



RUTGERS-NEW BRUNSWICK
Artificial Intelligence
and Data Science Collaboratory

AI/ML Use Case: Investigating Corrosion Failures in Industrial and Water Infrastructure

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Image: Alamy

- Corrosion: electrochemical interaction between a metal surface and its environment.
- Ubiquitous in chemical plants and water infrastructure and costs billions in maintenance and repairs.
- Variables: pipe materials, mechanisms, pH, flow rate, temperature, hardness, anions, particulates, bubbles, flow duration, dissolved gases, turbulence, microbes, disinfectant, etc.
- Key challenge: **How to accurately identify corrosion failure from photos and case details and suggest evidence-based solutions (e.g., repair, replacement, alter fluid chemistry, etc.) to prevent reoccurrence?**
- *Keywords:* Image classification – Natural Language Processing – Corrosion Chemistry



- **Project Leads:** Aresty Research Undergraduates Aanand Aggarwal and Daniella Mangibin
- **Dataset** from a purchased book with 650+ case studies and images (*DRM free version*)
- **Data and image extraction** and classify into training and test datasets
- **Image preprocessing** to overcome small dataset limitation and enhance image quality and count
- Three **Convolutional Neural Networks** tested that extract features from raw pixel data and ascribe labels based on case text
- **Validation accuracy** >70% achieved
- **Future goals:**
 - Source additional corrosion case studies to expand our dataset and increase model accuracy
 - Create a mobile-based public-facing LLM to assist engineers with corrosion investigations