Munich Re: AI-Driven Climate Claims Analytics

- A Full Stack Pipeline – Excel → Python → ML → NLP → Power BI
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- 🗓️ June 2025

Munich Re Foundation
From Knowledge to Action

Executive Summary

- This project analyzes climate event-related insurance claims.
- Goal: Identify high-risk claims using Machine Learning and NLP.
- Tools: Excel, Python, Power BI, Hugging Face Transformers, scikit-learn.
- Outcome: Actionable dashboard for business insights and risk triaging.

Project Pipeline

- Excel (Raw Data)
- Python (Cleaning + Feature Engineering)
- ML (Risk Prediction)
- NLP (Text Classification)
- Power BI (Dashboard Visualization)
- 🛠️ Tools: Pandas | Scikit-learn | NLTK | Transformers | Power BI

Excel Sheets Breakdown

- 🗂️ 4 Sheets:
- **Sheet 1 – Raw_Data** (50 insurance claims)
- **Sheet 2 – Data_Cleaning** (Handling missing, standardizing)
- Sheet 3 – Feature_Engineering (Temp_Range, Claim_Risk_Level, etc)
- Sheet 4 - **Pivot_Analysis** (Business summaries)
- 📌 Pivot tables and Excel logic were used to prepare clean model-ready data.

Python Processing

- ✅ Tasks:
- Data Cleaning (fillna, outlier duplicates)
- Feature Engineering (labeling risk levels, temperature bands)
- ML Model: **Random Forest Classifier**
- Accuracy: 50% (on validation split)
- 🧠 Labels used:
- Low (< €7K), Medium (€7K–€13K), High (> €13K)

NLP on Customer Reports

- 🤖 Hugging Face Model: facebook/bart-large-mnli
- **Task:** Classify claim descriptions into severity levels:
- Minor
- Moderate
- Severe
- Example:
- *Text:* "The storm damaged roof tiles and caused flooding.“
- *Prediction:* **Severe**
- 🔍 Used for claim pre-screening and priority assignment.

Power BI Dashboard

- 🧩 Key Visuals:
- Claims by State and Event Type (Bar Chart)
- Risk Level Distribution (Donut Chart)
- Monthly Trends (Line Chart)
- Interactive Slicers (State, Year, Event)
- 📊 Clear, dynamic insights for underwriters and analysts.

Key Insights

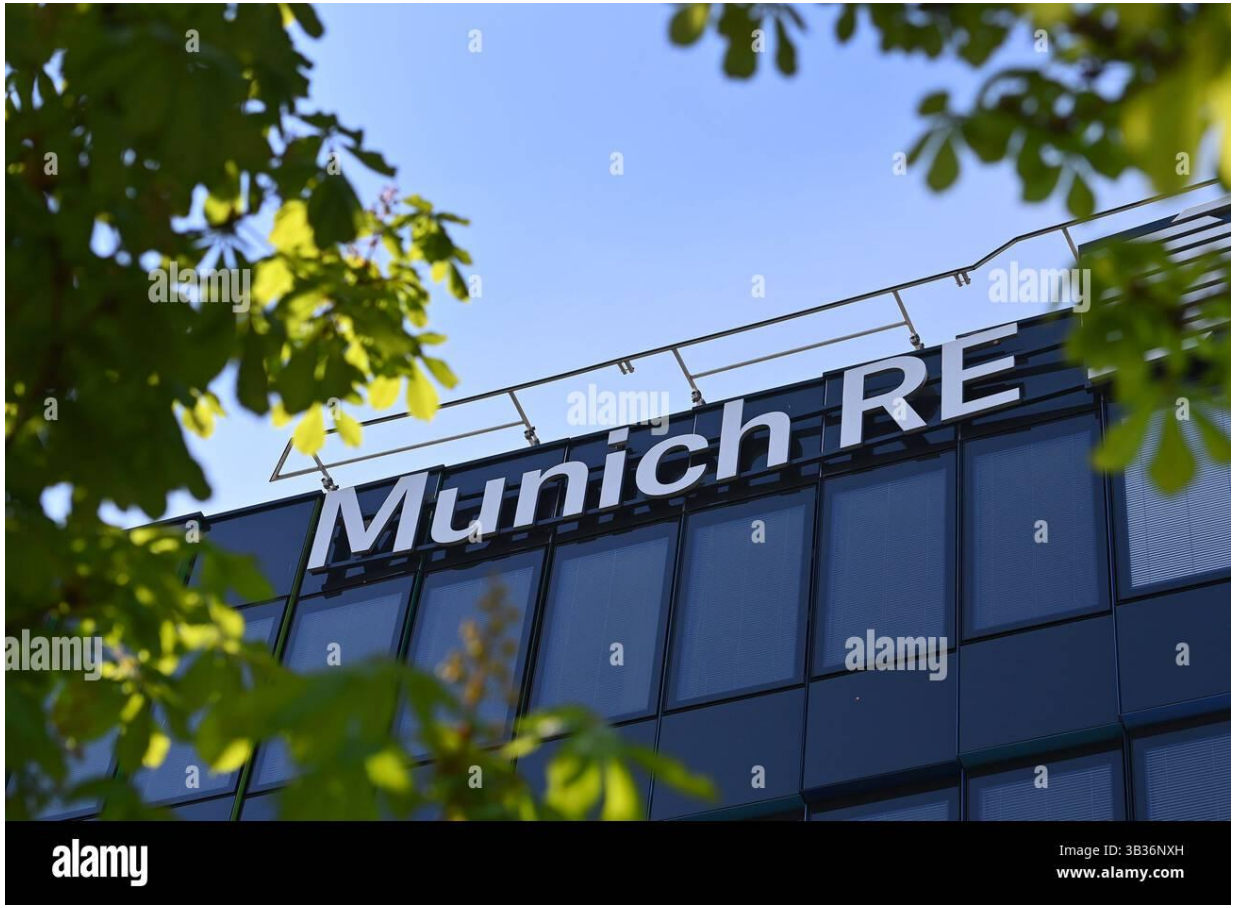
- **Flood** and **Storm** claims dominate high-risk categories.
- **Bavaria** has the highest average claim value.
- **Winter months (Dec–Feb)** see a rise in High Risk snow-related claims.
- NLP identified **15% of claims** as *Severe*, needing deeper review.

Business Value to Munich Re

- Improved early detection of high-risk claims
- Reduced claim processing time
- AI-powered flagging of severe cases
- Foundation for scalable automation in insurance analytics

Conclusion & Next Steps

- 📌 Completed:
- Data pipeline from Excel to Power BI
- ML + NLP integration
- Business-ready visuals and case study
- 🧭 Next:
- Scale to 1,000+ real claim entries
- Real-time NLP claim filtering
- Integrate with external weather APIs



Thank You

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- 🗂️ Project: Munich Re Climate Claims Pipeline
- 💻 Tools: Excel | Python | Hugging Face | Power BI