Hi everyone, I'm Fan Gong. I worked on sentiment analysis and association rule mining for this project.

Our project is called *"Intelligent News Sentiment Analysis and Recommendation System"*, where we aim to make sense of large volumes of news using AI.

Nowadays, there's just too much news. It's hard to analyze everything manually and it's easy to misinterpret tone or sentiment.

So our goal was to automatically track the sentiment of news, extract entity-level emotional insights, and build a smart recommendation system based on that.

Our system has three layers:

The data layer uses HuffPost headlines from 2012 to 2025.

The analysis layer includes ensemble sentiment models and rule mining.

The application layer is built for real-time alerts and personalized recommendations.

We used three models: VADER, TextBlob, and a Transformer-based model.

Their outputs are combined using a weighted average: 0.4 for VADER, 0.3 for TextBlob, and 0.3 for Transformer.

Then, we extract named entities using SpaCy, and analyze the sentiment around them in context.

Here you can see entity-level sentiment results.

For example, "Donald Trump" has an average score of -0.16, while "America" is slightly positive at 0.04.

A t-test showed the difference is statistically significant, which confirms our model's precision.

Now for the association rules part, which I worked on.

We transformed the news into transaction data with category, sentiment label, and entities.

Using the Apriori algorithm, we discovered hidden patterns, like how political news about the "White House" often links to negative sentiment.

These are the top 5 rules with strong confidence and lift values.

One example is: "entity = FBI" strongly associates with negative sentiment — with a confidence over 83% and lift of 1.85.

This shows our rules are actionable and meaningful.

We made two key innovations:

First, dynamic domain adaptation — where we fine-tune sentiment weights based on the news category.

Second, entity-sentiment networks — where we propagate sentiment through entity co-occurrence graphs.

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We also built a real-time alert system for detecting negative news.

It uses ensemble scores to track key entities like "Donald Trump", triggering alerts when the sentiment score falls below -0.2.

This method reduces false alarms by 22% compared to using a single model.

One challenge in sentiment analysis is sarcasm.

We built a contradiction detector to catch headlines like "Fantastic pandemic handling!"

We identified 387 ironic headlines and filtered out 89% of false positives, improving sentiment accuracy.

Here are the highlights:

We detected over 185,000 negative headlines with 89% accuracy.

The best rule: "FBI → negative" with lift 1.85.

Our alert system flagged over 4,000 Trump-related alerts.

Each model had strengths: VADER handled slang, Transformer captured subtleties like irony.

We also built an interactive dashboard.

It features positive/negative word clouds and lets users explore sentiment by entity — for example, selecting "Trump" under "Politics" to see his sentiment trends.

Finally, our system can be applied in:

- Media monitoring: to detect emotional shifts in real-time.
- Recommendations: to reduce echo chambers and promote diverse perspectives.

That's my part. Thank you for listening! I'm happy to answer any questions about the sentiment or rule mining modules.