**📰 Fake News Detection System – Project Report**

**1. Project Objective**

The goal of this project is to develop a **machine learning-powered web application** that can automatically detect whether a news article is *real* or *fake*. This helps users identify misinformation and make more informed decisions in the digital age.

**2. Technologies Used**

#### 🔧 Backend:

* **Python**
* **Flask** – for creating the web server and handling predictions
* **scikit-learn, XGBoost, joblib** – for model training and saving

#### 🎨 Frontend:

* **HTML, CSS** – for layout and styling
* **JavaScript** – for form handling and real-time result display

### 3. ****Dataset****

* **Source**: Kaggle's "Fake and Real News Dataset"
* **Files Used**: True.csv (real news), Fake.csv (fake news)
* **Preprocessing**:
  + Merged and labeled both datasets
  + Removed duplicates
  + Text cleaned and vectorized using **TF-IDF**

### 4. ****Model Building****

#### Models Applied:

1. **Logistic Regression**
2. **Multinomial Naive Bayes**
3. **Support Vector Machine (LinearSVC)**
4. **Random Forest**
5. **XGBoost**

#### ✅ Vectorization:

* TfidfVectorizer with max\_df=0.7 and max\_features=5000

#### 🔁 Training Setup:

* 75% Training, 25% Testing (with stratified split)
* Saved best models using joblib

#### 🧪 Evaluation Metrics:

* **Accuracy**
* **Confusion Matrix**
* **Precision, Recall, F1-Score**

## ****5. Project Structure****

Fake\_News\_Detection\_project/

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├── static/

├─── css

│ └──── styles.css # CSS for styling

│ ├───── js

└──── script.js # JavaScript for interactivity

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├── templates/

│ └── index.html # HTML page served by Flask

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├── app.py # Flask application

├── Logistic Regression\_model.pkl # Trained ML model

├── tfidf\_vectorizer.pkl # TF-IDF vectorizer

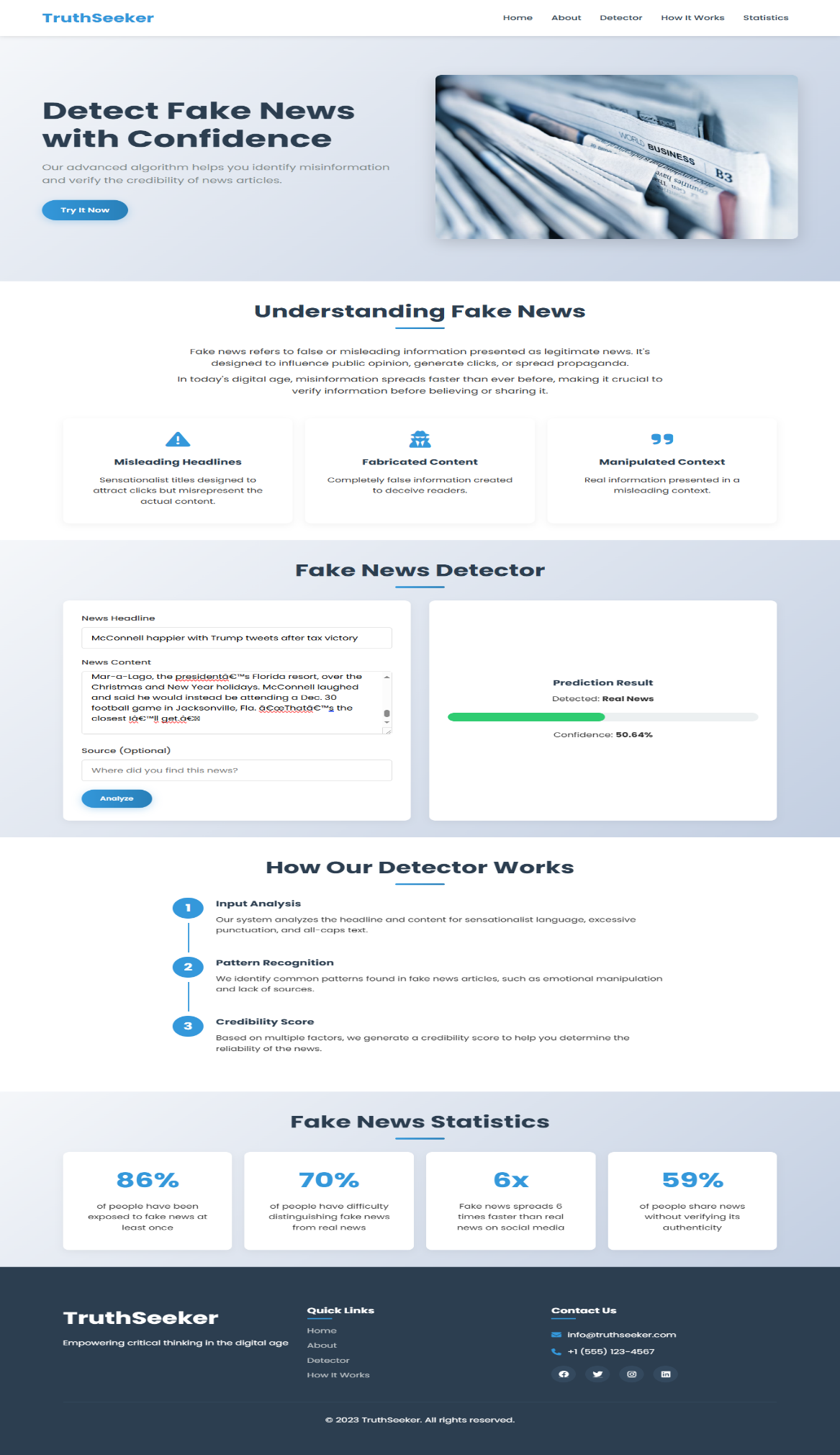
1. **How It Works**
2. **User** enters headline and content
3. **Frontend** sends the data to Flask
4. **Flask** vectorizes and predicts
5. **Model** returns result
6. **JS** shows result on screen with risk color bar
7. **Conclusion**

This Fake News Detection project combines **machine learning** with a fully functional **web interface** to make fake news identification easy and accessible. By analyzing headlines and article content, the app provides instant feedback on news credibility.

**📊 Results:**

| **Classes** |  |  | **Real (0)** |  |  | **Fake (1)** |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Model** | **Accuracy** | **Precision** | **Recall** | **F1-Score** | **Precision** | **Recall** | **F1-Score** |
| Naive Bayes | 93% | 93% | 94% | 93% | 94% | 93% | 94% |
| SVM | 99% | 99% | 100% | 99% | 100% | 99% | 100% |
| Logistic Regression | 98% | 98% | 98% | 98% | 98% | 98% | 98% |
| Random Forest | 98% | 98% | 99% | 98% | 99% | 98% | 98% |
| XG Boost | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

**Screenshot**

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