Air Pollution Challenge

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AGENDA

- Business goal and data
- Workflows
- Findings and recommendations
- Product and future work

BUSINESS GOAL

Help the African government **predict the air quality** of a city and implement preventive measures for the well-being of its residents.

AIR QUALITY INDEX

AQI Level	PM 2.5	Health Recommendation for 24hr exposure
Good (0-50AQI)	0-12	Air quality is satisfactory, and air pollution poses little or no risk.
Moderate (51-100AQI)	12.1-35.4	Air quality is acceptable. However, there may be a risk for some people, particularly those who are unusually sensitive to air pollution.
Unhealthy for Sensitive Groups (101-150 AQI)	35.5-55.4	Members of sensitive groups may experience health effects. The general public is less likely to be affected.
Unhealthy (151-200 AQI)	55.5-150.4	Some members of the general public may experience health effects; members of sensitive groups may experience more serious health effects.
Very Unhealthy (201-300 AQI)	150.5-250.4	Health alert: The risk of health effects is increased for everyone.
Hazardous (301 and above AQI)	250.5+	Health warning of emergency conditions: everyone is more likely to be affected.

Source: https://www.iqair.com/us/newsroom/what-is-aqi

DATA INFO AND SOURCES

Air-quality sensors

PM 2.5

Global weather forecast

Humidity

Wind speed

Temperature

Sentinel 5P satellite

GHG's

Sensor Angles

Clouds

PROJECT WORKFLOW

Call for precise prediction of air quality

↓

Diverse data collection
over 350 cities over a period of 3 months

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Evaluate PM 2.5 predictions as air quality target

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Impact analysis to create a multi-facetted model
of top 50 factors

TECHNICAL WORKFLOW

Data analysis & Cleaning

↓

Feature Engineering and Selection

↓

Ensemble Model

↓

Evaluate model performance by RMSE and optimization on a more precise prediction

FINDINGS

Important Features

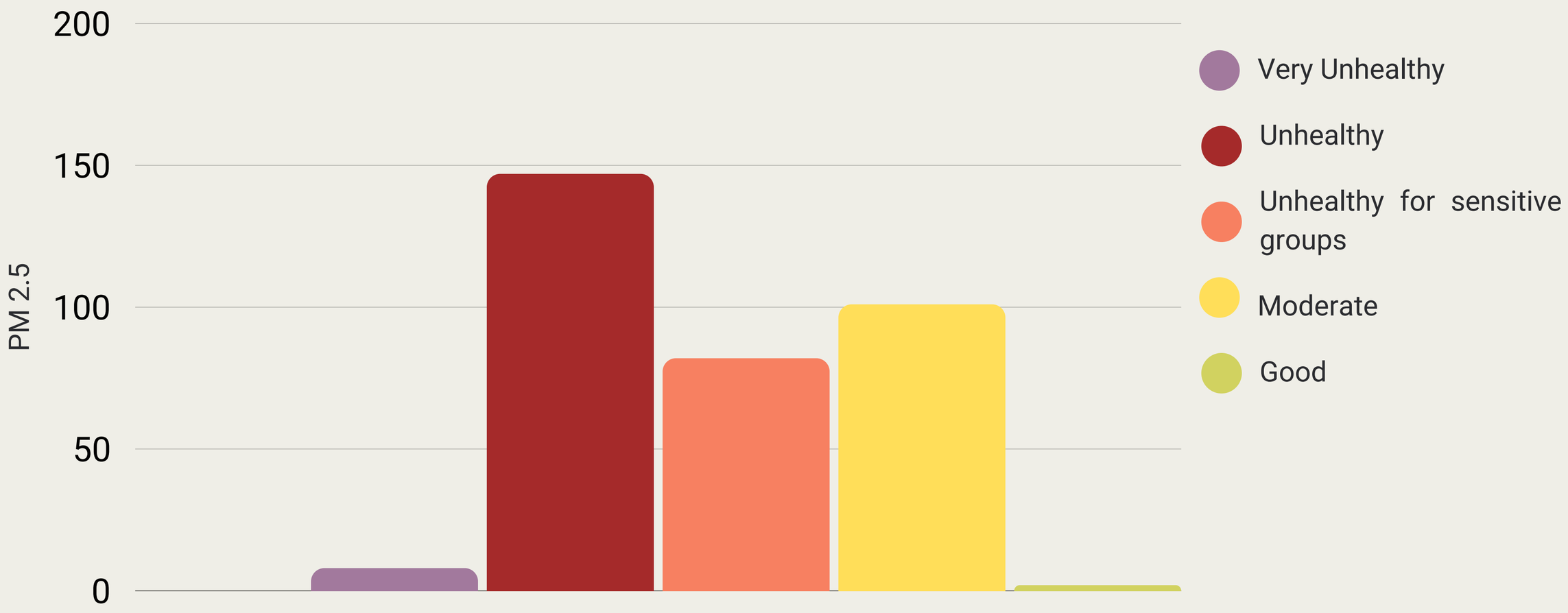
- Temperature 2m above ground
- V component of wind 10m above ground
- Cloud base pressure
- Cloud base height
- The density of pollutants like Aerosol, Formaldehyde, Carbon Monoxide and Sulphur Dioxide

Baseline vs Final Model	Baseline Model	Final Model
Train RMSE	31.21	30.77
Test RMSE	38.42	31.93

Shortcomings

- RMSE could be improved
  - The error could misclassify the air quality category
- Exclusion of methane
  - 80 % missing data
- A lot of data imputation
  - This could have led to adding information

AIR QUALITY ACROSS CITIES



RECOMMENDATIONS

Good (0-50AQI)	Moderate (51-100AQI)	Unhealthy for Sensitive Groups (101-150 AQI)	Unhealthy (151-200 AQI)	Very Unhealthy (201-300 AQI)	Hazardous (301 and above AQI)
• Share good news!	• Share good news! • Encourage outdoor activities	• Alerts for sensitive groups	• Share potential risks with public health advisories	• Emergency communication (text messages and social media)	• Emergency state & share emergency plans
	• Be mindful of vulnerable groups! • Share protection ideas to reduce exposure	• Alternatives for indoor activities for sensitive groups	• Limit outdoor exposure including outdoor work hours • Encouraging the use of public transportation • Promote the use of air purifiers in homes and public buildings	• Stay indoors, close windows, use air purifiers	• Provide clean air shelters, distribute masks • Support healthcare facilities • Limit vehicular traffic and industrial activities

PRODUCT AND FUTURE WORK

Web App - that can be included in the cities webpage

- SaaS product tailored for municipalities in African cities, connected to sensor data through APIs for seamless real-time data retrieval.
- Our model accurately predicts air quality and categorizes the Air Quality Index (AQI) level in real time based on your location.
- We provide recommendations and actions to take, guided by the current air quality conditions.

Future scope

- Work with local bodies and weather stations to incorporate more data
- Predict future air quality and provide recommendations in advance
- Improve RMSE