**Plastic Pollution and Mitigation**

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Github Link: [Capstone Project](https://github.com/SureshChinnasamy123/CCTCapstoneProject/tree/main)

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**Introduction:**

In 1907, plastic is created. The manufacture and consumption of plastics are rising daily at an exponential rate. Despite widespread public awareness of the negative effects of plastic use, little concrete is done to reduce plastic manufacture and its associated harm. (MOMENI, 2023)

Everyone should be aware of the detrimental effects that plastic usage has on all earthly creatures, both living and non-living. Immediate corrective measures need to be taken to address the global issue which is growing massively across the globe. Very few sustainable measures like recycling the plastics were taken to address this issue so far.

**Objectives:**

1. Plastic production and usage
2. Impact on Environments due to pollution
3. Controlling measures and Recycling
4. Alternative solutions to save our planet.

**Project Scope:**

Main purpose of the project is to understand key factors like increase in production of plastics every year, impact of plastics due to pollution and necessary sustainability measures to overcome the impact on the earth.

In this study, AI technology used to explore the models is Linear regressions for the historic data analysis and future prediction for plastic pollution and mitigation. This will help to create universal awareness and take necessary steps to control the plastic pollution and uncover the truth to present the reality.

**Details of Dataset:**

The report uses annual data submissions in 2020 for the analysis of global production patterns for plastics. Planning to use the raw data downloaded from the reference (K, 2023).

**Key Challenges:**

Collecting right quantifiable and more recent data as well as choosing the right references is a key challenge. In addition, filtering the necessary and meaningful data, choosing the right dataset for analysis, formatting the data is taking lot of time.

**Timeline:**

Below is the tentative timeline to track the different stages of the project and subject to change.

**Semester one:**

* Detailed study from references: 2 weeks
* Analysis of key challenges: 2 weeks
* Choosing and using right model for data analysis and future prediction: 3 weeks
* Impact analysis using various smaller datasets: 3 weeks
* Ongoing documentation: 2 weeks

**Semester two:**

* Using right model for historic data analysis and future prediction: 3 weeks
* Training the model with larger datasets: 3 weeks
* Validating the accuracy: 3 weeks
* Graphical presentation of the output: 1 week
* Ongoing documentation: 2 weeks

**Impact of Plastics:**

Plastic is cheap and easily available to use in various applications like home appliances, medical instruments, and food packaging. But when plastic waste is not recycled and managed properly, then it kept in sealed landfills, and 60% of plastics enters environment as a plastic waste(Zhang et al., 2021). One to two million tonnes of plastic enter our oceans yearly, affecting wildlife and ecosystems (MOMENI, 2023).

**Sustainability and Mitigation Strategy**

1- Rapid increase in Plastic production

It was not until the 1950s that the world's plastic output began to rise rapidly. The annual manufacturing of plastics has expanded about 230 times over the next 70 years, reaching 460 million tonnes in 2019. The last 20 years have seen a dramatic increase in the manufacturing of plastic worldwide (MOMENI, 2023).

Are there any such real demands for the massive production?

2- Generation of Plastics waste

Plastic pollution depends on how much of this waste is mismanaged. Non recycled plastic waste is kept in sealed landfills. Mismanagement will result in waste leaking to the environment. The discarded plastics over the days due to sunlight or ocean waves it can release microplastics, tiny particles are mixed with air, food, water, and turning up in tests of human blood. Around 400 million tons of plastic waste is generated according to a 2022 report from Organisation for Economic Co-operation and Development (Walsh, 2023).

how much of the waste is managed properly or recycled?

3- Recycling of Plastic waste

Only around 9% of the plastics were recycled so far. Half of the world’s plastic still goes straight to landfill. Another fifth is not recycled and kept in sealed landfills which is risk of being leaked into rivers and the ocean. (MOMENI, 2023)

Can we reduce the consumption as well as reuse and recycle the plastics?

4- Better plastic waste management

Environmental problem due to plastic pollution can be solved with the improvement in waste management strategies. Controlled production and planned consumption, recycling and using disposable plastics, imposing ban on the excess production will heal the damages created so far in the environment. (Kibria et al., 2023)

The reported global plastic scrap and waste fell by 50% over the past few years, from around 12.4 million metric tonnes per annum in 2017 to 6.2 Mt per annum in 2021. (Brown, Laubinger and Börkey, 2023).

**Conclusion:**

To preserve the environment and make it a better place to live for future generations, everyone must adhere to the three Rs: Reduce, Reuse, and Recycle Plastics (Kibria et al., 2023)   
Due of its connection to climate change and the release of harmful gases and toxins into the atmosphere, plastic waste is becoming a major worldwide issue and causes severe health complications. (Marie, 2016).

The increasing volume of plastic waste not only degrades soil fertility and contaminates groundwater but also heavily damages the surrounding ecosystems and marine environment. However, the conventional techniques of plastic management mainly involve open dumping or landfilling, burning and these processes ultimately cause environmental pollution rather than achieving sustainable waste management goals.

**Future Developments**

Research and funding for bioplastics continues to increase, costs to manufacture them will continue to decrease. Bioplastic companies allocate funds towards research and development to find the most efficient ways to produce bioplastics. (Parrish, 2020).

Industry revenue expected to reach over 10 billion in 2020 (www.ibisworld.com, 2023). Global plastic productions over the next 20 years from plants could double (Coren, 2016).

The desire for alternatives to plastic is predicted to drive growth in the bioplastics business. Algorithms based on artificial intelligence (AI) will significantly boost the capacity of research on molecular analyses by quickly producing predictions about modifications to an enzyme's molecular structure that may hasten the degradation of plastic. The researchers will then evaluate the enzyme variants and their different properties in the lab. (Walsh, 2023)

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