**Final Project Prospectus**

Title: Final Project Prospectus – UK Drought Susceptibility Analysis

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**Project Repository:** *<if applicable weblink to public repository>*

**Google Drive Link:** *<if applicable with data, notebooks, etc.>*

**Time Spent:** *2*

**Abstract**

*<Delete this text in light grey throughout>*

*250 words max. Clearly summarize the following major sections. Each gets one or two sentences.*

**Problem Statement**

*As our planet’s climate changes, specific nations and regions are going to face specific problems and threats. Over the summer of 2022, the United Kingdom was faced with a near-nationwide drought and heatwave of unprecedented severity (Rhoden-Paul, 2022). The reasons for this are complex and multifaceted; this project will attempt to use nationwide historical precipitation data from the UK Meteorological Office to discern trends in precipitation over time and to make assessments about regional drought susceptibility.*

*Table 1. Requirements for analysis*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **#** | **Requirement** | **Defined As** | **(Spatial) Data** | **Attribute Data** | **Dataset** | **Preparation** |
| 1 | Rainfall data | Raw input dataset from UK Met Office | Rainfall data on a 2km grid across the UK | Precipitation | [UK Met Office Climate Data Portal](https://climate-themetoffice.hub.arcgis.com/datasets/TheMetOffice::monthly-precipitation-observations-1991-2020/explore?location=55.217672%2C-3.312248%2C6.67) | TBD |
| 2 | High volume traffic | > 100 cars per hour |  | Volume | AADT Data |  |
| 3 |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |

**Input Data**

*Describe the data in two paragraphs max. Fill out the table.*

*Table 2. Expected data sources*

|  |  |  |  |
| --- | --- | --- | --- |
| **#** | **Title** | **Purpose in Analysis** | **Link to Source** |
| 1 | Monthly Precipitation Observations 1991-2020 | Raw 2km grid input dataset for rainfall analysis from UK Met Office | [UK Met Office Climate Data Portal](https://climate-themetoffice.hub.arcgis.com/datasets/TheMetOffice::monthly-precipitation-observations-1991-2020/explore?location=55.217672%2C-3.312248%2C6.67) |
| 2 | Monthly Precipitation Projections 2050-2079 | Comparative analysis of future rainfall patterns at a 12km grid | [UK Met Office Climate Data Portal](https://climate-themetoffice.hub.arcgis.com/datasets/TheMetOffice::monthly-precipitation-projections-2050-2079/explore) |
| 3 | Standardised Precipitation Index 5km Grid (1862-2015) | Comparative analysis of drought and precipitation levels | [UK Centre for Ecology and Hydrology Environmental Information Data Centre](https://catalogue.ceh.ac.uk/documents/233090b2-1d14-4eb9-9f9c-3923ea2350ff) |
| 4 | Integrated Hydrological Unites of the United Kingdom | Hydrological region maps of the UK | [UK Centre for Ecology and Hydrology Environmental Information Data Centre](https://catalogue.ceh.ac.uk/documents/3a4e94fc-4c68-47eb-a217-adee2a6b02b3) |

**Methods**

*Include a data flow diagram or screenshot from model builder. Do references in line (Rammankutty, 2033). Document any and all steps that you did to the input data in the data flow diagram. Provide natural language description of the most important steps, giving a narrative arc and provide well formatting screenshots with a boarder and centered throughout.*

*Resources on Data Flow Diagrams:*

* [*https://www.visual-paradigm.com/tutorials/data-flow-diagram-dfd.jsp*](https://www.visual-paradigm.com/tutorials/data-flow-diagram-dfd.jsp)
* [*https://www.lucidchart.com/pages/data-flow-diagram/how-to-make-a-dfd*](https://www.lucidchart.com/pages/data-flow-diagram/how-to-make-a-dfd)

*Figure 1. Data flow diagram.*

*If appropriate, add in pseudo-code describing model algorithms and/or objects. If using mathematical equations, create a clear mapping between the reference equation, pseudo-code, and actual implementation in a programming language.*

**Results**

*Show the results in figures and maps. Describe how they address the problem statement.*

*Follow best practice for map design, coloring, etc.*

**Results Verification**

*Data will be compared to the following data sources:*

* *UK Centre for Ecology and Hydrology’s 5km Standard Precipitation Index data, available from December 1961 to July 2022 (Barker et al., 2016) (Svensson et al., 2017)*
  + [*https://eip.ceh.ac.uk/droughts*](https://eip.ceh.ac.uk/droughts)
* *UK Met Office monthly 12km precipitation projections 2050-2079 (UK Met Office, 2021)*
  + [*https://climate-themetoffice.hub.arcgis.com/datasets/TheMetOffice::monthly-precipitation-projections-2050-2079/about*](https://climate-themetoffice.hub.arcgis.com/datasets/TheMetOffice::monthly-precipitation-projections-2050-2079/about)

**Discussion and Conclusion**

*What did you learn? How does it relate to the main problem?*

**References**

Barker, L. J., Hannaford, J., Chiverton, A., & Svensson, C. (2016). From meteorological to hydrological drought using standardised indicators. *Hydrology and Earth System Sciences*, *20*(6), 2483–2505. https://doi.org/10.5194/hess-20-2483-2016

Rhoden-Paul, A. (2022, September 1). Heatwave: England has had joint hottest summer on record, Met Office says. *BBC News*. https://www.bbc.com/news/uk-62758367

Svensson, C., Hannaford, J., & Prosdocimi, I. (2017). Statistical distributions for monthly aggregations of precipitation and streamflow in drought indicator applications. *Water Resources Research*, *53*(2), 999–1018. https://doi.org/10.1002/2016WR019276

UK Met Office. (2021, November 5). *Monthly Precipitation Projections 2050-2079*. https://climate-themetoffice.hub.arcgis.com/datasets/TheMetOffice::monthly-precipitation-projections-2050-2079/explore

**Self-score**

|  |  |  |  |
| --- | --- | --- | --- |
| **Category** | **Description** | **Points Possible** | **Score** |
| **Structural Elements** | All elements of a lab report are included **(2 points each)**:  Title, Notice: Dr. Bryan Runck, Author, Project Repository, Date, Abstract, Problem Statement, Input Data w/ tables, Methods w/ Data, Flow Diagrams, Results, Results Verification, Discussion and Conclusion, References in common format, Self-score | 28 |  |
| **Clarity of Content** | Each element above is executed at a professional level so that someone can understand the goal, data, methods, results, and their validity and implications in a 5 minute reading at a cursory-level, and in a 30 minute meeting at a deep level **(12 points)**. There is a clear connection from data to results to discussion and conclusion **(12 points)**. | 24 |  |
| **Reproducibility** | Results are completely reproducible by someone with basic GIS training. There is no ambiguity in data flow or rationale for data operations. Every step is documented and justified. | 28 |  |
| **Verification** | Results are correct in that they have been verified in comparison to some standard. The standard is clearly stated **(10 points)**, the method of comparison is clearly stated **(5 points)**, and the result of verification is clearly stated **(5 points)**. | 20 |  |
|  |  | 100 |  |