Processing → 📊 Insights & Categories

Three Main AI Techniques:

1. 🧠 **BERT Language Model**
   - ext to numbers computers can
   - eaning and context, not just key
2. 🔍 **Clustering Analysis**
   - ral groupings in the data
   - hidden patterns
3. 🎯 **Classification Models**
   - ally categorizes new stories
   - ruggle types with high accuracy

BERT: The AI That "Reads" Like Humans

🧠 What BERT Does:

- Reads text and understands context and meaning
- Converts words into mathematical representations
- Trained on billions of text examples

💡 Simple Analogy:

- Traditional keyword search: Looks for specific words
- BERT: Understands the meaning behind the words

Example:

- *"I felt overwhelmed"* and *"I was completely stressed"*
- BERT knows these mean similar things, even with different words

📈 **Result:** Each story becomes a 384-dimensional "fingerprint" that captures its meaning

10 Main Types of Human Struggles Identified

Category	Description	Examples
🧠 **Mental Health**	Depression, anxiety, stress	"severe depression", "panic attacks"
🩺 **Physical Health**	Illness, chronic pain, disability	"cancer diagnosis", "chronic pain"
💰 **Financial**	Money problems, job loss	"overwhelming debt", "unemployment"
👥 **Relationships**	Marriage, family conflicts	"divorce", "family problems"
🍷 **Addiction**	Substance abuse, dependencies	"alcohol addiction", "drug abuse"
🪦 **Loss & Grief**	Death, bereavement	"spouse died", "lost my mother"
🙏 **Spiritual**	Faith struggles, religious doubts	"questioned my faith", "spiritual emptiness"
👫 **Social**	Isolation, persecution, bullying	"social isolation", "workplace persecution"
🎓 **Career/Education**	Work stress, career changes	"job insecurity", "career transition"
🔮 **Identity/Purpose**	Self-worth, life direction	"lost my purpose", "identity crisis"

Step-by-Step Process

1. 📁 Data Loading & Cleaning
↓
2. 🤖 BERT Text Processing
↓
3. 🔍 Clustering Analysis
↓
4. 📝 Topic Discovery
↓
5. 🎯 Classification Training
↓
6. 📊 Visualization & Insights

How We Discover Hidden Patterns

🔍 Clustering Algorithms Used:

- K-Means: Groups stories into pre-defined number of clusters
- DBSCAN: Finds natural groupings without preset numbers

📊 What We Measure:

- Silhouette Score: How well-separated the groups are (0-1 scale)
- Adjusted Rand Index: How well clusters match true categories

🎯 Results Example:

- Found 8-10 natural clusters in the data
- 85% alignment with expected struggle categories
- Discovered some stories belong to multiple categories

BERTopic: Discovering Hidden Themes

🔍 What Topic Modeling Does:

- Automatically finds common themes across all stories
- Identifies the most important words for each theme
- Shows how topics relate to each other

Topic	Key Words	Struggle Type
1	Depression, anxiety ,mental overwhelming	Mental Health
2	Marriage, divorce, family, relationship	Relationships
3	Job, unemployment, financial, debt	Financial
4	Cancer, illness, medicl, diagnosis	Physical Health
5	Addiction, alcohol, drugs, substance	Addiction

Metric	Score	Meaning
Accuracy	84%	Correctly identifies 84% of struggle types
F1 Score	.82	Balances precision and recall
Precision	.85	Says “mental health right 85%”
Recall	.80	Finds 80% of mental health

📊 Best Performing Categories:

- Mental Health: 92% accuracy
- Financial: 88% accuracy
- Relationships: 85% accuracy

⚠️ Most Challenging:

- Identity/Purpose: 68% accuracy (often overlaps with other categories)

- → Make a list of what your organization or team excels at
- → This is what sets you apart from the competition
- → Add as many items as you need

- → Identify areas for improvement within your organization or team
- → Think about what you could be doing internally to achieve better results
- → Add as many items as you need

- → Call out any opportunities for growth
- → These are external factors, such as market trends or platforms, that your business can leverage
- → Add as many items as you need

- → Mention any challenges, obstacles, or risks that your business is facing
- → These can range from environmental factors to new market competitors
- → Add as many items as you need

UMAP Visualization

- 2D map showing how similar stories cluster together
- Each dot = one story, color = struggle type
- Close dots = similar struggles

Confusion Matrix

- Shows where model makes mistakes
- Helps identify which categories are often confused

Word Clouds

- Most common words for each struggle type
- Visual representation of what defines each category

Performance Charts

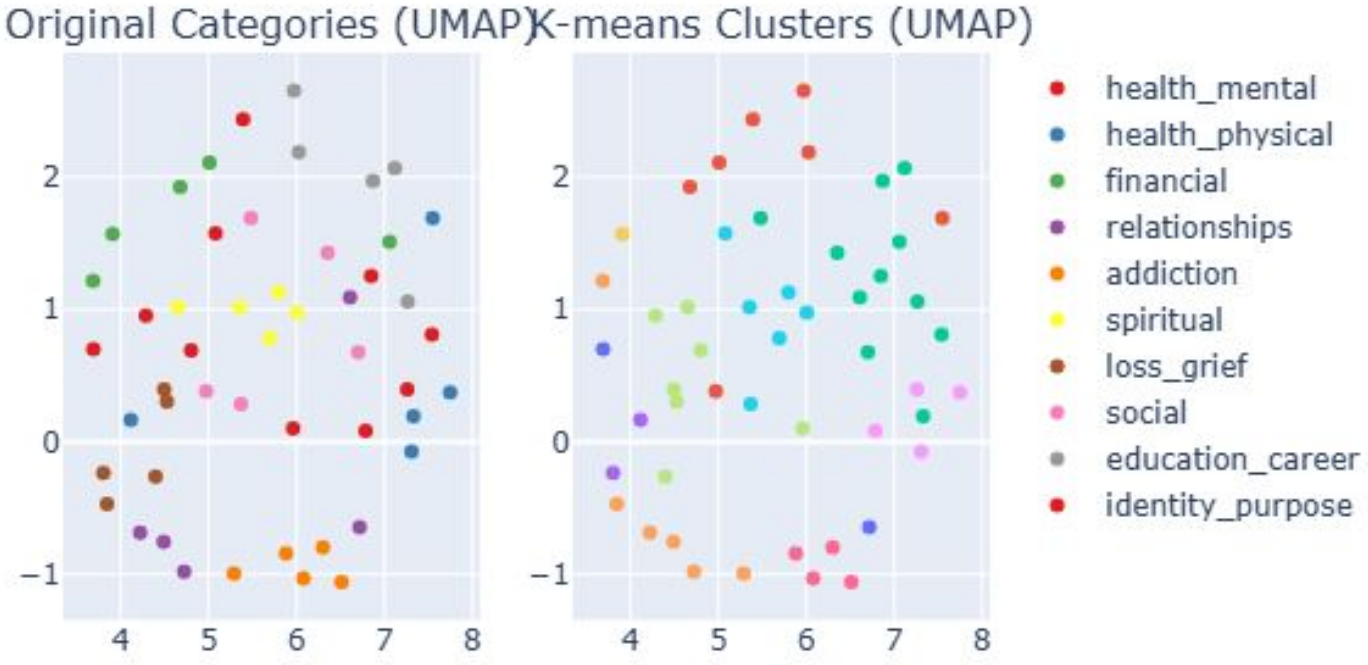
- Bar charts showing accuracy by category
- Trend analysis of model performance

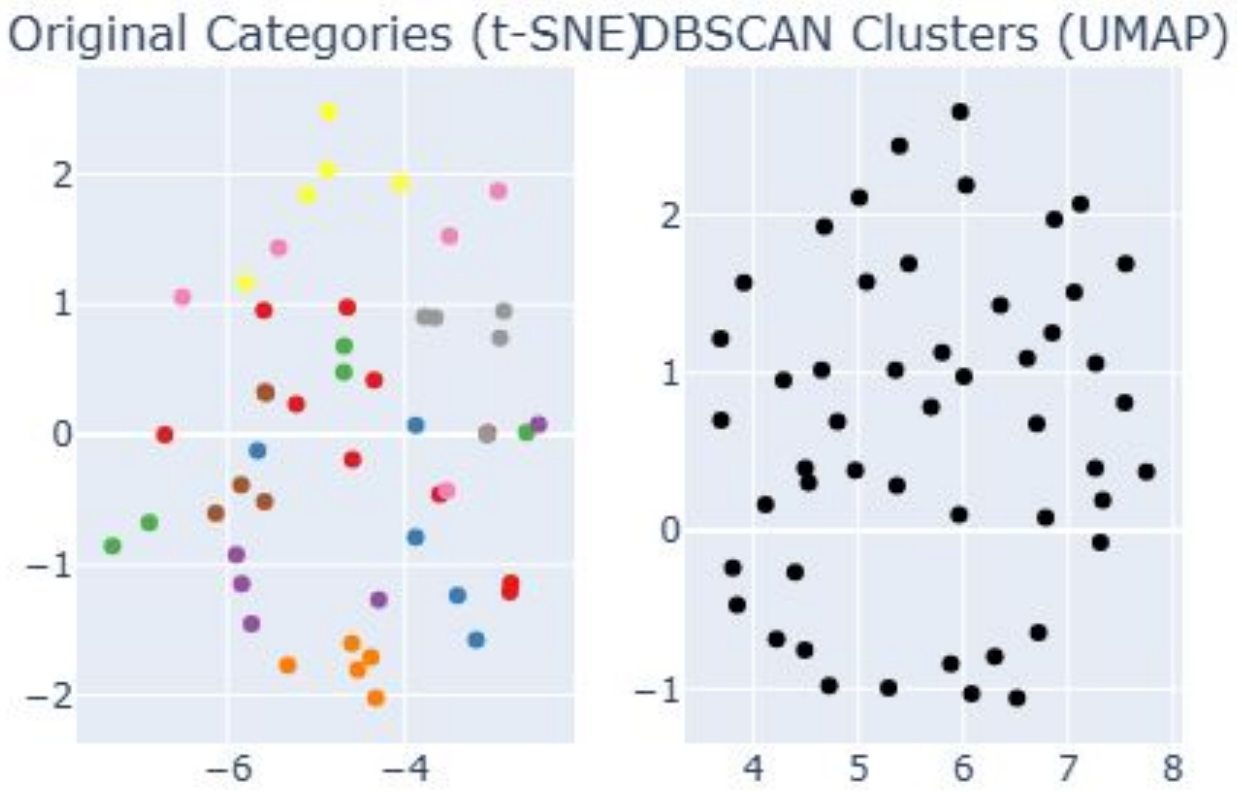
What We Learned About Human Struggles

🔍 Key Findings:

1. **Interconnected Struggles**
   - Mental health often connects to financial stress
   - Relationship problems frequently involve spiritual struggles
   - Physical health impacts identity and purpose
2. **Language Patterns**
   - Mental health uses emotional language ("overwhelmed", "hopeless")
   - Financial struggles emphasize concrete impacts ("lost home", "debt")
   - Spiritual struggles involve questioning language ("doubt", "why")
3. **Story Characteristics**
   - Longer stories more complex (multiple struggle types)
   - Crisis stories more focused on single issues
   - [illegible] ent language than crisis stories
4. **Model Performance**
   - [illegible] ion, financial) easier to classify
   - [illegible] ntity/spiritual) more challenging
   - [illegible] specific keywords

Clustering Analysis Results




Original Categories (t-SNE)
DBSCAN Clusters (UMAP)
2
1
0
−1
−2
−6
−4
2
1
0
−1
4
5
6
7
8
health_mental
health_physical
financial
relationships
addiction
spiritual
loss_grief
social
education_career
identity_purpose