Fall 2025 Brewster Ambulance Co-op Roadmap

Contacts:

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    - If you need to reach out to me, please use my below personal contacts:
        - 201-657-6474
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SQL Data Connection:

- **SQL Host IP**: 10.25.8.81
- SQL Port: 3306
- Username and password --> reach out
    - "Steve Dinsmoor" <sdinsmoor@brewsterambulance.com>
- I used the python library pymysql
    - Might want to look into SQLalchemy as this is preferred by pandas but I had some trouble with it.

Projects Overview:

1. **Automated Payroll/Timesheet Audit:** Cross-verification of clock-in/out, logs, etc.
2. **EMS Pre-Billing QA:** ML to review PCRs before billing for errors and compliance, including both discrete fields as well as NLP of unstructured narrative and other free-type text.
3. **Claims Denial Prediction:** Predict and address at-risk claims before submission.
4. **Automated Billing Code Suggestion:** NLP to improve billing code accuracy.

Roadmap:

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Below are tables, libraries, approaches, etc. that I think would be helpful in completing a project. **You may need other resources not listed below to achieve desired results.** Please take your time to explore the data tables before diving in. Feel free to use what is comfortable for you but make sure that it is accurate and documented properly.

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Automated Payroll/Timesheet Audit

- SQL Tables:
    - payroll_archive_timecard_punches
        - date_line, start_time, end_time, type, deleted (is 0), user_id, pay_period_id, total_hours, shift_assignment_id
    - sched_template_shift_assignments
        - comments, id, date_line, start_time, end_time
    - user_punch_discrepancies
    - users
        - disabled (is False), deactivated (is False), termination_date (is Blank/nan)
- Approach:
    - Group payroll_archive_timecard_punches by pay_period_id and sum total_hours by user_id.
    - Ensure start_time and end_time line up between payroll_archive_timecard_punches and sched_template_shift_assignments
        - shift_assignment_id <--> id
    - Filter for outliers in the upper bounds and lower bounds for pay_period_id and/or date_line (individual shifts).
    - NLP on sched_template_shift_assignments comments column
- Python Libraries:
    - pandas, numpy, math, spaCy/NLTK/Flair

EMS Pre-Billing QA

- SQL Tables:
    - cad_trip_legs_rev
        - leg_id, leg_date, pu_facility_id/pu_facility_name, do_facility_id/do_facility_name, ordering_facility_id/ordering_facility_name, canceled_reason, comments, etc
    - cad_trip_status
    - sched_template_shift_assignments
        - comments, id, leg_id, date_line, start_time, end_time
    - cad_payors
    - billing_trip_leg_denials
    - billing_trip_legs
    - billing_credits
    - cad_trip_leg_credits
- Approach:
    - Look for blank/erroneous fields that are necessary for a valid billing
    - Use NLP on comment columns and other free text columns
- Python Libraries:
    - pandas, spaCy, NLTK, Flair, Transformers (Hugging Face)

Claims Denial Prediction

- SQL Tables:
    - cad_trip_legs_rev
        - leg_id, leg_date, pu_facility_id/pu_facility_name, do_facility_id/do_facility_name, ordering_facility_id/ordering_facility_name, canceled_reason, comments, etc
    - cad_trip_status
    - sched_template_shift_assignments
        - comments, id, leg_id, date_line, start_time, end_time
    - cad_payors
    - billing_trip_leg_denials
    - billing_trip_legs
    - billing_credits
    - cad_trip_leg_credits
- Approach:
    - Use a classifier to identify whether a bill/trip is at risk of being denied
        - Random Forest Classifier (e.g.)
- Python Libraries:
    - pandas, numpy, scikit-learn, matplotlib

Automated Billing Code Suggestion

- SQL Tables:
    - cad_payors
    - billing_trip_leg_denials
        - billing_denial_reasons
        - billing_denial_schedule
    - billing_trip_legs
    - billing_credits
    - cad_trip_leg_credits
    - billing_credit_types
- Approach:
    - Mix of NLP and classifier (open ended approach)
- Python Libraries:
    - pandas, numpy, scikit-learn, matplotlib, spaCy, NLTK, Flair, Transformers (Hugging Face)