3 Month Inpatient Risk Predictive Model

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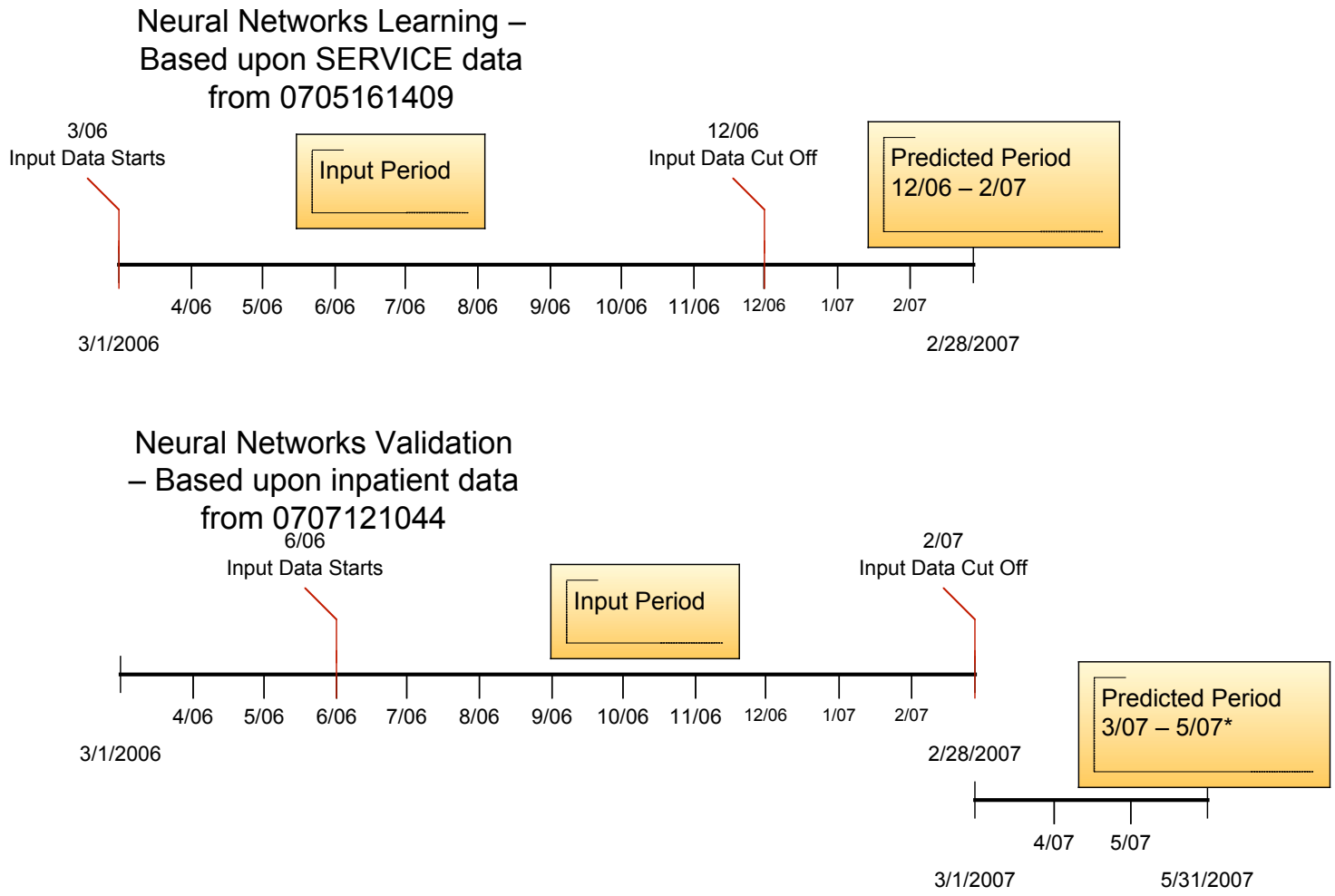
Purpose

Initial comparison between Ingenix Impact Pro predictive modeling software and Hung-Han Chen neural network predictive modeling algorithm:

- Comparison of the positive predictive value of predicting future inpatient stays within the next three months.
- Validate initial neural networks algorithms value and initiate subsequent analysis.

Analysis Periods



Type of Models

- **Ingenix Impact Pro:**
  - **Learning algorithm**: Rule-Based.
  - **Result**: Risk Score.

- **Chen's Model**:
  - **Learning algorithm**: Neural Networks.
  - **Result**: Members likely to have hospital admission in next 3 months.

Chen's Model

- **Data Source:**
  - **Member Table**: Enrollment data.
  - **Service Table**: Medical Claims, Pharmacy claims.

- **Model's Inputs:**
  - Age, Gender, ICD9, CPT4, NDC, CCS Groups etc.

Chen's Model

- **Learning Algorithm**
  - Clustering Analysis and Neural Networks
- **Validation Result**

		TRUE	FALSE	
CHEN	TRUE	1778	2708	4486
	FALSE	31127	2427814	
	Sensitivity	Specificity	PPV	
	5.40%	99.87%	39.63%	

Comparison with Ingenix's Model

- **Scenario 1**:

  Picking out same amount of True Positives.

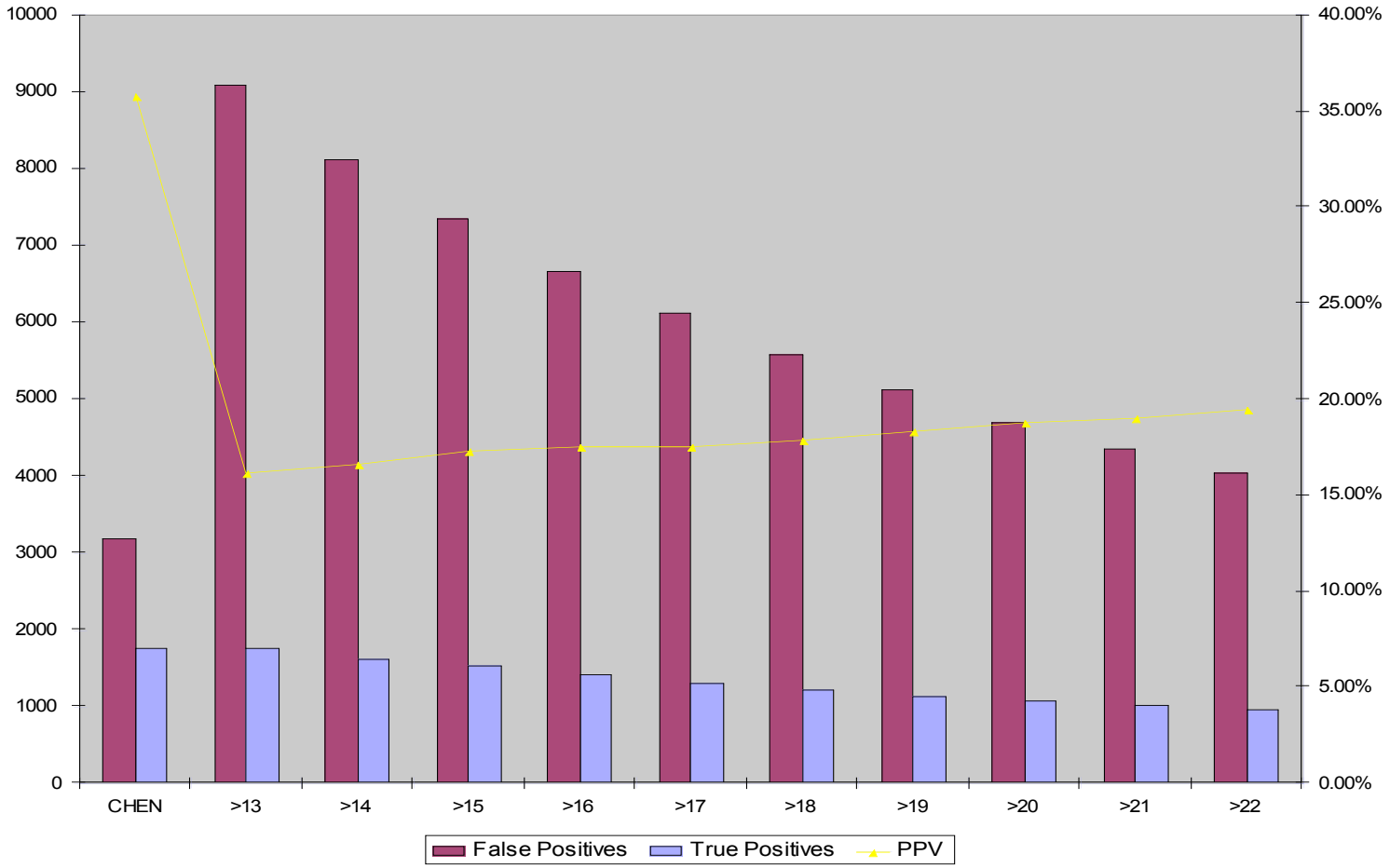
  Comparing number of False Positives.

- **Scenario 2**:

  Picking out same amount of risk members.

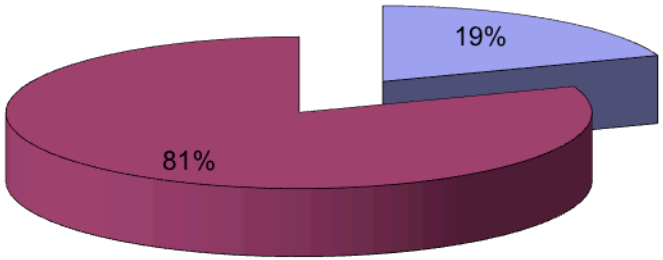
  Comparing the positive predicted value (PPV)

Scenario 1

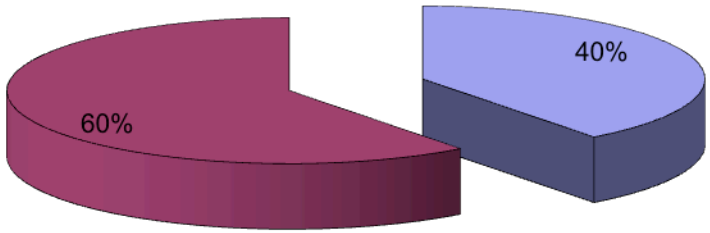

10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
40.00%
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
CHEN
>13
>14
>15
>16
>17
>18
>19
>20
>21
>22
False Positives
True Positives
PPV

Scenario 2

Ingenix, RS3m>22, TOTAL Selected = 5,015



Chen's Model, TOTAL Selected = 4,486



TRUE POSITIVE FALSE POSITIVE

Risk Score from Impact Pro

Commercial Risk Score	True Positives	False Positives	Total	Sensitivity	PPV
> 13	1,748	9,099	10,847	5.31%	16.12%
> 14	1,619	8,124	9,743	4.92%	16.62%
> 15	1,531	7,346	8,877	4.65%	17.25%
> 16	1,416	6,679	8,095	4.30%	17.49%
> 17	1,302	6,121	7,423	3.96%	17.54%
> 18	1,213	5,582	6,795	3.69%	17.85%
> 19	1,143	5,116	6,259	3.47%	18.26%
> 20	1,081	4,695	5,776	3.29%	18.72%
> 21	1,019	4,356	5,375	3.10%	18.96%
> 22	973	4,042	5,015	2.96%	19.40%
Chen's model					
5k model	1,778	2,708	4,486	5.40%	39.63%
10k model	2,412	5,913	8,325	7.33%	28.97%
15k model	3,004	10,336	13,340	9.13%	22.52%