

- DIRECT Project -

EASE

- Electricity Analysis Suggestion Ensemble -

Team 6

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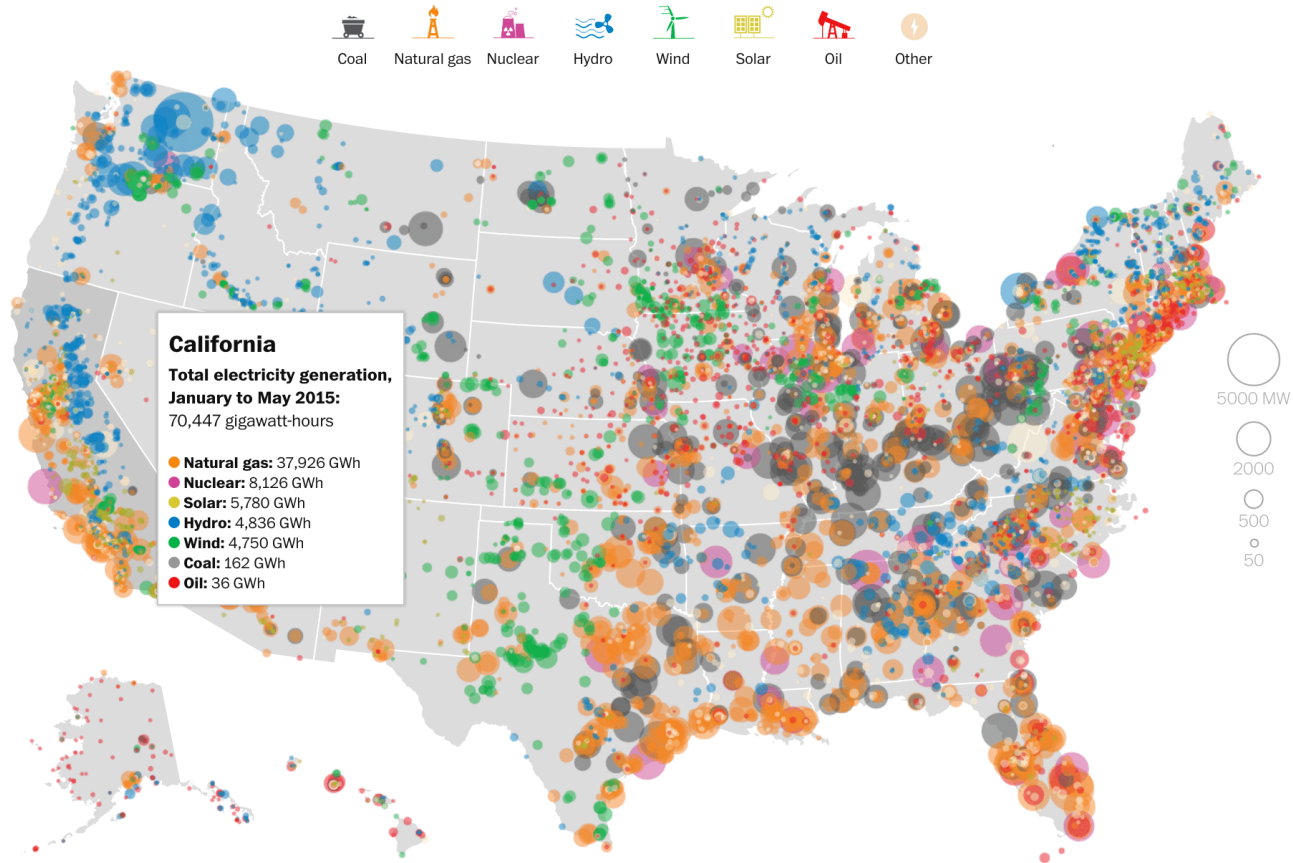
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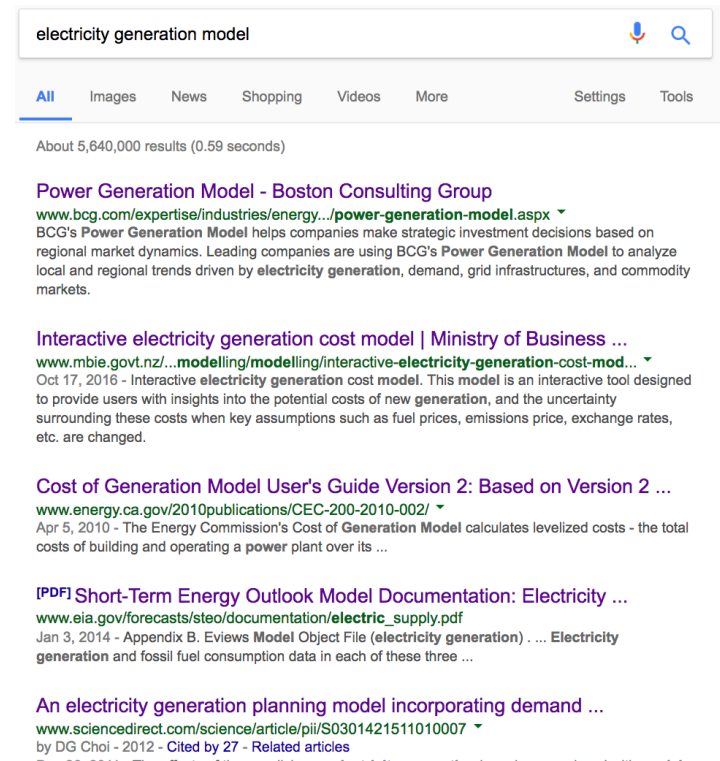
Project Background

Plant capacity by power source in megawatts



Project Background

- > No electricity generation source model existed that incorporates weather, cost, and CO₂ emission as consideration combined.
- > Several separated models existed at high cost
 - New Zealand Interactive Electricity Generation Cost Model 2010
 - U.K. Gov. Electricity Generation Cost Model



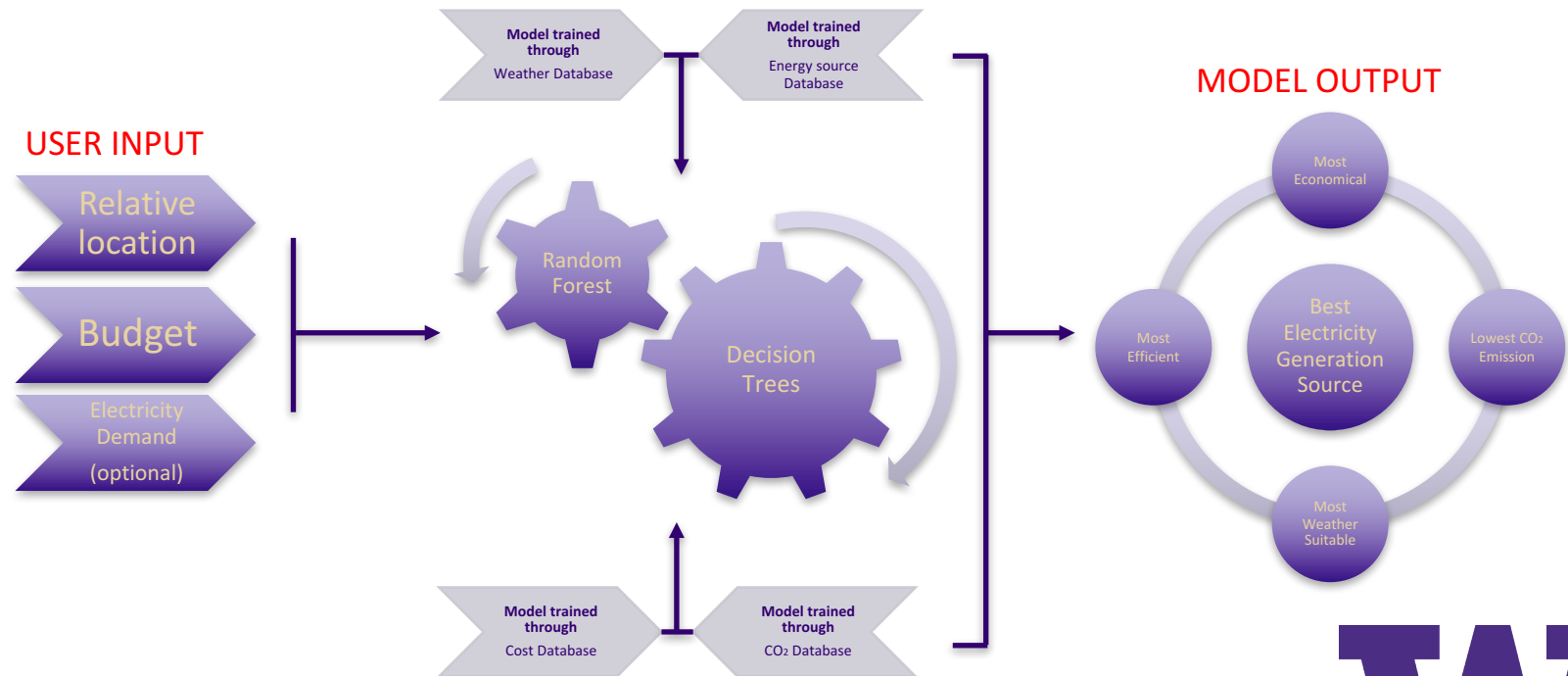
Project Proposal

- > Electricity is one of the major energies being utilized in all sectors (Governmental, Residential, Industrial)
- > Electricity is generated through different sources
 - Conventional (Petroleum, Coal, Natural Gas, etc.)
 - Unconventional (Wind, Hydro, Solar, Nuclear, Biofuel, etc.)
- > Conventionally generated electricity is accompanied by high CO₂ emission, often associated with different levels of CO₂ taxation depending on the state.
- > Unconventionally generated electricity is often accompanied with various degree of costs and limitations
 - Weather, location, technology as limitations
 - Installation and maintenance costs, revenue

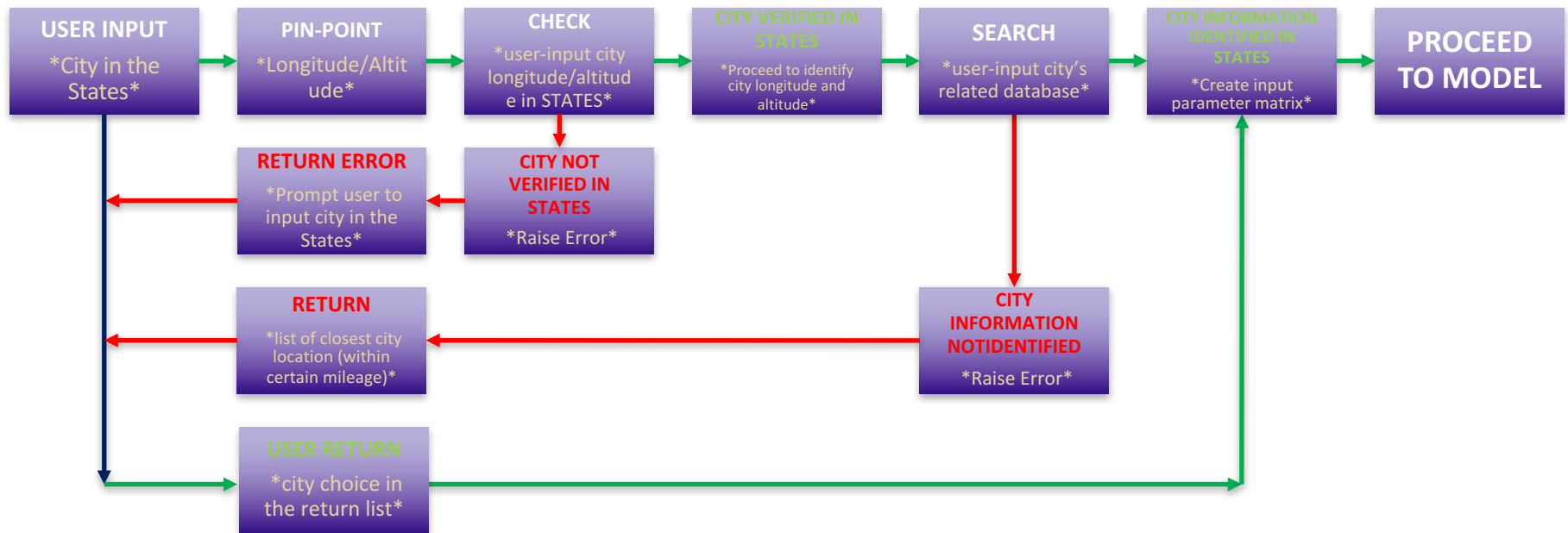


Project Objective

- > Develop a predicative model using ML to provide users suggestions on the best electricity generation source type.



User Case Example



Database in hands

> Electricity Usage / Generation Source Database ([link](#))

YEAR	STATE	TYPE OF PRODUCER	ENERGY SOURCE	GENERATION (Megawatthours)
1990	AK	Total Electric Power Industry	Total	5,599,506
1990	AK	Total Electric Power Industry	Coal	510,573
1990	AK	Total Electric Power Industry	Hydroelectric Conventional	974,521
1990	AK	Total Electric Power Industry	Natural Gas	3,466,261
1990	AK	Total Electric Power Industry	Nuclear	407,448

> Annual Weather Information Database ([link](#))

WBAN Number	Name	Location	Latitude	Longitude	YearMonthDay	Avg Temp	Mean Station Pressure	Total Monthly Precip	Avg Wind Speed	Avg HDD	Avg CDD
3013	LAMAR, CO	LAMAR MUNICIPAL	38.04	-102.41	20001130	33.8	26.19	0.06	8.6	31	0
3016	RIFLE, CO	GARFIELD COUNTY AIRPORT	39.32	-107.44	20001130	29.5	24.49	0.72	3.8	35.3	0
3017	DENVER, CO	DENVER INTERNATIONAL AP	39.5	-104.4	20001130	28.9	24.56	0.6	8.4	35.8	0
3024	BORGER, TX	HUTCHINSON COUNTY AIRPORT	35.42	-101.23	20001130	41.9	26.87	0.01	9.1	11.9	0

> Financial Cost Dataset ([link](#))

Year	State	Producer Type	Energy Source	CO2 (Metric Tons)	SO2 (Metric Tons)	NOx (Metric Tons)
1990	AK	Commercial Cogen	All Sources	824,004	13,198	3,011

Revenue from Sales to Ultimate Customers (Thousand Dollars) by State by Provider, 1990-2015								
Year	State	Industry Sector Category	Residential	Commercial	Industrial	Transportation	Other	Total
2015	AK	Total Electric Industry	405,270	481,839	196,314	0	NA	1,083,422
2015	AL	Total Electric Industry	3,731,831	2,538,645	2,021,316	0	NA	8,291,793

- Installation cost and maintenance cost vary greatly by states, database is in search*

