



U.S. AIR FORCE

Data X

Real Life NLP Project for Military Assessments

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Data X

Overview

- Situation and Problem Statement
- Our Solution
 - Final Architecture
 - Python Functions
- Learning path
- Challenges
- Future Work



Data

Enlisted Performance Report (EPR)

- Required by the United States Air Force (USAF) as a form of evaluation for all enlisted airmen
- The EPR requires multiple bulleted lists of airmen accomplishments and comments on airmen performance
- Follow strict formatting conventions and acceptable abbreviations



ENLISTED PERFORMANCE REPORT (AB thru TSgt)				
PRIVACY ACT STATEMENT				
<p>AUTHORITY: Title 10 United States Code (U.S.C.) 8013, Secretary of the Air Force; AFI 36-2406, and Executive Order 13397 (SSN), as amended.</p> <p>PURPOSE: Used to document effectiveness/duty performance history; promotion; school and assignment selection; reduction-in-force; control roster; reenlistment; separation; research and statistical analysis.</p> <p>ROUTINE USES: May specifically be disclosed outside the DoD as a routine use pursuant to 6 U.S.C. 562a(b)(3). DoD Blanket Routine Uses apply.</p> <p>DISCLOSURE: Voluntary. Not providing SSN may cause form to not be processed or to positively identify the person being evaluated</p> <p>SORN: F030 AF PCA, Effectiveness/Performance Reporting Records</p>				
I. RATEE IDENTIFICATION DATA (Refer to AFI 36-2406 for instructions on completing this form)				
1. NAME (Last, First, Middle Initial) JONES, MIKE, M	2. SSN 123-45-6789	3. RANK SSgt	4. DAFSC <input checked="" type="checkbox"/> 1A171	
5. ORGANIZATION, COMMAND, AND LOCATION Ice Age ENT, Houston TX		6. PAB CODE TP1LFVWW	7. FDID LPC0FVWW	
8. PERIOD OF REPORT (DD Month YYYY) From: 09 Oct 2017 Thru: 09 Oct 2017	9. NO. DAYS NON-RATED 180	10. NO. DAYS SUPERVISION 80	11. REASON FOR REPORT ANNUAL	<input checked="" type="checkbox"/>
II. JOB DESCRIPTION				
1. DUTY TITLE C-5 Flight Engineer				
2. KEY DUTIES, TASKS, AND RESPONSIBILITIES (Primary and Additional Duties) (Minimum of 1 line, but limited to 4 lines)				
<ul style="list-style-type: none"> - Performs as primary aircrew member in both Flight Engineer and Scanner crew positions on the C-5M Super Galaxy - Monitors engine, pneumatic, electric, hydraulic & pressurization systems during preflight, thru-flight & in-flight ops - Computes aircraft performance data for normal & emergency flight conditions and maintains in-flight documentation - Conducts preflight, in-flight & post-flight inspections; ensures systems integrity & coordinates w/Mx during gnd ops 				
III. PERFORMANCE IN PRIMARY DUTIES/TRAINING REQUIREMENTS (Using AFI 36-2010. The Enlisted Force Structure, as the standard of performance expectations commensurate with the ratee's rank, assess to what degree the ratee complied with the following performance expectations.)				
<p>1. Task Knowledge/Proficiency: Consider the quality, quantity, results, and impact of the Airman's knowledge and ability to accomplish tasks. Initiative: Motivation: Describe the degree of willingness to execute duties, motivate colleagues, and develop innovative new processes. Skill Level Upgrade Training: Consider skill level upgrading course, CDC timeliness completion, course exam results, and completion of core task training. Duty Position Requirements, Qualifications, and Certifications: Consider duty position qualifications, career field certifications (if applicable), and readiness requirements. Training of Others: Consider the impact the Airman made training others.</p>				
Not-Rated	Met some but not all expectations	Met all expectations	Exceeded some, but not all expectations	Exceeded most, if not all expectations <input checked="" type="checkbox"/>
2. COMMENTS (Minimum 1 line, but limited to 6 lines)				
<ul style="list-style-type: none"> - Flew 350 hrs/50 sorties w/9 cbt spc; dlv'd 1.8M lbs cgo/600 prsmn--fulfilled AMC taskers f/EUCOM/PACOM forces - Transported Army Signal Battalion; ferried 2 satellite terminals/93K lbs--extended SATCOM range/resources f/ANA - Spf'd Op INHERENT RESOLVE; ID'd inop fuel valve/dvl'd in-flt solution--dply'd CRW forces/90K lbs cgo on time - Alft'd USN WSS repair kit; ferried F-18 engine/armament loading eqpmnt--enabled sea/air ops f/USS Ronald Reagan - Sq/CC sel f/DTRA spt msn; pn'd 31K lbs classified eqpmnt on sched--reinforced US ballistic missile defense network - FTAC luncheon speaker; counseled 6 Amn on EFS & detailed CEA re-train ops--deliberately dvlpd next-gen Airmen 				
IV. FOLLOWERSHIP/LEADERSHIP				
<p>1. Resource Utilization (e.g. Time Management, Equipment, Manpower, and Budget): Consider how effectively the Airman utilizes resources to accomplish the mission. Complies with/Enforces Standards: Consider personal adherence and enforcement of fitness standards, dress and personal appearance, customs and courtesies, and professional conduct. Communication Skills: Describes how well the Airman receives and relays information, thoughts, and ideas up and down the chain of command (includes listening, reading, speaking, and writing skills); fosters an environment for open dialogue. Caring, Respectful, and Dignified Environment (Teamwork): Rate how well the Airman selflessly considers others, values diversity, and sets the stage for an environment of dignity and respect; to include promoting a healthy organizational climate.</p>				
Not-Rated	Met some but not all expectations	Met all expectations	Exceeded some, but not all expectations	Exceeded most, if not all expectations <input checked="" type="checkbox"/>
2. COMMENTS (Minimum 1 line, but limited to 2 lines)				
<ul style="list-style-type: none"> - Led 3 UCC exs; coord'd actions w/C2 agencies--ensured Sq readiness f/real-world emer...secured Wg IG "Excellent" - Instructed 2 CT sessions; brf'd Sq/Gp negative trends/departure planning/afid procedures--reinforced SII's f/12 CEAs 				
V. WHOLE AIRMAN CONCEPT (Not applicable if Airman receives Referral comments in Sections II-IV or if an Airman receives a "Met some but not all" rating.)				
<p>1. Air Force Core Values: Consider how well the Airman adopts, internalizes, and demonstrates our Air Force Core Values of Integrity First, Service Before Self, and Excellence in All We Do. Personal and Professional Development: Consider the amount of effort the Airman devoted to improving themselves and their work center/through education and involvement. Esprit De Corps and Community Relations: Consider how well the Airman promotes camaraderie, embraces esprit de corps, and acts as an Air Force ambassador.</p>				
Not-Rated	Met some but not all expectations	Met all expectations	Exceeded some, but not all expectations	Exceeded most, if not all expectations <input checked="" type="checkbox"/>
2. COMMENTS (Minimum 1 line, but limited to 2 lines)				
<ul style="list-style-type: none"> - Completed CCAF rqmts; earned 3 credits f/Aviation Ops deg--incr'd prof dvlpmnt/mentored 2 toward education goals - Conducted Middle School C-5M tour; briefed acft msn/global impact f/30 students--dlv'd AF msg to lcl community 				
AF FORM 910, 20151130, V3		PREVIOUS EDITIONS ARE OBSOLETE		PRIVACY ACT INFORMATION: The information in this form is FOR OFFICIAL USE ONLY. Printed 14IN the Privacy Act of 1974.
Prescribed by: AFI 36-2406				

<p>Personal Data</p> <p>Job Description</p> <p>Duties, Tasks and Responsibilities</p> <p>Performance Primary Duties and Training Requirements Rating</p> <p>Followership/Leadership Rating</p> <p>Whole Airman Concept Rating</p>	<p>The screenshot shows the AF Form 910, Enlisted Performance Report (AB thru TSgt). The form is divided into several sections:</p> <ul style="list-style-type: none"> I. RATEE IDENTIFICATION DATA: Fields include Name (Jones, Mike M), SSN (123-45-6789), Rank (SSgt), DAFSC (1A171), Organization (Ice Age ENT, Houston TX), PAB Code (TP1LFVWW), and FID (LPC0FVWW). II. JOB DESCRIPTION: Duties listed: C-5 Flight Engineer. III. PERFORMANCE IN PRIMARY DUTIES/TRAINING REQUIREMENTS: A grid for rating performance levels (Not-Rated, Met some but not all expectations, Met all expectations, Exceeded some, but not all expectations, Exceed most, if not all expectations) across five categories. IV. FOLLOWERSHIP/LEADERSHIP: A grid for rating performance levels across five categories. V. WHOLE AIRMAN CONCEPT: A grid for rating performance levels across five categories. Comments Section: A large red arrow points to the bottom right of the form, specifically to the "Comments" section where comments are written.
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- Computes aircraft performance data for normal & emergency flight conditions and maintains in-flight documentation
- Conducts preflight, in-flight & post-flight inspections; ensures systems integrity & coordinates w/Mx during gnd ops

III. PERFORMANCE IN PRIMARY DUTIES/TRAINING REQUIREMENTS (*Using AFI 36-2618. The Enlisted Force Structure, as the standard of performance expectations commensurate with the ratee's rank; assess to what degree the ratee complied with the following performance expectations.*)

1. Task Knowledge/Proficiency: Consider the quality, quantity, results, and impact of the Airman's knowledge and ability to accomplish tasks. **Initiative/Motivation:** Describes the degree of willingness to execute duties, motivate colleagues, and develop innovative new processes. **Skill Level Upgrade Training:** Consider skill level awarding course, CDC timeliness completion, course exam results, and completion of core task training. **Duty Position Requirements, Qualifications, and Certifications:** Consider duty position qualifications, career field certifications (*if applicable*), and readiness requirements. **Training of Others:** Consider the impact the Airman made training others.

Not-Rated	Met some but not all expectations	Met all expectations	Exceeded some, but not all expectations	Exceed most, if not all expectations
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

2. COMMENTS (*Minimum 1 line, but limited to 6 lines*)

- Flew 350 hrs/50 sorties w/9 cbt spt; dlvr'd 1.8M lbs cgo/600 prsnl--fulfilled AMC taskers f/EUCOM/PACOM forces
- Transported Army Signal Battalion; ferried 2 satellite terminals/93K lbs--extended SATCOM range/resources f/ANA
- Spt'd Op INHERENT RESOLVE; ID'd inop fuel valve/dvlp'd in-flt solution--dply'd CRW forces/90K lbs cgo on time
- Alft'd USN WSS repair kit; ferried F-18 engine/armament loading eqpmt--enabled sea/air ops f/USS Ronald Reagan
- Sq/CC sel f/DTRA spt msn; psn'd 31K lbs classified eqpmt on sched--reinforced US ballistic missile defense network
- FTAC luncheon speaker; counseled 6 Amn on EFS & detailed CEA re-train ops--deliberately dvlp'd next-gen Airmen

IV. FOLLOWERSHIP/LEADERSHIP

1. Resource Utilization (e.g. Time Management, Equipment, Manpower, and Budget): Consider how effectively the Airman utilizes resources to accomplish the mission. **Complies with/Enforces Standards:** Consider personal adherence and enforcement of fitness standards, dress and personal appearance, customs and courtesies, and professional conduct. **Communication Skills:** Describes how well the Airman receives and relays information, thoughts, and ideas up and down the chain of command (includes listening, reading, speaking, and writing skills); fosters an environment for open dialogue. **Caring, Respectful, and Dignified Environment (Teamwork):** Rate how well the Airman selflessly considers others, values diversity, and sets the stage for an environment of dignity and respect; to include promoting a healthy organizational climate.

Not-Rated	Met some but not all expectations	Met all expectations	Exceeded some, but not all expectations	Exceed most, if not all expectations
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

2. COMMENTS (*Minimum 1 line, but limited to 2 lines*)

- Led 3 UCC exs; coord'd actions w/C2 agencies--ensured Sq readiness f/real-world emer...secured Wg IG "Excellent"

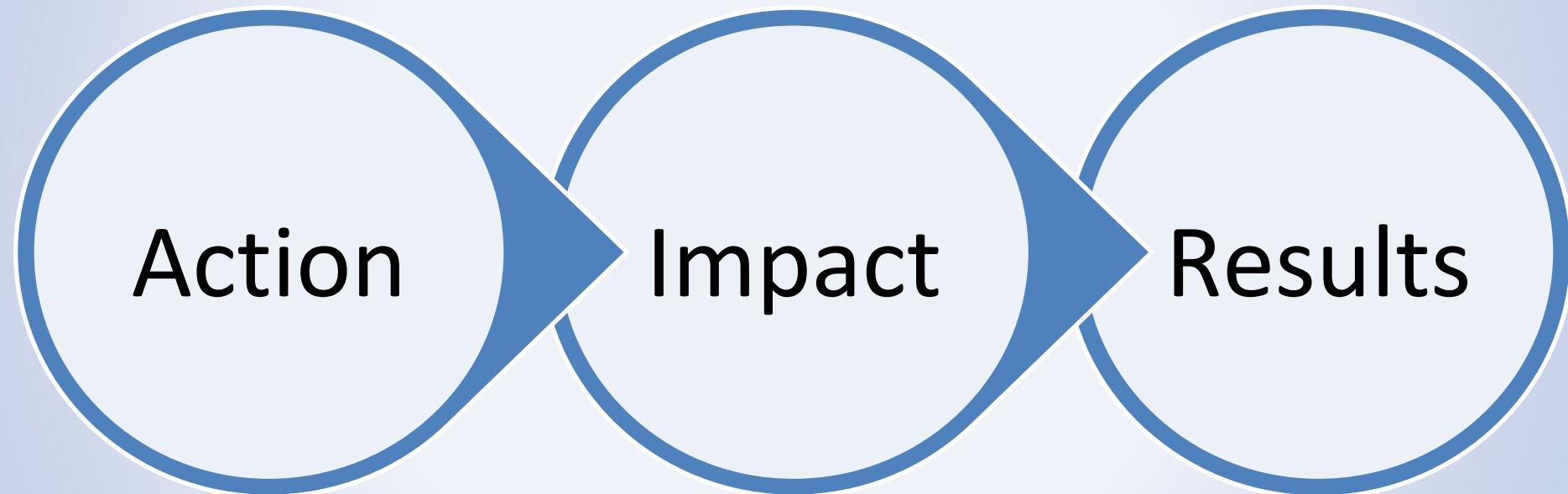
Comments Section

- Flew 350 hours, 50 sorties with 9 combat support missions. Delivered 1.8 million pounds of cargo and 600 personnel. Fulfilled Air Mobility Command taskers for European Command and Pacific Command forces

2. COMMENTS (Minimum 1 line, but limited to 6 lines)

- Flew 350 hrs/50 sorties w/9 cbt spt; dlvr'd 1.8M lbs cgo/600 prsnl--fulfilled AMC taskers f/EUCOM/PACOM forces
- Transported Army Signal Battalion; ferried 2 satellite terminals/93K lbs--extended SATCOM range/resources f/ANA
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Framing the Comments Section



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User Input/Out

Input: Action, Impact, Result

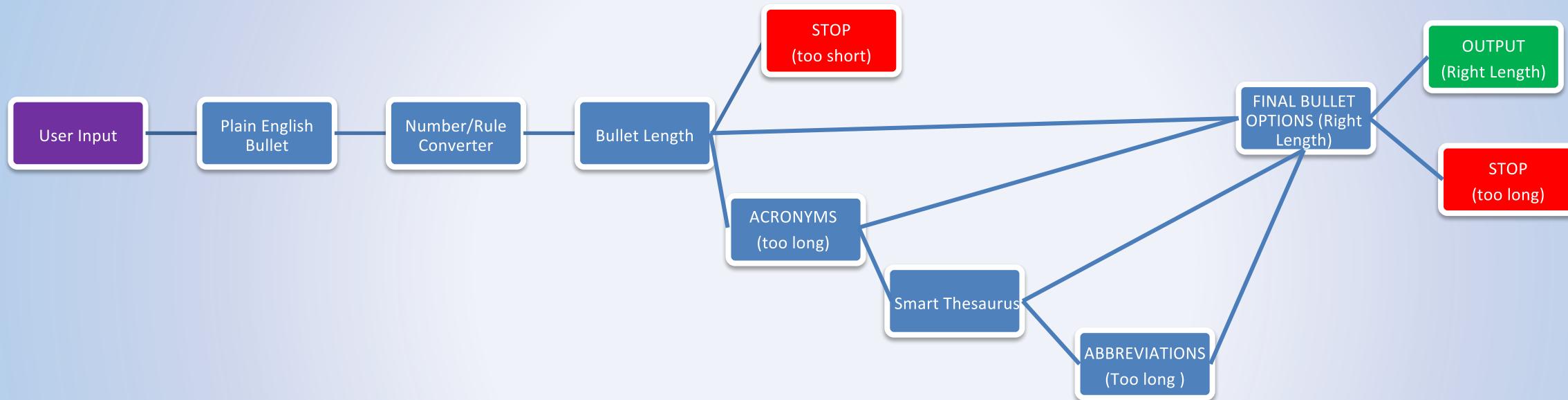
Output: Bullet using specific language requirements and recommended rating based on input compiled into proper Performance Report form

Top 3 User Requirements

- Accuracy of bullet statements
- Ease of use
- Speed of process

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Not-Rated <input type="checkbox"/>	Met some but not all expectations <input type="checkbox"/>	Met all expectations <input type="checkbox"/>	Exceeded some, but not all expectations <input type="checkbox"/>	Exceed most, if not all expectations <input type="checkbox"/>
2. COMMENTS (Minimum 1 line, but limited to 6 lines)				
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2. COMMENTS (Minimum 1 line, but limited to 2 lines)				
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Not-Rated <input type="checkbox"/>	Met some but not all expectations <input type="checkbox"/>	Met all expectations <input type="checkbox"/>	Exceeded some, but not all expectations <input type="checkbox"/>	Exceed most, if not all expectations <input type="checkbox"/>
2. COMMENTS (Minimum 1 line, but limited to 2 lines)				

Final Architecture



Functions

- ***Number converter:*** This function takes in a string as input and returns the string with all plain English numbers changed to numerals, substituting common symbols (%,\$) for the words they represent and performing basic substitutions on a string according to the AMC writer's guidance.
- ***Bullet Length:*** Function to check bullet length and determine if it's too long, too short, or just right.
- ***Acronym Function:*** Converts acronyms which gives list of possible bullets with acronyms converted
- ***Abbreviation Function:*** Replaces words with abbreviations in order to shorten bullet.
- ***Smart Thesaurus Function:*** Replaces words with synonyms or phrases in order to shorten bullet.

Learning Path

Discussed requirements and available datasets with USAF mentor (SSGT Stephen Gibson)

Clarified deliverables and objectives of the project

Learned how to create UI in python

Familiarized ourselves with natural language processing techniques

Created and integrated dictionaries with AF acronyms and abbreviations

Learned how to use word2vec to create a Smart Thesaurus



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Challenges

- Difficulty in creating bullets with the exact spacing required due varying sizes of different fonts
- Difficulty in implementing smart thesaurus due to changes in tense
- Would require very large corpus of similarly structured bullets in order to create useful Word2Vec model. This would be very difficult to obtain
- Difficulty in identifying verbs as user input is not in proper english



Future Work

- Create database of user selected bullet options in order to reinforce application
- Create a custom corpus and train a word2vec model on this corpus to better suggest synonyms
- Improve the UI and user experience

Check here for updates: https://github.com/SlicedBadge/Data-X_Project



Potential Extensions

- Rate EPR comments against peers
 - Would require significantly more data including some private information
- Applications outside of the Air Force
 - Annual reviews for companies
 - Resume writing suggestions

Check here for updates: https://github.com/SlicedBadge/Data-X_Project



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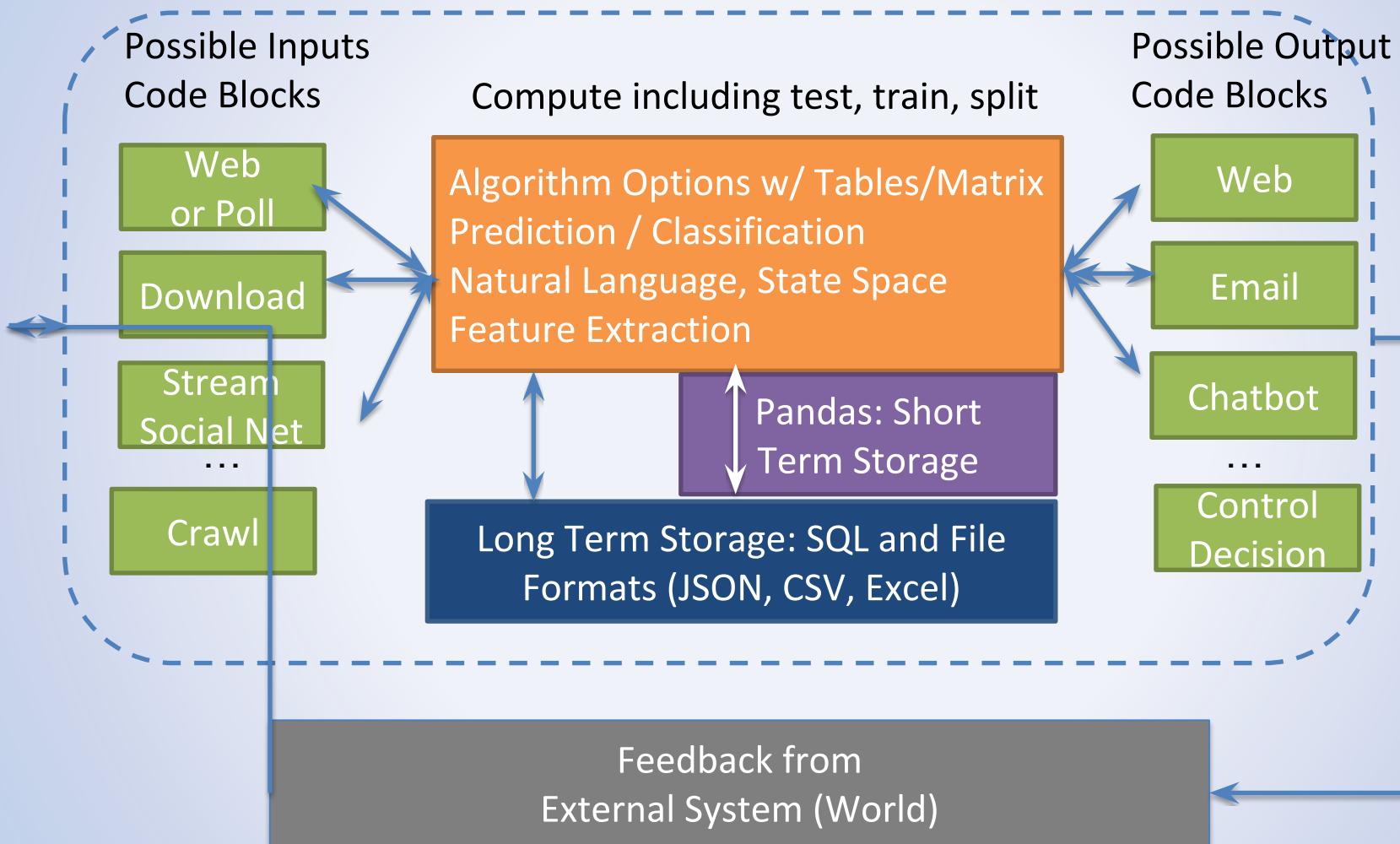
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Put Sample Architecture (SA) and /or Data Model (DM)

Replace the diagram below with your SA / DM
(it is okay to use two slides, one for SA and one for DM)



Data